AIR QUALITY AND NOISE IMPACT ASSESSMENT SCOPING REPORT FOR THE PROPOSED ASSEGAI GAS-TO-POWER PROJECT

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Submitted to:
Chand Environmental Consultants

October 2020

Report Details:

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Report Revisions	Date	Comments/changes
01	October 2020	Draft scoping report

Details and Declaration of Interest by the Specialist

This report has been professionally independently prepared by DDA Environmental Engineers cc, which is a South African Professional Consulting company, with a team of professionals specialising in air quality and noise pollution.

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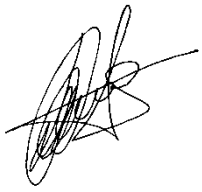
The author of this report, Demos Dracoulides, does hereby declare that he is an independent consultant appointed by Chand Environmental Consultants and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are his own.



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October 2020

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1. INTRODUCTION

Avedia Energy is proposing the development of a gas-to-power facility for direct transmission into the ESKOM electricity grid. This proposal forms part of a bid submission to be included under the Risk Mitigation IPP Procurement Programme for new generation capacity, as advertised by the Department of Mineral Resources.

The power plant is to be established on the existing Avedia Energy site near the Port of Saldanha in Saldanha Bay, Western Cape. It will consist of twelve gas-fired turbines fuelled with the piped LPG. The LPG will be supplied to the power plant from existing on-site LPG tanks and will be delivered from a very large gas carrier at the Port of Saldanha and transported via a pipeline to the existing Avedia Energy onshore terminal (previously authorized). The vessel will serve as primary storage, whilst the facility will serve as secondary storage.

The maximum power output per turbine is 32 MW. It is anticipated that a maximum of 320 MW of power generation can be achieved, taking into consideration the transmission loss.

Chand Environmental Consultants appointed DDA to provide input regarding the air pollution and noise impacts to the Scoping and Environmental Impact Assessment (EIA) phases of the proposed Assegai gas-to-power project.

This scoping report identifies the air pollution and noise-related issues and impacts that are likely to occur in the surrounding environment and delineates the approach to their assessment in the EIA phase. The main aims of the air pollution and noise scoping study are outlined below:

1.1 Air Quality

- Describe the environment that may be affected by the proposed development;
- Identify all the relevant air quality legislation and guidelines that have been considered in the preparation of the scoping report;
- Highlight potential air quality impacts that should be investigated further during the EIA process; and
- Describe the methodology to be followed for the assessment of the air quality impacts in the EIA phase.

1.2 Noise

- Describe the noise environment that may be affected by the proposed development;
- Identify all related noise legislation and guidelines that have been considered in the preparation of the scoping report and that will be utilised in the noise impact assessment;
- Highlight potential noise impacts that should be investigated further during the EIA process; and
- Describe the methodology to be followed for the assessment of the noise impacts in the EIA phase.

2. BASELINE INFORMATION

2.1 Study Area

The power plant is to be established on the existing Avedia Energy site, which is located approximately 1.5 km north of the Port of Saldanha in Saldanha Bay in the Western Cape.

The project area is located adjacent to the Saldanha Industrial Development Zone (IDZ), which is designed to attract investments, stimulate further industrial and business activities in the area and encourage international competitiveness.

The space requirement for the power plant is approximately 0.5 hectares, which is available in the northern corner of the site. Minor clearing of the area and stabilisation would be required to prepare the surface for the location of the plant.

The main existing industrial users surrounding the project site include:

- The Port of Saldanha, which handles dry bulk, breakbulk and liquid bulk, and is situated 1.5 km south of the site;
- Saldanha Steel, currently closed down, approximately 2 km northeast of the site;
- Tronox Namakwa Sands (Smelter), 5 km northeast of the site; and
- Various mineral storage facilities, further northeast.

The nearest residential area to the project site is Blouwater Bay, approximately 3 km to the southwest. Further to the southwest, there are White City and Diazville residential areas. Vredenburg is approximately 8 km to the north, and Langebaan is located approximately 11 km south of the site. The holiday resort Mykonos is about 7 km south of the site.

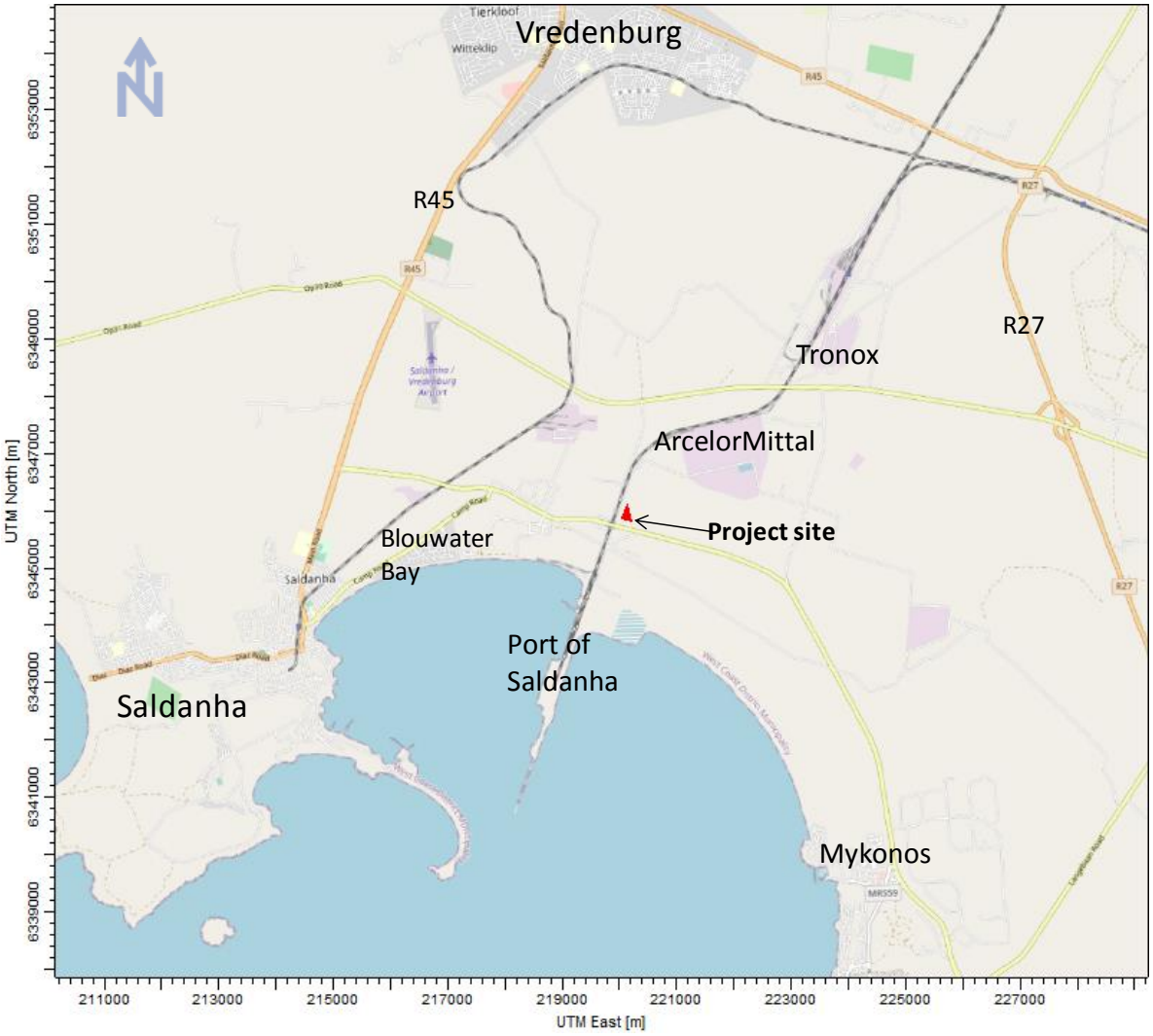

Figure 2-1. Locality Map

2.2 Meteorology

The West Coast in the Western Cape experiences a temperate, coastal, Mediterranean climate, with warm, dry summers and mild, moist winters. Rain occurs mainly from May to August. Near the coast, in summer, the temperature is between 14°C and 31°C, and in winter, the temperature is between 7°C at night and 19°C during the daytime. The average precipitation and daily maximum and minimum temperatures in Saldanha can be seen in Figure 2-2 (Meteoblue.com, 2020).

The local wind field can be seen in the wind rose depicted in Figure 2-3 further below, which was generated from the hourly data supplied by the Langebaanweg weather station for the years 2016-2020. It is evident that south-westerly winds are predominant, with an average wind speed of 3.85 m/s.

The area's meteorological conditions, as well as the wind speeds and direction frequencies, will be taken into consideration for the air pollution dispersion modelling, as well as the noise modelling in the detailed EIA phase.

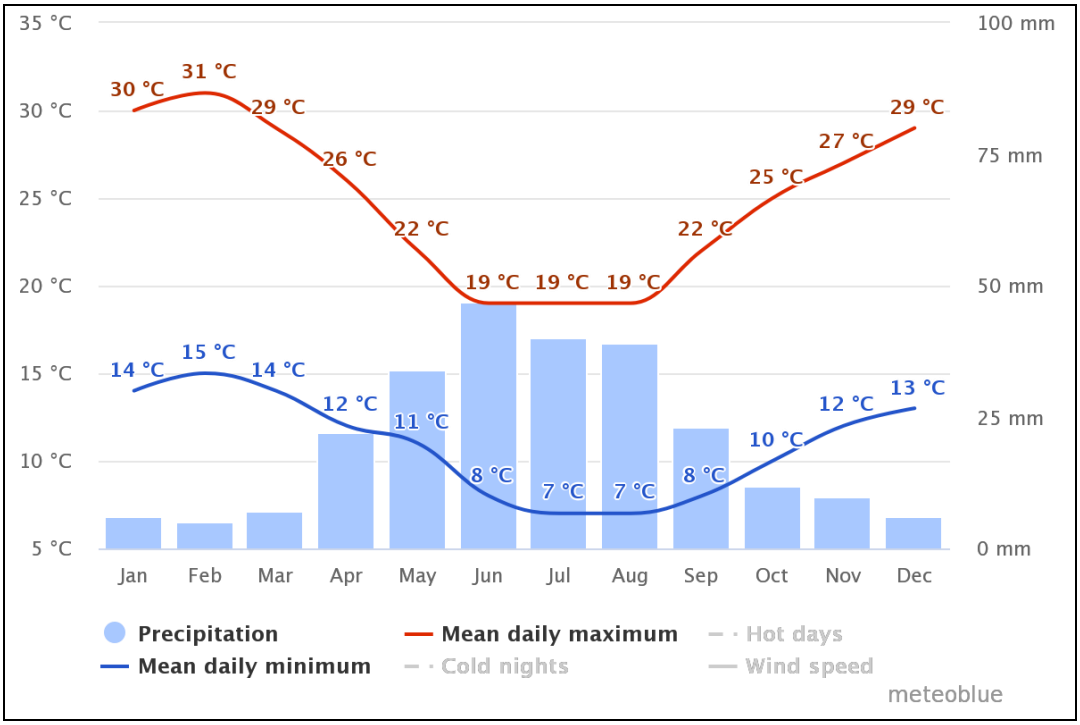

Figure 2-2. Monthly Average Precipitation and Daily Temperature

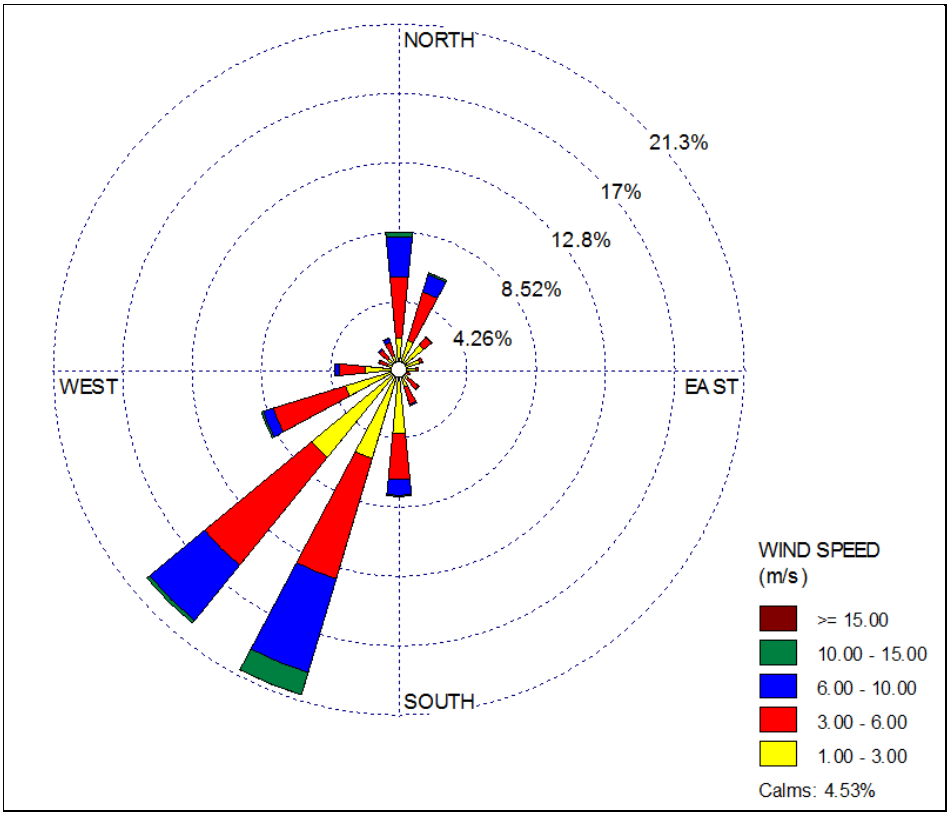

Figure 2-3. Wind Field

2.3 Existing Air Quality

The air quality in the study area is impacted by the emissions from existing industrial operations in the area, such as the Saldanha Port, a cement manufacturing plant, a chlorine, caustic soda and hydrochloric acid plant, as well as other operations the vicinity of the IDZ.

There are 2 ambient air quality monitoring stations near the project site, one of which is located in Saldanha and the other in Vredenburg. The ambient air quality monitoring data from the two stations was obtained for the period from January 2015 to September 2018.

The measured ambient concentrations for nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and particulate matter (PM_{10} and $PM_{2.5}$) are shown in Table 2-1 below. No carbon monoxide (CO) data was available.

The average NO_2 and SO_2 concentrations were 3.56 µg/m^3 and 5.13 µg/m^3 for Vredenburg and 4.10 µg/m^3 1.47 µg/m^3 for Saldanha.

The average PM_{10} hourly concentrations were 4.6 µg/m^3 and 25 µg/m^3 at Vredenburg and Saldanha Harbour respectively, but the data availability for Vredenburg was only 1%. As can be seen, the PM_{10} sensor at the Vredenburg station was not operational for most of the time.

Table 2-1. Ambient Concentrations

Station	NO_2	SO_2	PM_{10}	$PM_{2.5}$	
Vredenburg	3.56	5.13	4.60	5.74	Average hourly concentration (µg/m^3)
	45%	46%	1%	1%	Data availability
Saldanha	4.10	1.47	25.0	7.10	Average hourly concentration (µg/m^3)
	93%	86%	90%	90%	Data availability
Air quality standard (µg/m^3)	200 (1hr)	350 (1hr)	75 (24hr)	40 (24hr)	

2.4 Existing Noise Environment

The existing noise environment in the study area is primarily impacted by:

- The ore loading and offloading operations at the Saldanha Port;
- The Tronox Namakwa Sands plant;
- The various operations at the Saldanha Industrial Development area;
- The train operations on the railway line to the port; and
- The vehicular traffic on Camp Street.

The general area around the proposed site is industrial. The acceptable daytime and night-time rating levels in an industrial district are 70 dB(A) and 60 dB(A) respectively (SANS 10103:2008). The nearest residential area to the project site is Blouwater Bay, approximately 3 km to the southwest. This area is considered a suburban district, with little road traffic and acceptable daytime and night-time rating levels of 50 dB(A) and 40 dB(A) respectively.

The current daytime and night-time baseline noise environment in the various areas around the project site will be measured and evaluated in detail in the EIA phase of this project.

3. LEGISLATIVE CONTEXT AND GUIDELINES

3.1 Air Quality

3.1.1 The Constitution of the Republic of South Africa Act and NEMA

According to the South African Constitution (Act No. 108 of 1996) Section 24, everyone has the right-

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The South African legislation on environmental management and air quality is:

- The National Environmental Management Act No. 107 of 1998 (NEMA)
- The National Environmental Management Act, Air Quality Act (Act No. 39 of 2004).

The NEMA is the statutory framework to enforce Section 24 of the Constitution. It was promulgated on 27 November 1998 and commenced on 29 January 1999. It repealed a large part of the Environment Conservation Act. 1989 (Act No. 73 of 1989), which is its predecessor.

The National Environmental Management: Air Quality Act (Act No. 39 of 2004) provides measures for the prevention of pollution and ecological degradation and for securing an ecologically sustainable development, while promoting justifiable economic and social development.

The National Environmental Management Air Quality Act places the focus on the reduction of the air quality impacts on the receiving environment, instead of air quality management based on source-based control only. The Act has also transferred the responsibility of air quality management from the national government to the local authorities (district and metropolitan municipalities). Thus, local municipalities are tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities and emissions reduction strategies.

3.1.2 National Ambient Air Quality Standards

The Air Quality Act also made provision regarding ambient air quality and emission standards. The South African National Ambient Air Quality Standards (NAAQS) were published in the Government Gazette (No. 32816) on the 24th of December 2009. These standards are based on international best practices and indicate safe exposure levels for the majority of the population.

The South African Bureau of Standards also published Limits for Common Pollutants in the SANS 1929:2011, aiming at the protection of human health. The common pollutants included are sulphur dioxide, nitrogen dioxide, carbon monoxide, PM_{10}, $PM_{2.5}$, ozone, lead, benzene and dust deposition.

3.1.3 National Dust Control Regulations

On the 1st of November 2013, the Government Notice 827 - National Dust Control Regulations, published in terms of Section 53(o) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) was promulgated. The Regulations prescribe general measures for the control of dust in all areas. A standard for the acceptable dustfall rate is set out in the Regulations for residential and non-residential areas.

3.1.4 Listed Activities and Atmospheric Emissions Licence

According to Section 21 of the National Environmental Management: Air Quality Act, the Minister of Environmental Affairs is required to publish a list of activities, which result in atmospheric emissions and to establish minimum emissions standards in respect of a substance or mixture of substances resulting from those listed activities. The consequence of the listing is that in order to conduct such an activity in the Republic of South Africa, a person would require a Provisional Atmospheric Emissions License or an Atmospheric Emission License.

The Department of Environmental Affairs (DEA) has published a list of activities, which result in atmospheric emissions and the associated minimum emission standards in Gazette No. 37054 of 22 November 2013.

Gas combustion installations are listed under Category 1.0, Subcategory 1.4. The minimum emission standards for the listed activity 1.4 are shown in Table 3-1.

Table 3-1. Listed Activity 1.4: Gas Combustion Installations

Description:	**Gas combustion (including gas turbines burning natural gas) used primarily for steam raising or electricity generation.**		
Application:	**All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used.**		
Substance or Mixture of Substances		**Plant Status**	**mg/Nm³ under normal conditions of 273k and101.3 kPa**
Common Name	**Chemical Symbol**		
Particulate matter	N/A	New	10
		Existing	10
Sulphur dioxide	SO_2	New	400
		Existing	500
Oxides of nitrogen	NOx expressed as NO_2	New	50
		Existing	300

a. Reference conditions for gas turbines shall be 15% O2, 273k and 101.3kPa.

b. Where co-feeding with waste materials with calorific value allowed in terms of the Waste Disposal Standards published in terms of the Waste Act, 2008 (Act No. 59 of 2008) occurs, additional requirements under subcategory 1.6 shall apply.

The proposed power plant will need to obtain an air emission license (AEL), since it triggers the listed activity 1.4. The procedure for the license application will be included in the EIA report.

3.1.5 Regulations Regarding Air Dispersion Modelling

Air dispersion modelling is increasingly becoming an important tool in assessing atmospheric impact. This modelling needs to comply with the layout requirements, as stipulated in the Regulations Regarding Air Dispersion Modelling, which was published in the Government Notice R533 in the Government Gazette 37804, dated 11 July 2014.

The regulations prescribe the models to be used, depending on the levels of assessment, as well as the source data input and meteorological data input. Guidance is also given on the geophysical data, the modelling domain and the relevant coordinates system required for the dispersion modelling. In addition, the regulations outline the plan of study and modelling assessment reports that are to be presented to the authorities.

The above-mentioned regulation, guidelines and standards will be taken into consideration for the air quality impact assessment in the EIA phase.

3.1.6 Greenhouse Gas Emission Reporting Regulations

The National Greenhouse Gas (GHG) Emission Reporting Regulations (2016) were published under Government Notice 275 in the Government Gazette 40762 of 3 April 2017, as amended in Government Notice No. R.994 in Government Gazette No. 11174 of 11 September 2020.

It provides a list of activities for which GHG emissions must be reported to the competent authority. There are three tiers of reporting:

- Tier 1: using readily available statistical data on the intensity of processes (activity data) and default emission factors. This method is the simplest and has the highest level of uncertainty.
- Tier 2: similar to Tier 1, but uses technology or country-specific emission factors. Tier 2 methods improve the level of certainty.
- Tier 3: any methodology more detailed than Tier 2 and might include process models, direct measurements, etc. Tier 3 methods have the lowest level of uncertainty.

The gas-to-power falls under fuel combustion activities, of which GHG emissions reporting is mandatory, when the power output is greater than the threshold of 10 MW. The emissions reporting needs to follow either Tier 2 or Tier 3 method. The GHG emissions for the project will be estimated as part of the air quality impact assessment report, in the EIA phase.

3.2 Noise

3.2.1 Noise Control Regulations

In South Africa, the national Noise Control Regulations were promulgated in terms Section 25 of the Environmental Conservation Act (GN R154 in Government Gazette No. 13717 dated 10 January 1992). The responsibility of the administration of the Noise Control Regulations is at provincial level. In the Western Cape, noise is regulated by the New Noise Control Regulations put forward in June 2013, Provincial Gazette Number 7141 of 20 June 2013, which replaces the old Noise Control Regulation promulgated in 1998, Provincial Gazette Number 5309 of 20 November 1998.

The disturbing noise and noise nuisance definitions have also changed in the new regulations:

''Disturbing noise'' means a noise, excluding the unamplified human voice, which—

a) exceeds the rating level[a] by 7 dBA;
b) exceeds the residual[b] noise level where the residual noise level is higher than the rating level;
c) exceeds the residual noise level by 3 dBA where the residual noise level is lower than the rating level; or
d) in the case of a low-frequency noise, exceeds the level specified in Annex B of SANS 10103;

''Noise nuisance'' means any sound which impairs or may impair the convenience or peace of a reasonable person.

In Schedule 2 of the Noise Control Regulations, 2013, it is stipulated that a person may not:

a) cause a disturbing noise; or
b) allow a disturbing noise to be caused by any person, animal, machine, device, apparatus, vehicle, vessel or model aircraft, or any combination thereof.

In Schedule 3, regarding causing of a noise nuisance, a person may not:

- build, make, construct, repair, rebuild, modify, operate or test a vehicle, vessel, aircraft, model aircraft or any other object, or allow it to be built, made, constructed, repaired, rebuilt, modified, operated or tested, in or near a residential area;

In terms of Schedule 4 (1) of the Noise Control Regulations:

[a] The equivalent continuous level that Includes corrections for tonal character, impulsiveness of the noise and the time of day. These rating levels are indicated in columns 2 and 5 of Table 2 in SANS 10103 (see also Table 3-2).
[b] The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far, excluding the noise under investigation.

The local authority, or any other authority responsible for considering an application for a building plan approval, business license approval, planning approval or environmental authorization, may instruct the applicant to conduct and submit, as part of the application, a noise impact assessment in accordance with SANS 10328 to establish whether the noise impact rating of the proposed land use or activity exceeds the appropriate rating level for a particular district as indicated in SANS 10103, or where the noise level measurements cannot be determined, an assessment, to the satisfaction of the local authority, of the noise level of the proposed land use or activity.

In terms of Schedule 4 (3) of the Noise Control Regulations:

Where the results of an assessment undertaken in terms of sub regulation (1) indicate that the applicable noise rating levels referred to in that sub regulation will likely be exceeded, or will not be exceeded but will likely exceed the existing residual noise levels by 5 dBA or more, the applicant must provide a noise management plan, clearly specifying appropriate mitigation measures to the satisfaction of the local authority, before the application is decided; and implementation of those mitigation measures may be imposed as a condition of approval of the application.

In terms of Clause 4(4) of the Noise Control Regulations:

Where an applicant has not implemented the noise management plan as contemplated in sub regulation (3), the local authority may instruct the applicant in writing to cease any activity that does not comply with that plan, or reduce the noise levels to an acceptable level to the satisfaction of the local authority.

3.2.2 Noise Guidelines

The SANS 10103 Code of Practice provides typical ambient noise rating levels ($L_{Req,T}$) in various districts. The outdoor ambient noise levels recommended for the districts are shown in Table 3-2 below.

It is probable that the noise is annoying or otherwise intrusive to the community or to a group of persons if the rating level of the ambient noise under investigation exceeds the applicable rating level of the residual noise (determined in the absence of the specific noise under investigation), or the typical rating level for the ambient noise for the applicable environment given in Table 3-2 (Table 2 of SANS 10103).

The expected response from the local community to the noise impact, i.e. the exceedance of the noise over the acceptable rating level for the appropriate district, is primarily based on Table 5 of SANS Code of Practice 10103 (SANS 10103, 2008), but expressed in terms of the effects of impact, on a scale of NONE to VERY HIGH.

The noise monitoring of the baseline conditions within and around the site will provide the rating level of the residual noise. The noise impact during construction and operation will be determined by comparing:

- the ambient noise under investigation with the measured rating level of the residual noise (background noise levels); and

- the ambient noise under investigation with the typical rating level for the ambient noise for the applicable environment given in Table 3-2.

Table 3-2. Typical Rating Levels for Ambient Noise

Type of Districts	Equivalent continuous rating level ($L_{Req.T}$) for noise (dB(A))					
	Outdoors			Indoors, with open windows		
	Day-Night $L_{R,dn}$ [1)]	Day-time $L_{Req,d}$ [2)]	Night-time $L_{Req,n}$ [2)]	Day-Night $L_{R,dn}$ [1)]	Day-time $L_{Req,d}$ [2)]	Night-time $L_{Req,n}$ [2)]
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

Note: Daytime: 06:00 to 22:00, Night-time: 22:00 to 06:00.

1) Equivalent continuous rating levels that include corrections for tonal character and impulsiveness of the noise and the time of day.

2) Equivalent continuous rating levels that include corrections for tonal character and impulsiveness of the noise.

The above-mentioned regulations and guidelines will be taken into consideration in the EIA phase for the noise measurements, noise modelling and impact assessment.

4. NATURE AND EXTENT OF AIR AND NOISE IMPACTS

A generic illustration of a gas-to-power plant can be seen in Figure 4-1 below (Entrepose Group, 2020). For the proposed Assegai Gas-to-Power project there will be 12 gas turbines installed.

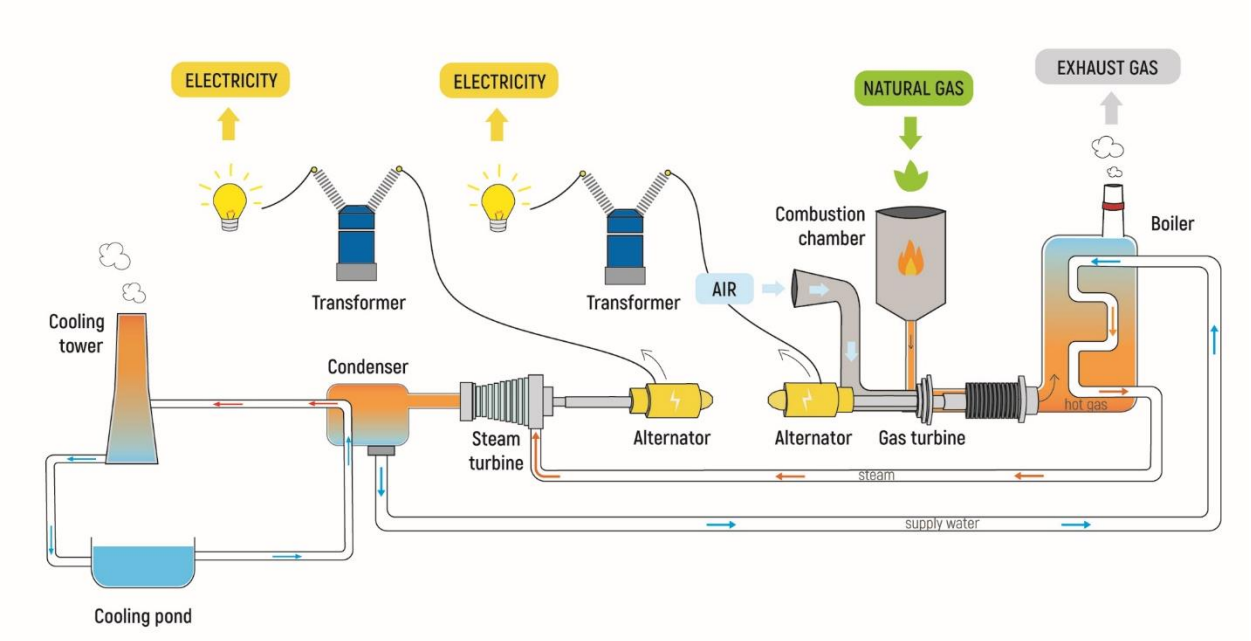

Figure 4-1. Generic Illustration of a Gas-to-Power Plant

4.1 Air Quality

4.1.1 Construction Phase

At the proposed power plant dust will be generated through the various earthworks and construction activities, such as site clearance, site levelling, building of internal roads, piling of turbine foundations, as well as the construction of concrete and turbine pedestals and buildings.

The greatest impact of the dust deposition will be limited to the immediate vicinity of the proposed site and with appropriate mitigation measures, such as dust suppression, this impact is expected to be of low significance.

The air quality impacts arising from the vehicle exhaust emissions during construction are expected to be of short duration and local extent.

Both of the above-mentioned emissions are anticipated to be small, and their relevant impacts will be assessed qualitatively in the air quality report. Appropriate mitigation measures to be included in the environmental management plan will be provided in the EIA phase.

4.1.2 Operational Phase

The main air quality sources for this project have been identified as:

- The turbine combustion emissions during the normal operational phase.
- The turbine combustion emissions during the start-up and during potential upset conditions.

The main air pollutants emitted from the gas turbines include nitrogen oxides (NOx), sulphur dioxide (SO_2), particulate matter, carbon monoxide (CO), volatile organic compounds (VOCs) including benzene and greenhouse gases, i.e. carbon dioxide and nitrous oxide (N_2O). The emissions will be quantified for a mitigated and an unmitigated scenario in the EIA phase.

The exhaust emissions during normal operations, start-up and upset conditions can have a negative impact on the air quality of the areas close to the power plant. Impacts on human health may potentially occur where residential areas exist in close proximity to the site. The duration of these impacts will be long-term, i.e. for the lifespan of the project, and their extent and significance may vary depending on the location of the affected area and the region's meteorological conditions.

The air quality and human health impacts will be addressed in detail in the EIA.

4.2 Noise

4.2.1 Construction Phase

The main noise sources during the construction of the plant will be due to the construction equipment and related activities. Noise associated with construction is generally of local extent and of short duration. The construction operations are not expected to have any significant impact on the nearest community at Blouwater Bay.

The noise in the immediately surrounding area is likely to be audible but not intrusive. The noise impact, therefore, is expected to be of low significance. These impacts will be determined and assessed in the EIA phase.

4.2.2 Operational Phase

The main noise sources have been identified as:

- The air filters;
- The gas compressors;
- The gas turbines;
- The electricity generators;
- The electricity transformers;
- The stacks;
- The heat recovery equipment; and
- The steam turbines; and

The type and noise emissions of the various equipment will be obtained from the design engineers, together with any possible noise level reduction measures applicable. A noise model will be used to calculate the resulting sound propagation around the power plant and assess the impacts for a mitigated and an unmitigated scenario. This detailed assessment will be performed in the EIA phase.

The duration of the noise impact is expected to be long-term, i.e. for the duration of the operational life of the project. The extent is expected to be local and the significance low, since the area immediately surrounding the project site is industrial. These, together with any potential cumulative impacts on the surrounding area and sensitive receptors will be evaluated in the EIA phase of the project.

5. WAY FORWARD

5.1 Air Pollution

An atmospheric impact study will be undertaken to assess the potential air quality impacts, as a result of the proposed development emissions and to make recommendations regarding mitigation measures, as well as air quality monitoring if deemed necessary.

The main aims of the air quality study will be:

- The establishment of the dispersion potential of the area, utilising localised meteorological data or data from the extended area.
- The establishment of an emissions inventory for PM_{10}, SO_2, NO_x, CO, CO_2, N_2O and VOCs in which emissions from all project-related activities are quantified under the following conditions:
    - Under normal operations; and
    - During start-up and upset conditions.
- For those pollutants where in-stack measurement data is available, this1 will be utilised in the establishment of the emissions inventory. For the other air pollutants, applicable emissions factors from the international literature or similar projects will be used.
- The prediction of ambient air pollutant concentrations, with the use of dispersion modelling for each of the above-mentioned scenarios. Three years of hourly meteorological data from the Langebaanweg weather station will be utilised for the dispersion modelling.
- The assessment of the impacts based on comparisons of the resulting concentrations against the national ambient air quality standards and guidelines. The cumulative effects of existing air pollution levels will be taken into consideration in the impact assessment if relevant information is available.
- The identification of emission reduction opportunities and cost-effective emission abatement strategies. The operational scenarios will include a mitigated and unmitigated impact assessment.
- Provision of recommendations regarding the optimum air quality monitoring positions and the establishment of an air quality monitoring programme.

5.1.1 Atmospheric Impact Assessment Methodology

The emission inventory will be based on the internally available emission factors for gas-fired turbines, as well as information from the design engineers. Depending on data availability, other significant emission sources in the area will also be included in the emissions inventory. The construction emissions will be estimated by utilising internationally accepted emission inventory methodologies for construction operations.

The selected proposed air pollution dispersion model is the new-generation AERMOD View, which is a complete and powerful package incorporating into one interface the popular preferred U.S. EPA model: AERMOD. This model is used extensively worldwide and in South Africa to assess air pollution

concentrations and dust deposition from a wide variety of industrial sources and is appropriate for point, area, volume, flare and line sources.

Different emission scenarios will be generated for the construction and operational phases of the project. The local meteorological conditions will be parameterised for input into the model and the worst-case scenario maximum concentrations will be generated for each identified emission scenario.

The modelled ambient concentrations, depending on data availability, will also take into consideration any possible cumulative effects due to existing sources. These results will be compared against South African Air Quality Standards and international guidelines.

Any assumptions utilised and limitations which may affect the study findings will be evaluated and outlined in the detailed air quality impact study.

5.2 Noise

The noise impact assessment study of the EIA phase will:

- Determine the existing noise levels around the perimeter of the site, as well as at the noise-sensitive receptors in the area.
- Create a representative noise model in order to simulate the sound propagation and determine the resulting noise levels due to the project.
- Determine the noise impacts based on South African legislation and international guidelines.
- Identify potential noise emission reduction opportunities and cost-effective emission abatement strategies.
- Provide recommendations regarding the optimum noise monitoring positions and the establishment of a noise monitoring programme.

5.2.1 Noise Study Methodology

The baseline noise study will be based on noise measurements, in accordance with the Western Cape Noise Control Regulations and the SANS 10103: 2008 and SANS 10328:2008 Codes of Practice.

An initial assessment of the site will be performed, in order to determine the optimum positioning of the noise measurement points. These measurements will be performed during the day- and night-time, in order to generate results comparable to the legislation and the Codes applicable at the time of the survey.

All measurements will be A-weighted equivalent sound pressure levels obtained with I-time weighting or those required in accordance with the applicable standard. The occurring maximum and minimum levels during the measurement period will also be recorded. Abnormal disturbances, such as loud noise generation nearby or sudden noise bursts that affect the measurement, will be discarded.

The internationally recognised 3-dimensional software CADNAA for predicting noise contours from all the noise sources will be utilised in the noise study. This will enable various scenarios to be realised and tested to optimise layouts of potentially noisy activities, the plant and equipment and determine the resulting noise levels in the area.

The model utilises standard and user-defined noise profiles for various equipment and terrain profiles as input. The profile and noise calculation algorithms are based on several guidance documents that address atmospheric absorption and noise attenuation, in accordance with SANS 10357:2004. The calculation of sound propagation by the Concave method and ISO 9613-2:1996.

The main output from the model will be noise exposure contours that are used for land use compatibility mappings and impact assessment. The model supports 16 different predefined noise metrics, such as A-Weighted and C-Weighted. The noise levels at specific sites, such as dwellings or other noise-sensitive locations will also be predicted. For these grid points, the model reports detailed information for the analyst to determine the noise levels at each location.

The predicted noise levels will then be compared against current legislated limits, as well as local and international guidelines, in order to quantify the noise impacts in the surrounding areas. Based on the expected locations with maximum impact, an appropriate noise monitoring programme will be proposed, in order to ensure future compliance with the noise control regulations.

Any assumptions and limitations during the noise measurements will be stated in the baseline environment assessment. Similarly, all assumptions utilised in the noise modelling and limitations in the available information, which may affect the study findings, will be evaluated and outlined in the detailed noise impact study.

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