TRANSNET

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

Scoping and Environmental Impact Assessment for the proposed Manganese Export Facility and Associated Infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara area

DRAFT EIA REPORT

CHAPTER 12:

NOISE IMPACT ASSESSMENT

Summary

A noise specialist study conducted by Safetech (Brett Williams) considered baseline monitoring data of the ambient noise levels recorded at the closest residential receptor, namely dwellings at the Tankatara Farm and Gxakra Street, Motherwell. The results show that current noise levels are in the order of 40 - 51 dB(A) during the day and during the night, which already exceeds the recommended rating levels at NSA5 for both day and night (recommended rating levels 50 dB(A) and 40 dB(A)), and at NSA1 and NSA3 for night time (recommended rating levels of 35 dB(A) during the night).

The results of the study showed that the closest residents should not be impacted by noise generated from the Manganese Ore Export Facility construction. However, construction activities at the compilation yard are anticipated to affect NSA3 located approximately 170 m west of the main railway line.

During the construction phase, the overall noise impact from the proposed development is predicted to be of **low** significance before mitigation and after mitigation.

During the operational phase, the results of the study showed that the closest residents will not be impacted by noise generated from the Manganese Ore Export Facility. The facility includes a manganese ore terminal and associated infrastructure, a compilation yard and doubling of the railway line. The noise from the rail operations is largely due to the trains on the main line running north and south through the proposed project. The noise from the shunting operations may be audible at two noise sensitive locations, but will be intermittent.

The overall noise impact associated with the operation of the proposed development is expected to be of **low to medium** significance for the Manganese Ore Export Terminal and the railway operations respectively, before mitigation. With the effective implementation of proposed mitigation measures, the residual noise impacts associated with the operation of the proposed development is predicted to be of **low** significance.

The following key mitigation measures are recommended:

- Consider the use of “brake” wagons to minimise the impact noise when coupling and de-coupling takes place.
- Relocation of the workers cottage at NSA 3 further away from the main line.
- It is further recommended that during the operational phase the ambient noise around the project and at the closest residential areas be monitored every six months, for at least 2 years, to determine the actual environmental noise impact.

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GLOSSARY OF TERMS & DEFINITIONS

Ambient noise	Totally encompassing sound in a given situation at a given time, and usually composed of sound from many sources, both near and far. **Note:** Ambient noise includes the noise from the noise source under investigation.
Annoyance	General negative reaction of the community or person to a condition creating displeasure or interference with specific activities
A-weighted sound pressure level (L_{pA} and $L_{Aeq,T}$)	A-weighted sound level L_{pA} which is the sound pressure level at specific frequencies and is given using the following equation: $L_{pA} = 10\text{Log}\left(\frac{P_A}{P_O}\right)_2$ Where: *PA* = is the root-mean-square sound pressure, using the frequency weighting network A *PO* = is the reference sound pressure (*PO* = 20 μPa). A-weighted sound pressure level is expressed in decibels dBA **Note:** For clarity in this study L_{pA} shall equal $L_{Aeq,T}$
Continuous noise	Noise that occurs continuously over a 24 hour period
dBA	The decibel is the unit used to measure sound pressure levels. The human ear does not perceive all sound pressures equally at all frequencies. The "A" weighted scale adjusts the measurement to approximate a human ear response.
Equivalent continuous day/night rating level ($L_{R,dn}$)	Equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$) during a reference time interval of 24 h, plus specified adjustments for tonal character, impulsiveness of the sound and the time of day; and derived from the following equation: $L_{R,dn} = 10Log\left[\left(\frac{d}{24}\right)10^{\frac{L_{Req,d}}{10}} + \left(\frac{24-d}{24}\right)10^{\frac{L_{Req,n}+k_n}{10}}\right]$ dB Where: $L_{R,dn}$ is the equivalent continuous day/night rating level; d is the number of daytime hours; $L_{Req,d}$ is the rating level for daytime; $L_{Req,n}$ is the rating level for night-time; K_n is the adjustment of 10 dB added to the night-time rating level.
High-energy impulsive sound	Sound from one of the following categories of sound sources: quarry and mining explosions, sonic booms, demolition and industrial processes that use high explosives, explosive industrial circuit breakers, military ordnance (e.g. armour, artillery, mortar fire, bombs, explosive ignition of rockets and missiles), or any other explosive source where the equivalent mass of TNT exceeds 25 g, or a sound with comparable characteristics and degree of intrusiveness
Highly impulsive sound	sound from one of the following categories of sound sources: small arms fire, metal hammering, wood hammering, drop-hammer pile driver, drop forging, pneumatic hammering, pavement breaking, or metal impacts of rail yard shunting operations, or sound with comparable characteristics and degree of intrusiveness
Infra sound	Sound which predominantly contains sound energy at frequencies below 10 Hz
Isopleth	Lines of equal intensity
Line source	Noise generated along a line e.g. conveyor and moving train
Low frequency noise	Sound which predominantly contains sound energy at frequencies below 100 Hz
m/s	Metres per second
NSA	Noise Sensitive Area
Point source	Noise generated at a stationary point
Reference time interval	Representative duration of time periods that are regarded as typical for sound exposure of the community within a period of 24 h:

	- Daytime: 06:00 to 22:00 - Night-time: 22:00 to 06:00
Residual noise	Totally encompassing sound in a given situation at a given time, and usually composed of sound from many sources, both near and far, excluding the noise under investigation
Specific noise	Component of the ambient noise which can be specifically identified by acoustical means and which may be associated with a specific source **Note:** Complaints about noise usually arise as a result of one or more specific noises.

CHAPTER 12: NOISE IMPACT ASSESSMENT

This chapter presents the Noise Impact Specialist study undertaken by Brett Williams from Safetech, under appointment to CSIR, as part of the Environmental Impact Assessment for the proposed Manganese ore export facility and associated infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara area.

12.1 INTRODUCTION AND METHODOLOGY

12.1.1 Scope and Objectives

The overall objective of the noise assessment is to provide a comprehensive and detailed Noise Impact Assessment (NIA) that presents and evaluates the noise impact of the proposed project.

The scope of work of the noise study includes the following:

- Conduct a desktop study of available information that can support and inform the specialist noise study;
- Identify issues and potential impacts, as well as possible cumulative impacts related to the noise aspects of the project;
- Measure the existing ambient noise at the proposed site, during both the day and night time;
- Identify the components of the project that could generate significant noise levels;
- Identify the sensitive noise receptors in the vicinity of the proposed project;
- Conduct a noise study of the predicted (future) noise impacts during construction and operation of the proposed project; and
- Identify management and mitigation actions to enhance positive impacts and avoid/reduce negative impacts respectively.

12.1.2 Terms of References

The Terms of Reference for this noise study included the following:

- A desktop review of available information that can support and inform the specialist study.
- A description of the current environmental conditions from a noise perspective in sufficient detail so that there is a baseline description/status quo against which impacts can be identified and measured i.e. sensitive noise receptors.
- Identify all noise sensitive receptors within the study area. These include the receptors within 1km of the site boundary (external to the site).
- The measurement and description of the present ambient noise levels at the proposed development site. This will be quantified by collecting noise measurement samples, in line with relevant specifications and regulations, at representative points and times during a typical weekday and weekend. Noise measurements will be collected with the use of a noise meter.
- Prediction of the future ambient noise levels due to the noise emissions during the construction and operation of the proposed project (and alternatives). This will be carried out by developing a detailed model, in line with relevant specifications and regulations, of the noise emissions during both the construction and operational phases. Where possible, measurements of noise for similar activities/operations will be undertaken and used as proxy inputs in the model.

- List and describe any applicable legislation, policies and guidelines, including the NMBM noise control by-law in preventing a disturbing noise/nuisance from occurring, e.g. SANS standards for industrial and residential/rural areas (as applicable), especially from key sources of noise.

12.1.3 Approach and Methodology

The methodology used in the study consisted of two approaches to determine the noise impact from the proposed project and associated infrastructures. These are as follows:

- A desktop study to model the likely noise emissions from the site; and
- Field measurements of the existing ambient noise at three receptors.

12.1.3.1 Desktop Study Methodology

The modelling software used to predict the noise from the proposed development was conducted by Mr Andrew Wade of Sound Research Laboratories with the use of Bruel & Kjaer Predictor™ software (version 6.20). The method used is that described in:

- ISO 9613-1: Attenuation of sound during propagation outdoors, Part 1: Calculation of sound by the atmosphere (first edition 1993.06.01); and
- ISO 9613.2: Attenuation of sound during propagation outdoors, Part 2: General method of calculation (first edition 1996.12.15).

Two models have been developed, for the day and night. It has been assumed that the operations will run continuously, so the only difference between the two models is the meteorological conditions which are as follows:

- Day: 25˚C, 60% relative humidity
- Night: 10˚C, 85% relative humidity

The above meteorological conditions are conditions which will result in the worst case sound transmission over distance.

Five Noise Sensitive Areas (refer to Table 12-1) where identified and included as receptors in the noise modelling.

12.1.3.2 Field Study

A field study was conducted during August and September 2012. Three community ambient noise monitoring points were chosen based on their proximity to the proposed development. These points are referred to as Noise Sensitive Areas (NSA's).

A number of measurements were taken by placing a noise meter on a tripod and ensuring that it was placed at least 1.2 m from floor level and 3.5 m from any large flat reflecting surface. All measurements were taken over a period of more than 10 minutes, except where indicated. The noise meter was calibrated before and after the survey. At no time was the difference more than one decibel (dB) (Note: If the difference between measurements at the same point under the same conditions is more than 1 dB, then this is an indication that the noise meter is not properly calibrated). The weighting used was on the A scale and the meter was placed on "fast", which is the preferred method as per SANS 10103:2008 The measurement and rating of environmental noise. A measurement was taken during the day and night-time. The meter was fitted with a windscreen, which is supplied by the manufacturer. The windscreen is designed so as to reduce wind noise around the microphone and not bias the measurements.

The test environment contained the following noise sources:

- Vehicular traffic;
- Birds;
- Wind; and
- Community noise such as people talking, laughing, music, dogs barking etc.

SANS 10210:2004 standard (Calculating and predicting road traffic noise) was not used in this assessment as the noise source being investigated, if complaints should occur, originates from the terminal location, conveyor rail and compilation yard and not from the traffic.

The instrumentation that was used to conduct the study is as follows:

- Rion Precision Sound Level Meter (NL32) with one third Octave Band Analyzer, Serial No. 00151075;
- Microphone (UC-53A) Serial No. 307806;
- Preamplifier (NH-21) Serial No. 13814; and
- Garmin GPS III – Pilot.

All equipment was calibrated in November 2011 according to the South African National Accreditation System (SANAS) requirements and calibration is valid for 1 year.

12.1.4 Assumptions and Limitations

The following assumptions and limitations are applicable to the noise impact assessment:

- The infrastructure layout was supplied by the client.
- The operational parameters of the train movements were supplied by Transnet. The manganese ore handling facilities will operate continuously.
- There will be four full 200 wagon trains per day arriving at the site. There will be four empty 200 wagon trains per day leaving the site. The compilation yard will thus essentially be operational for 24 hours per day, although there may be quiet periods within a 24 hour period. The tippler at the stockyard will receive 100 wagon rakes.
- The sound power levels for the operational equipment were supplied by Hatch Africa PTY Ltd from a similar ore handling operation (i.e. including similar infrastructures) and represented operational measurements.
- The impact of staff vehicles were not modelled as the project borders on the N2. The staff vehicles will leave the N2 at an off ramp before the Tankatara farm. The Motherwell residents will not be affected by the N2 traffic.

12.1.5 Sources of Information

The sources of information included a site visit, a planning session hosted at the CDC premises and information supplied by the client.

In addition, the following standards have been used to aid this study and guide the decision making process with regards noise pollution:

- GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989);
- GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989);

- SANS 10103:2008 Version 6 - The measurement and rating of environmental noise with respect to annoyance and to speech communication;
- SANS 10357:2004 Version 2.1 - The calculation of sound propagation by the Concawe method);
- ISO 9613-1: Attenuation of sound during propagation outdoors, Part 1: Calculation of sound by the atmosphere (first edition 1993.06.01);
- ISO 9613.2: Attenuation of sound during propagation outdoors, Part 2: General method of calculation (first edition 1996.12.15); and
- Nelson Mandela Bay Metropolitan Municipality: Noise Control By-Law GN 2322 March 2010.

12.1.6 Declaration of independence

The declaration of independence by the noise specialist is provided in Box 12.1 below:

BOX 12.1: DECLARATION OF INDEPENDENCE FOR NOISE IMPACT ASSESSMENT

I Brett Williams declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Manganese ore export facility, Port of Ngqura, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Name: B. Williams
Registered Occupational Hygienist

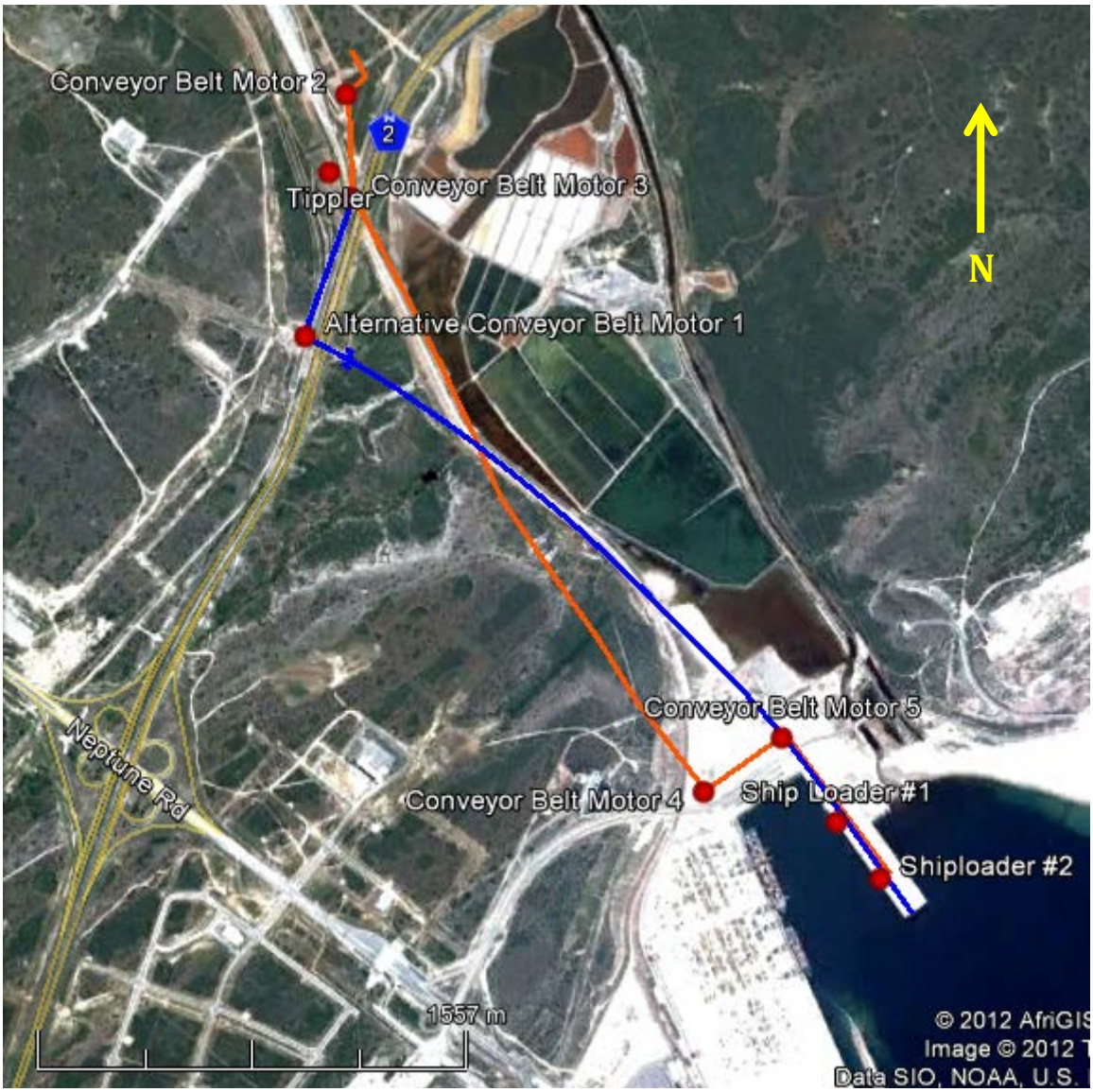
12.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO NOISE IMPACTS

A general description of the proposed project is provided in Chapter 2. This section provides additional information on aspects of the project specifically related to noise impacts.

12.2.1 Proposed Manganese Ore Export Terminal

The proposed manganese ore export terminal will operate 24 hours per day. The tippler, stacker, re-claimer, conveyors (to and from the tippler, stacker, reclaimer and shiploader) and ship loaders will generate most noise and are depicted in Figure 12.1 and 12.2 below.

Figure 12-1: Location of noise generating equipment at the proposed Mn ore terminal



Orange = preferred conveyor route
Blue = Alternative conveyor route

Figure 12-2: Location of Ship Loaders and Conveyor Routes

12.2.2 Proposed Compilation Yard

The train and wagon shunting, coupling and de-coupling will generate noise.

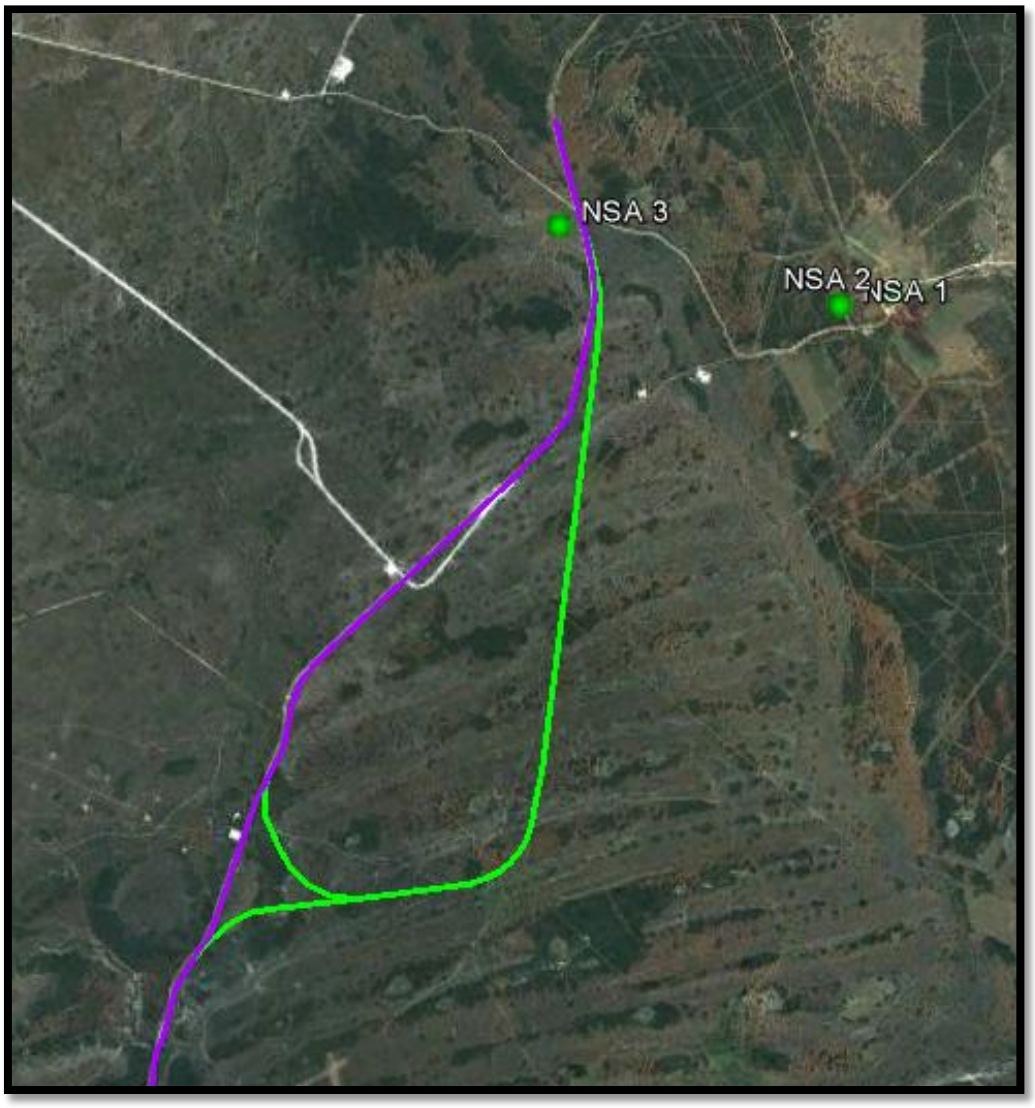


Figure 12-3: Location of the new rail lines and Compilation Yard (preferred layout) - Purple = existing main line and Green = new rail line

12.2.3 Proposed Doubling of Railway

The doubling of the railway will generate additional noise, although it is unlikely that both lines will operate at exactly the same time. The noise pollution is thus regarded as one line being operational.

12.2.4 Noise sources from the project during the Construction phase

The construction phase could generate noise during different activities such as:

- Site remediation and earthworks;
- Building construction using mobile equipment, cranes and concrete mixing equipment; and
- Vehicle use and movement

The types of vehicles and equipment that could be used on site are presented in Table 12.1 below.

Table 12-1: Types of vehicles and equipment to be used on site (Construction Phase)

Type	Description	Frequency of use	Typical Sound Power Level (dB)
Trucks	10 tonne capacity	Daily return trips to site as well as delivery of materials	95
Cranes	Overhead and mobile	Operational on site 08:00 to 17:00	109
Mobile Construction Vehicles	Front end loaders	Operational on site 08:00 to 17:00	100
Mobile Construction Vehicles	Excavators	Operational on site 08:00 to 17:00	108
Mobile Construction Vehicles	Bulldozer	Operational on site 08:00 to 17:00	111
Mobile Construction Vehicles	Dump Truck	Operational on site 08:00 to 17:00	107
Mobile Construction Vehicles	Grader	Operational on site 08:00 to 17:00	98
Stationary Construction Equipment	Concrete mixers	Operational on site 08:00 to 17:00	110
Compressor	Air compressor	Operational on site 08:00 to 17:00	100
Compactor	Vibratory compactor	Operational on site 08:00 to 17:00	110

12.2.5 Noise sources from the project during the Operational Phase

As mentioned previously, noise data/levels for the operational equipment were provided by Hatch Africa (PTY) Ltd. These are presented in Tables 12.3 and 12.4 below. Broadly it can be divided into “Continuous” and “Intermittent” sources, the latter comprising train pass-by. The Stacker, Reclaimer, Tippler, Shiploader and conveyor operation is assumed to be continuous. The shunting and main rail line is considered intermittent. A number of assumptions have been made based on past experience regarding the noise levels etc. The noise data used in the model is described in Table 12.2 to Table 12.3 below.

Table 12-2: Types of Vehicle and equipment to be typically used on site (Operational Phase) and their Sound Power Levels, dB re 10-12 W (Continuous Sources)

Description	Qty	On-Time*	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
Stacker 1	1	100	110	109	104	102	100	96	90	84
Stacker 2	1	100	110	109	104	102	100	96	90	84
Stacker 3	1	100	110	109	104	102	100	96	90	84
Reclaimer 1	1	100	110	109	104	102	100	96	90	84
Reclaimer 2	1	100	110	109	104	102	100	96	90	84
Conveyor Belt Motor 1	1	100	105	106	106	107	103	102	95	85
Conveyor Belt Motor 2	1	100	105	106	106	107	103	102	95	85
Conveyor Belt Motor 3	1	100	105	106	106	107	103	102	95	85
Conveyor Belt Motor 4	1	100	105	106	106	107	103	102	95	85
Conveyor Belt Motor 5	1	100	105	106	106	107	103	102	95	85
Tippler	1	100	111	107	107	104	102	96	92	87
Ship Loader 1	1	100	120	119	118	115	113	111	107	108
Ship Loader 2	1	100	120	119	118	115	113	111	107	108
Conveyor Belt**	1	100	82	80	78	83	84	75	68	61

* Percentage of assessment period where each item is operating at the sound power level stated

** Line source (all others are considered to be point sources)

Table 12-3: Sound Power Levels of "Intermittent" Sources, dB re 10-12 W

Description	Qty	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Branch Line in Compilation Yard (Shunting & decoupling)**	1	107	104	101	100	96	92	88	80
Measured noise level of train pass-by at NSA 3 (train at full speed)		72 dB(A) SPL re 2 x 10^{-5} Pa							

** Line source

12.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The project is situated to the east of Port Elizabeth within the Coega Industrial Development Zone (Zones 8, 9, 11 and 13), Port of Ngqura, and on the adjacent Tankatara property. The project is mostly situated in a declared industrial development zone, except for the area that extends into the Tankatara Farm. A generic description of the receiving environment is provided in Chapter 3. This section below provides specific information on the receiving environment with regards to the noise impact assessment, including the results of field monitoring.

The following noise sensitive areas (NSA's) were identified:

Table 12-4: Location of Noise Sensitive Areas

Noise Sensitive Area	South	East	Closest distance to proposed site
NSA 1 – Dwelling on Tankatara Farm	33°41'5.30"S	25°43'23.14"E	Approximately 1800m from the main rail line
NSA 2 – Dwelling on Tankatara Farm	33°41'2.06"S	25°43'38.52"E	Approximately 2250m from the main rail line
NSA 3 – Dwelling on Tankatara Farm	33°40'46.50"S	25°41'59.79"E	Approximately 170 m to the west of main railway line
NSA 4 – Coega Hotel	33°45'38.30"S	25°38'47.47"E	Approximately 2000m to the Tippler
NSA 5 - Gxakra Street Motherwell	33°47'46.92"S	25°37'12.37"E	Approximately 4800m to the Tippler

The locations of the noise sensitive areas are shown in Figure 12.4.

As indicated in Figure 12.4, the nearest noise sensitive residential premises are the houses on Gxakra Street (Motherwell), the Coega Hotel and the dwellings on the Tankatara Farm.

Motherwell is approximately 3 000m to the west of the proposed site. There is an industrial area (Markman Township) between the proposed site and Gxakra Street, and while this will be subject to some noise from the proposed project (during the construction and operational phases) it is not considered to be noise-sensitive.

The Coega hotel is approximately 800m and 1 800m west of the main rail line and the stackers respectively.

The closest dwelling (workers cottage) on the Tankatara Farm NSA3 is approximately 170m west of the main rail line. The main dwellings on Tankatara Farm are approximately 2 000m from the main rail line.

During the field visit, ambient noise measurements were collected as described above. The results thereof are presented in Table 12.5 and 12.6.

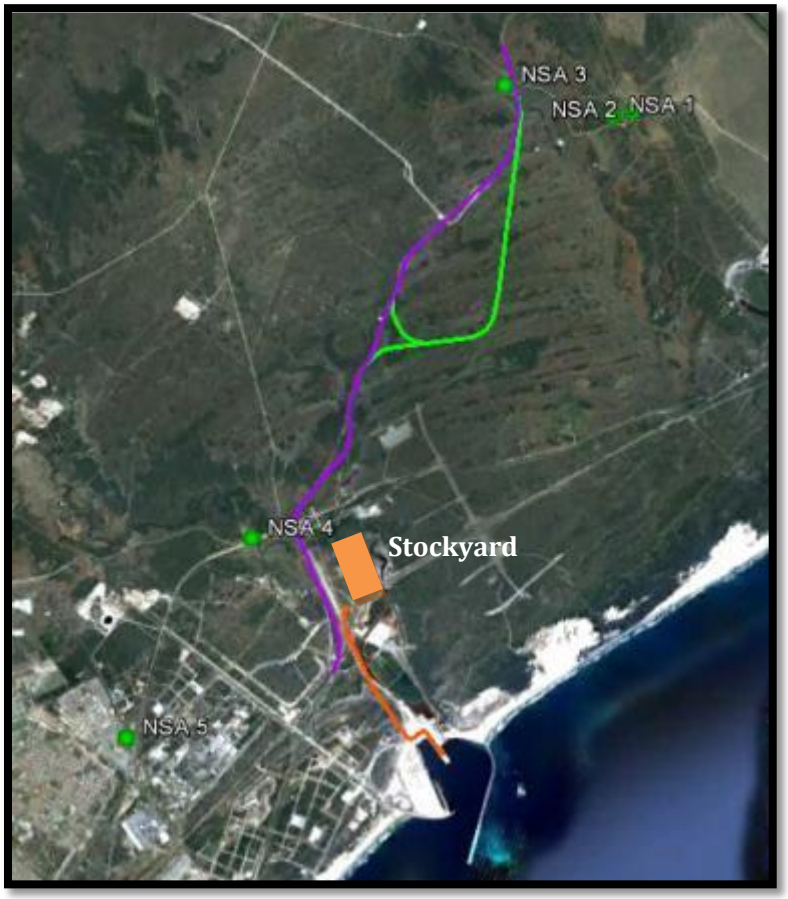


Figure 12-4: Location of Noise Sensitive Areas

Table 12-5: Ambient Noise – 12th September 2012

Location	Start Time	$L_{Aeq,T}$ dB(A)	Comments
Day NSA 5 – Gxakra Street Motherwell	13:30	51.3	Road traffic on R335 audible. Four cars passed measurement point. People talking as they passed the measurement point.
Night NSA 5 – Gxakra Street Motherwell	22h15	43.6	Road traffic on R335 audible. Two cars passed measurement point. Music from nearby house and people talking as they passed the measurement point.

Table 12-6: Ambient Noise – 27th August 2012

Location	Start Time	$L_{Req.T}$ dB(A)	Comments
Day NSA 1 – Main dwelling Tankatara	14:00	45.0	Birds, cows and one truck
Night NSA 1 – Main dwelling Tankatara	22h10	47.3	Wind noise
Day NSA 3 – Workers Cottage Tankatara	14:40	43.0	Birds
Night NSA 3 – Workers Cottage Tankatara	22h30	49.5	Wind noise

12.4 IDENTIFICATION OF KEY ISSUES

The key issues regarding the noise impacts that were identified are:

- Current noise profile for the proposed project area, by day and night;
- Noise impact during construction and operation of the proposed Manganese Ore Export Facility and associated infrastructure, by day and night; and
- Location of local sensitive human receptors (e.g. closest residential areas).

The above noise sources could impact on the local residents outside the study area, tenants within the Coega IDZ as well as persons within the facility. The noise will include audible, low frequency and infra sound. The impact noise from the tensioning of the couplings between rail cars could be a significant noise source.

The noise impact assessment will therefore address the following possible noise sources:

- Noise from the establishment of site construction areas and temporary workshops/storage areas.
- Construction equipment and vehicle noise.
- Noise from the operation of the following equipment
  - Train and wagon shunting, coupling and de-coupling
  - Conveyors at the Tippler and Ship-loader
  - Tippler, stacker and re-claimer
  - Workshops
  - Staff Vehicles

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12.5 RELEVANT LEGISLATION AND GUIDELINES

SANS 10103:2008 provides typical rating levels for noise in various types of districts, as described in Table 12.7 below.

Table 12-7: Typical rating levels for noise in various types of districts

Type of District	Equivalent Continuous Rating Level, LReq.T for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25
Suburban districts with little road traffic	50	50	40	40	40	30
Urban districts	55	55	45	45	45	35
Urban districts with one or more of the following: Workshops; business premises and main roads	60	60	50	50	50	40
Central business districts	65	65	55	55	55	45
Industrial districts	70	70	60	60	60	50

The rating levels above indicate that in rural districts (NSA 1, 2, 3 and 4) the ambient noise should not exceed 35 dB(A) at night and 45 dB(A) during the day. The rating levels above indicate that in suburban districts (NSA 5) the ambient noise should not exceed 40 dB(A) at night and 50 dB(A) during the day. The recommended levels for industrial districts should not exceed 60 dB(A) at night and 70 dB(A) during the day.

These levels can thus be seen as the target levels for any noise emissions from a nearby industrial facility. As it can be seen from the ambient monitoring results (Table 12.7), the ambient noise is already exceeding the recommended rating levels at NSA5 for both day and night (50 dB(A) and 40 dB(A) respectively for suburban districts) without any additional noise from the proposed development. The ambient noise measurement results in Tables 12.6 show that the current noise at NSA 1 and 3 is also exceeding the recommended rating levels of 35 dB(A) during the night.

Furthermore the South African noise control regulations and the local authority regulations describe a disturbing noise as any noise that exceeds the ambient noise by more than 7dB. This difference is usually measured at the complainants location should a noise complaint arise.

12.6 IMPACT ASSESSMENT AND RECOMMENDED MANAGEMENT ACTIONS

The impact of the noise pollution that can be expected from the site during the construction and operational phase will largely depend on the climatic conditions at the site. The prevailing wind is from the South West and South East.

12.6.1 Construction Phase

The impact of the construction noise that can be expected at the proposed site can be extrapolated from Table 12.1. As an example, if several pieces of equipment are used simultaneously, the noise levels can be added logarithmically and then calculated at various distances from the site to determine the distance at which the ambient level will be reached (refer to Table 12.8 and Table 12.9).

Table 12-8: Combining Different Construction Noise Sources – High Impact (Worst Case)

Description	Typical Sound Power Level (dB)
Overhead and mobile cranes	109
Front end loaders	100
Excavators	108
Bull Dozers	111
Piling machines (mobile)*	115
Total	117.7

*Impulse penalty not added to this value due to unknown underlying geology. This value is similar to the noise a ballast and regulating machine would generate

Table 12-9: Combining Different Construction Noise Sources – Low Impact

Description	Typical Sound Power Level (dB)
Front end loaders	100
Excavators	108
Truck	95
Total	111.8

The information in the two tables above can now be used to calculate the attenuation by distance. Noise will also be attenuated by topography and atmospheric conditions such as temperature, humidity, wind speed and direction, but this is ignored for this purpose as worst case conditions are calculated. Therefore, the distance calculated below would be representative of the maximum distance to reach ambient noise levels.

The table below (Table 12.10) gives an illustration of attenuation by distance from a noise source with a sound power level of 118 dB(A). These figures do not take into account terrain and other obstacle attenuation. The terminal and tippler are situated in a valley and this would therefore provide an attenuation effect.

Table 12-10: Attenuation by distance for noise generated (at 118 dB(A) during the construction phase (worst case)

Distance from noise source (metres)	Noise level dB(A)
10	90
20	84
40	78
80	72
160	66
320	60
640	54
1280	48
2560	42
3000	40

What can be inferred from the above table is that if the ambient noise level is at 43 dB(A), as at Motherwell (NSA 5) during the night, the construction noise will be similar to the ambient level at approximately 2500 metres from the source, if the noise characteristics are similar. Therefore, only receptors in very close proximity (approximately 1300m) to the proposed project will be affected by the construction noise.

Motherwell is located approximately 3 000 m away from the stockyard site and is the nearest noise sensitive receptor to it. The predicted noise level at this distance is approximately 40 dB(A) (see Table 12.10), which is below the measured ambient noise of 51.3 dB(A) in the day and 43.6 dB(A) at night.
Given the above the impact of noise generated during construction activities at the stockyard area is predicted to be of **low** significance before mitigation. The construction that occurs within the Coega River Valley will have an even lower impact due to the attenuation of the topography.

The Tankatara dwellings are approximately 10km from the main construction activities at the tippler and stockpiles. It is therefore not envisaged that the noise resulting from the construction activities at the stockyard will affect these dwellings. The construction of the first portion of the rail line to the Compilation Yard could affect NSA 3, the workers cottage on Tankatara farm located approximately 170 m to the west of the main railway line (Figure 12.3). As the construction progresses towards the main portion of the Compilation Yard, the noise will diminish. The predicted noise level closest to NSA is approximately 65 dB(A) which will be regarded as a disturbance as it exceeds the day and night ambient noise by more than 7 dB. However, the noise will be for short duration and will diminish as the rail construction progresses. It is not envisaged that the rail line construction will affect the main dwellings at Tankatara (NSA 1 and 2).

Given the above, the noise impact associated with construction activities at the compilation yard is anticipated to be of **low** significance before mitigation.

Mitigation actions for the Construction phase:

- As a precautionary measure piling should not occur at night although it is unlikely that piling will occur.

In summary, for the construction phase it is unlikely that the construction noise will impact on the noise sensitive areas. With the effective implementation of the above recommended mitigation measures, the residual noise impact associated with construction activities are predicted to be of **low** significance. It is recommended that the ambient noise around the project and at the closest residential areas be monitored twice during the construction phase.

12.6.2 Operational Phase

The modelling results are only for noise from the operational activities at the Manganese Ore Export Terminal and train operations as listed in Table 12.2 above, and exclude other noise sources around the site, such as road traffic on the N2 and the noise in the existing industrial areas, which are part of the existing ambient noise. The noise levels resulting from the operations are contained in Table 12.11 below. The figures in red font exceed/equal the recommended rating limit.

Table 12-11: Noise levels at Noise Sensitive Areas 1-5

	Day: $L_{Avq, 16 hours (0600-2200)}$			Night: $L_{Avq, 8 hours (2200-0600)}$		
	Continuous Noise Ore handling facilities	**Intermittent Noise Train shunting and coupling and main line**	SANS Rating Limit - Day	**Continuous Noise Ore handling facilities**	**Intermittent Noise Train shunting and coupling and main line**	SANS Rating Limit - Night
NSA1	14	45	45	14	47	35
NSA2	14	**47**	45	14	48	35
NSA3	14	**72**	45	14	72	35
NSA4	33	**54**	45	35	55	35
NSA5	24	37	50	26	39	40

The operational noise levels of the manganese ore handling facilities (when no trains are operational at high speed) are well below the SANS 10103 recommended levels. The noise levels when a train passes at high speed or shunting takes place are transient and will occur approximately sixteen times per day for 200 wagon arrivals, and exceed SANS 10103 recommended levels at all NSAs except for NSA 5. The results of the modelling are illustrated in Figures 12.5 to 12.8 below.

For the rail operations, the noise from the intermittent shunting operations and the main railway line operations will impact the NSA's 1, 2, 3 and 4 during the day and at night. The main railway line operation is the dominant noise source, although the shunting operations may be audible at NSA 3 and 4 due to their impulsive nature. The shunting noise would likely be classed by SANS 10103:2008 as a "highly impulsive sound". The SANS code of practice states that 12 dB(A) can be added to the predicted noise levels but these levels are still around 20 dB(A) below the main line rail operation noise levels (currently 72 dB(A) see Table 12-3) and therefore below the current noise levels. In reality, the shunting noise is a small component of the overall main line noise, although it may be audible at NSA 3 and 4. It is thus not envisaged that the shunting noise will be a significant noise source at the receptors.

Given the above, the noise impact associated with the operational activities at the Manganese Ore Export Terminal is predicted to be of **low** significance before mitigation while the impact associated with noise generated at the proposed compilation yard (operation phase) and by passing trains is anticipated to be of **medium** significance before mitigation.

Mitigation actions for the Operational Phase:

- Consider the use of "brake" wagons to minimise the impact noise when coupling and de-coupling takes place.
- Relocation of the workers cottage at NSA 3 further away from the main line.

With the effective implementation of the above recommended mitigation measures, the residual noise impact associated with operational activities are predicted to be of **low** significance. It is further recommended that during the operational phase the ambient noise around the project and at the closest residential areas be monitored every six months for at least 2 years, to determine the noise levels during normal operations.

Alternative Layouts

The alternative layouts for the proposed compilation yard and conveyor routes were not modelled (i.e. only the preferred option has been modelled). The difference in positioning (distance) between the alternatives from a sound perspective is negligible as the alternatives are not closer to the noise sensitive areas.

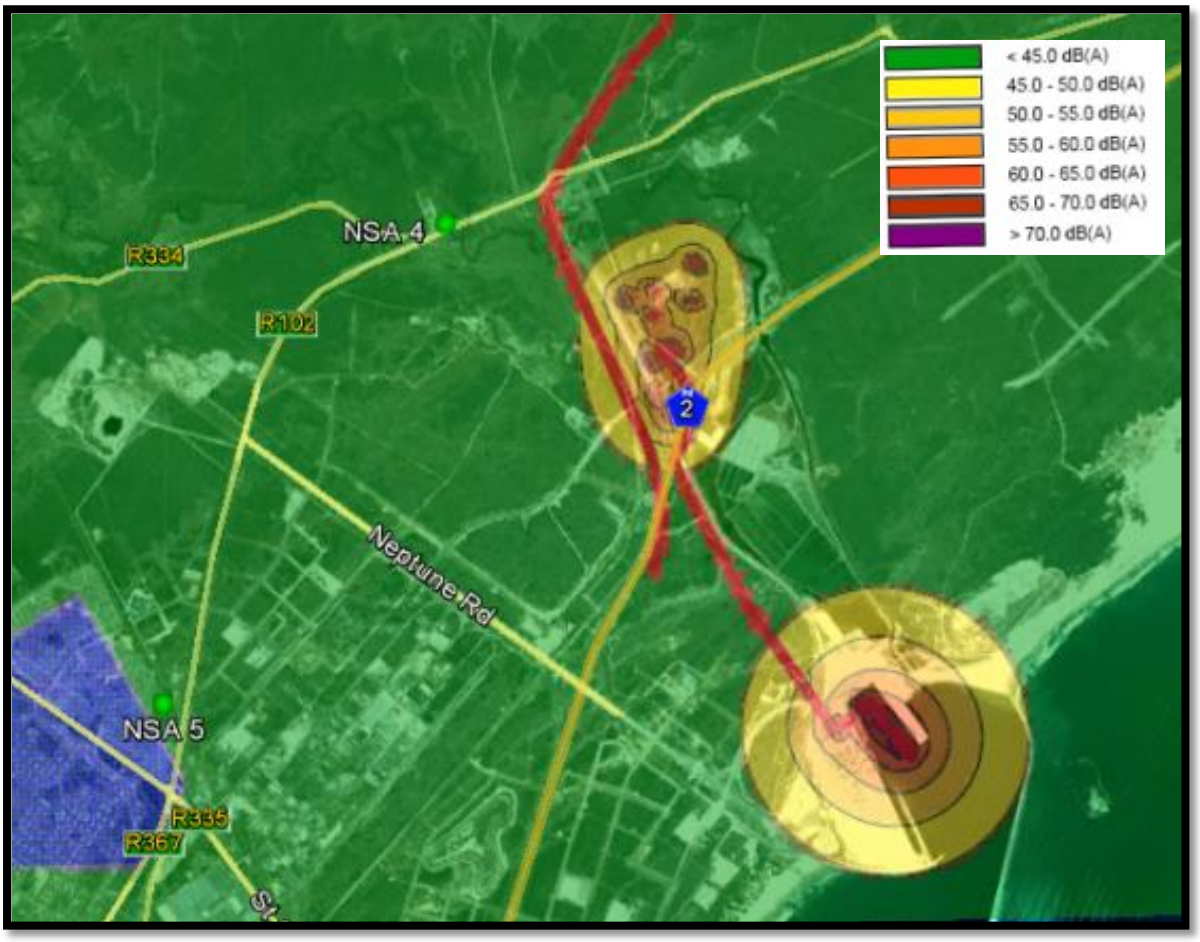

Figure 12-5: Predicted daytime noise impact resulting from Manganese Ore Handling Operations (no Trains operational)

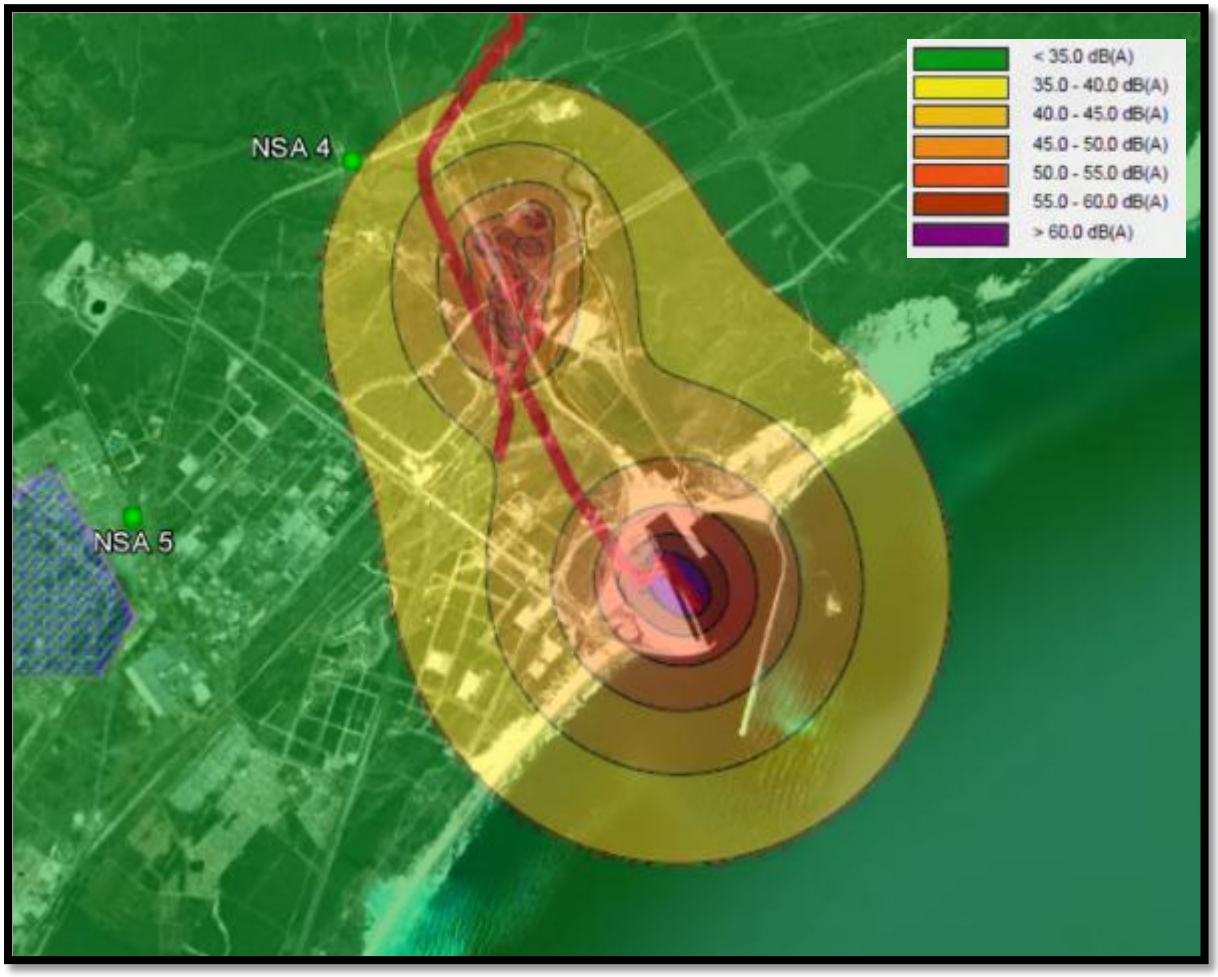

Figure 12-6: Predicted night time noise impact resulting from Manganese Ore Export Terminal (no Trains operational at high speed)

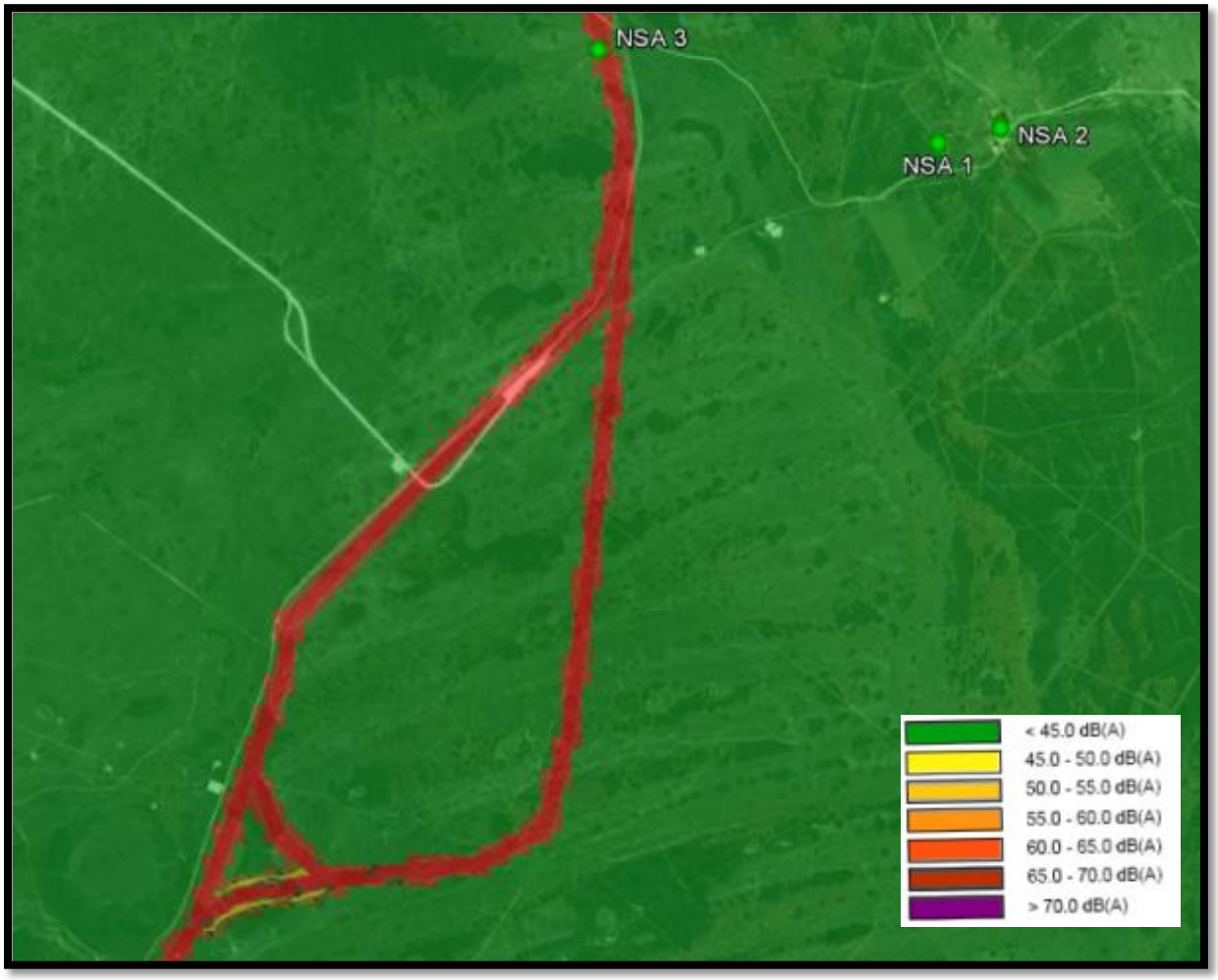

Figure 12-7: Predicted daytime noise impact resulting from the Intermittent Rail Operations at Compilation Yard

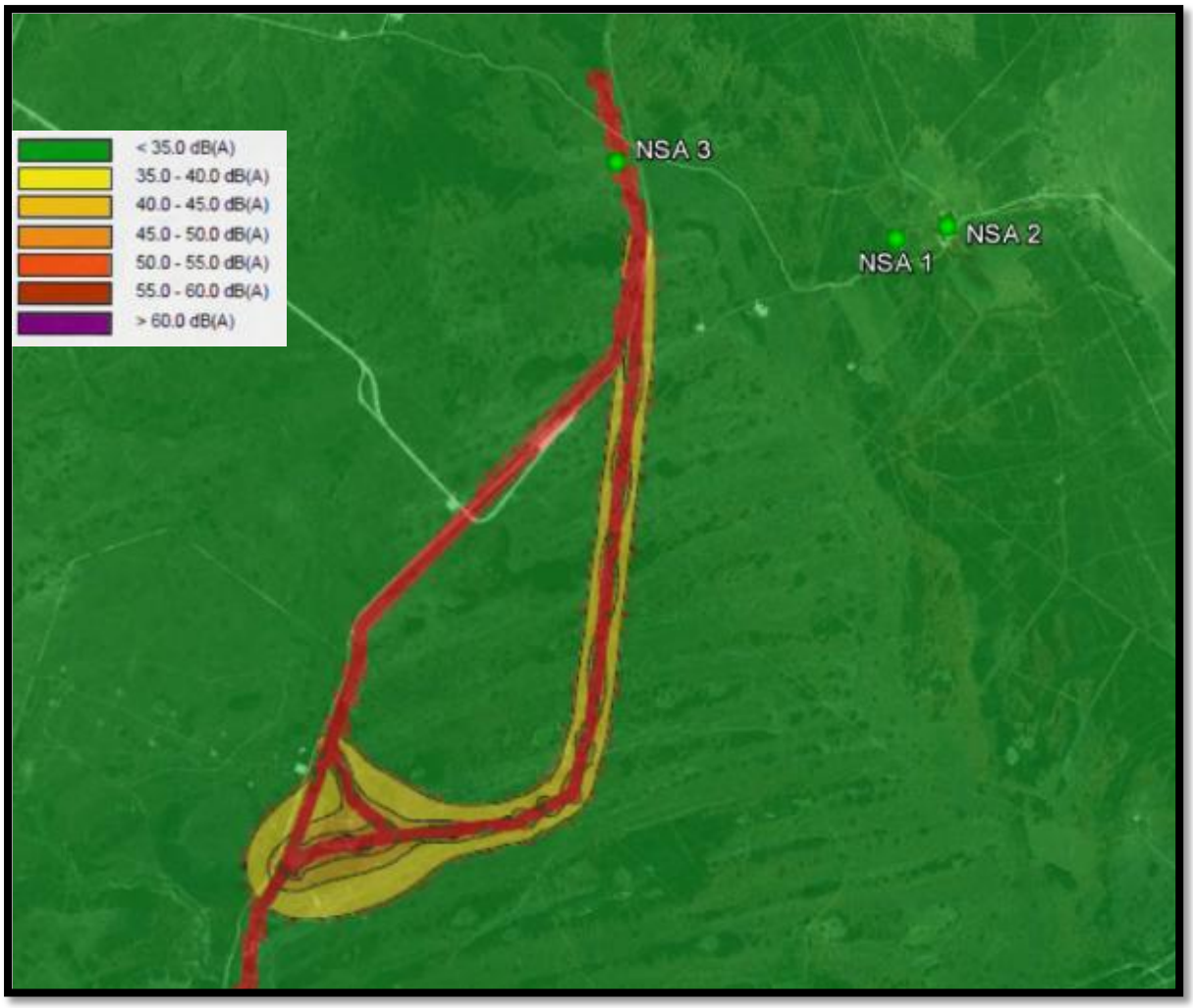

Figure 12-8: Predicted night time noise impact resulting from the Intermittent Rail Operations at Compilation Yard

12.6.3 Decommissioning Phase

The decomomissiong phase noise impacts will be the same as the construction phase impacts and will be of a short duration.

Therefore noise impacts associated with the decommissioning are anticipated to be of **low** significance after mitigation.

12.6.4 Cumulative impacts

The cumulative impact from the other noise sources in the Coega Industrial Zone is extremely difficult to predict. As the noise level at a receptor increases, the "loudest noise" will be heard. Therefore, if in future another noise source e.g. a wind farm, is located closer to the receptor and it is generating more noise energy, the wind farm noise will be heard above the other noise sources.

Noise impact assessment summary table

Construction Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Manganese Ore Export Terminal										
Impact of the construction noise on the Noise Sensitive Areas	Noisy construction activities exceeding the prescribed night time noise levels as per SANS 10103 or later should be limited to daylight hours.	**Local**	**Low**, no change in the environment is expected	**Short Term**, only for the duration of the construction (approx 24 months)	**High**	**Low**	**Improbable**, based on calculations	**Low negative**	**Low negative**	**High**, since based on actual measurements
Compilation yard (preferred and alternative)										
Impact of the construction noise on NSA 3	Noisy construction activities exceeding the prescribed night time noise levels as per SANS 10103 or later should be limited to daylight hours.	**Local**	**Medium**, disturbance to NSA 3	**Very Short Term**, only for the duration of the construction of first section of yard	**High**	**Low**	**Improbable**, based on calculations	**Low negative**	**Low negative**	**High**, since based on actual measurements
Impact of the construction noise on NSA 1 and 2	Noisy construction activities exceeding the prescribed night time noise levels as per SANS 10103 or later should be limited to daylight hours.	**Local**	**Low**, no change in the environment is expected	**Short Term,** only for the duration of the construction (approx 24 months)	**High**	**Low**	**Improbable**, based on calculations	**Low** negative	**Low** negative	**High**, since based on actual measurements

Operational Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Manganese Ore Export Terminal (Preferred and Alternative conveyor route)										
Impact of the manganese ore handling operational noise on the Noise Sensitive areas	Ambient noise monitoring around the site and at the closest residential areas should be undertaken every six months for at least 2 years to determine the actual environmental noise impact.	**Local**	**Low,** no change in the environment is expected	**Long Term**	**High**	**High**	**Improbable**, based on calculations	**Low Negative**	**Low Negative**	**High**, based on actual measurements
Rail Operations, including compilation yard (Preferred and Alternative)										
Impact of the rail operations on the Noise Sensitive areas	Ambient noise monitoring around the site and at the closest residential areas should be undertaken every six months for at least 2 years to determine the actual environmental noise impact. Consideration should be given to relocating NSA 3 (workers Cottage) Consider using brake wagons to minimise the decoupling noise.	**Local**	**Medium**, change in the environment is expected	**Long Term**	**High**	**High**	**Highly probable,** based on calculations	**Medium Negative**	**Low Negative**	**High**, based on actual measurements

Decommissioning Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Compilation Yard (Preferred and Alternative)										
Impact of the decommissioning phase noise on the Noise Sensitive Areas	Noisy construction activities exceeding the prescribed night time noise levels as per SANS 10103 or later should be limited to daylight hours.	**Local**	**Low**, no change in the environment is expected	**Short Term,** only for the duration of the decommissioning	**High**	**High**	**Improbable**, based on calculations	**Low negative**	**Low negative**	**High**, since based on actual measurements

12.7 CONCLUSIONS

Construction Phase

The results of the study showed that the closest residents should not be impacted by noise generated from the Manganese Ore Export Terminal construction. Construction activities at the compilation yard are predicted to impact NSA3 located approximately 170 m west of the main railway line. However, this impact is anticipated to be of very short duration (i.e. construction of the first northern section of the compilation yard).

Operational Phase

The noise from the rail operations is largely due to the trains on the main line running north and south through the proposed project. The noise from the shunting operations may be audible at two noise sensitive locations NSAs 3 and 4, but will be intermittent. In order to reduce the impact the following is recommended:

- Consider the use of "brake" wagons to minimise the impact noise when coupling and de-coupling takes place.
- Relocation of the workers cottage at NSA 3 further away from the main line.
- It is further recommended that during the operational phase the ambient noise around the project and at the closest residential areas be monitored every six months for at least 2 years, to determine the actual environmental noise impact.

The overall noise impact from the site (after the above mitigation measures have been considered) is expected to be of **Low Significance** for both the construction and the operational phases.

The alternative layouts for the proposed compilation yard and conveyor route were not modelled (i.e. only the preferred option has been modelled). The difference in positioning (distance) between the alternatives from a sound perspective is negligible as the alternatives are not closer to the noise sensitive areas.

12.8 BEST INTERNATIONAL PRACTICES

The recommendation made above regarding the brake wagon to mitigate noise during shunting is an international best practice and should be considered for this project.