



Draft EMPr

14/12/16/3/3/2/827

**PROPOSED COMBINED CYCLE GAS TURBINE (CCGT)
POWER PLANT ON A PORTION (± 130 ha) OF REMAINING
EXTENT OF FARM LANGEBERG 188, MALMESBURY RD,
SALDANHA BAY LOCAL MUNICIPALITY, WEST COAST
DISTRICT MUNICIPALITY, WESTERN CAPE PROVINCE**

Short name: Vortum Thermal Power Plant

8 April 2016

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Proposed Combined Cycle Gas Turbine (CCGT) Power Plant on a portion (± 130 ha) of the Remaining Extent of Farm LANGEBERG 188, Malmesbury RD, Saldanha Bay Local Municipality, West Coast District Municipality, Western Cape Province

Short name: Vortum Thermal Power Plant

April 2016

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ABBREVIATIONS AND ACRONYMS

AGES (Pty) Ltd	Africa Geo-Environmental and Engineering Services
BID	Background Information Document
CCGT	Combined Cycle Gas Turbine
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
DAFF	Department of Agriculture, Fisheries and Forestry
DEA	Department of Environmental Affairs
DEADP	Western Cape Department of Environmental Affairs and Development Planning
DoE	Department of Energy
DWS	Department of Water & Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environment Impact Assessment Report
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
GUMP	Gas Utilisation Master Plan
HRSG	Heat recovery steam generator
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resources Plan
kV	kilovolt
LNG	Liquefied Natural Gas
MW _{el}	Mega Watt electrical
MW _{th}	Mega Watt thermal
NEMA of 1998	National Environmental Management Act - Act No. 107
NERSA	National Energy Regulator of South Africa
NG	Natural Gas
NHRA	National Heritage Resources Act - Act no. 25 of 1999
Nm ³	Normal cubic meter of gas (m ³ of gas @ 0 °C and 1 atm)
NWA	National Water Act - Act no. 36 of 1998
OCGT	Open Cycle Gas Turbine
PoS	Plan of Study
Property / Project site	Remainder of the Farm LANGEBERG 188, Malmesbury RD
RFP	Request for Qualification and Proposals for New Generation Capacity under the IPP Procurement Programme
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
TJ	Tera Joule
toe	tonne of oil equivalent
UPS	Uninterruptible Power Supply
Vortum Energy	Vortum Energy (Pty) Ltd (applicant)
WC DEA&DP	Western Cape Department of Environmental Affairs and Development Planning

1. GENERAL INFORMATION

VORTUM ENERGY (PTY) LTD (Reg. No. 2013/088004/07) is proposing the establishment of an energy generation facility (thermal power plant) with associated infrastructure and structures on **a portion (±130 ha) of the Remaining Extent of the Farm LANGEBERG 188, Malmesbury RD (861ha)**, located in the **Saldanha Bay Local Municipality, West Coast District Municipality, Western Cape Province**.

The project site is located 9 km North-East of the Port of Saldanha Bay, West of the regional road R27, in an area excluded from the provisions of the Subdivision of Agricultural Land Act (Act 70 of 1970) and **already earmarked for Industrial Uses**.

Site location - Surveyor-general 21 digit site code:

C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	8	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

The energy generation facility will be a thermal power plant with a **maximum generation capacity up to 1200 MW_{el}** (electrical rated power).

The name of the facility will be **VORTUM THERMAL POWER PLANT**.

The proposed thermal power plant will be a **Combined Cycle Gas Turbine (CCGT) power plant**, to be fuelled with natural gas imported by means of one or more gas import facilities (e.g. LNG Import Terminal(s) and/or new gas pipeline(s)).

The Department of Energy and Transnet are investigating the feasibility of new gas pipelines and LNG Import Terminals, in order to import natural gas from new offshore gas fields and/or from other countries (e.g. Mozambique). A public participation process in terms of the EIA Regulations (2014) is currently being conducted by Environmental Resources Management Southern Africa (Pty) Ltd for LNG Import facilities as well as a Floating Power Plant in Saldanha Bay. The securing of new energy sources, like natural gas, has become high priority for the Government, considering that the current energy production is not able to meet the increased energy demand of the Country. This leads to frequent electricity shortage and fluctuations in supply ("load shedding"), detrimental to the economic development of South Africa.

Should natural gas not be available at the time of the commissioning of the Vortum Thermal Power Plant, the proposed facility will be fuelled with **liquid fuel** (diesel or other types of liquid fuels) until natural gas is available. Gas turbines can be fuelled either with natural gas or liquid fuel. Due to the current electricity shortage and the urgent need for new power generation units in the Country, the Vortum Thermal Power Plant will operate:

- as an **Open Cycle Gas Turbine (OCGT) power plant as a first phase;**
- in the **second phase**, with the "closure" of the open cycle (by means of steam turbine units added to the gas turbine units), as a **Combined Cycle Gas Turbine (CCGT) power plant**.

The construction timeframe of an OCGT plant is notably shorter than that of a CCGT plant.

The developed area (footprint) will be **up to 60 hectares**.

The Vortum Thermal Power Plant will consist of the following components:

- **up to 5 gas turbine units** with a capacity **up to 400 MW_{el} each** and an **overall capacity up to 800 MW_{el}**;
- **heat recovery steam generators (HRSG)** to generate steam;
- **up to 5 steam turbine units** with a capacity **up to 400 MW_{el} each** and an **overall capacity up to 400 MW_{el}**.
- up to 5 electrical generators, which convert the mechanical energy of the gas and steam turbine units to electricity;
- gas compressors and combustors with Dry Low NO_x (DNL) technology, for the gas cycle;
- water pumps and pressurisers, for the steam cycle;
- dry cooled condensers, in order to condensate the steam to water;
- a control room with offices;
- warehouses;
- up to 6 fuel (diesel) storage tanks of 5,400 m³ each, required during the first phase of the project, until gas is available;
- **an underground liquid fuel (diesel) pipeline** approximately 12 km long and with a diameter up to 0.4 m and a throughput capacity up to 2327 m³/day, from the Saldanha Port to the on-site fuel storage tanks;
- **an underground natural gas pipeline** approximately 12 km long and with a diameter up to 0.4 m and a throughput capacity up to 3171 ton/day, from the Saldanha Port to the project site;
- one on-site high voltage substation, with 132 kV and 400 kV step-up transformers and 132 kV and 400 kV bus bars, protections and metering;
- **up to three 400 kV power lines**, approximately 29 km long, for the connection to the Eskom Aurora substation;
- **up to two 132 kV power lines (double circuits)**, approximately 6 km long, for the connection to the Eskom Blouwater substation;
- a water supply pipeline, 5.3 km long with a diameter up to 0.2 m and a throughput capacity up to 1100 m³/day, connected to the planned municipal water network;
- water tanks with an overall storage capacity up to 10,000 m³;
- firefighting system;
- water treatment system (Reverse Osmosis Plant);
- compressed air system;
- exhaust system with flares, for exhaust gas.

The overall installed capacity will be **up to 1200 MW_{el} during the second phase (CCGT plant)** and **up to 800 MW_{el} during the first phase (OCGT plant)**.

The Vortum Thermal Power Plant will deliver energy:

- to the **Eskom AURORA main transmission substation via up to three 400 kV power lines approximately 29 km long (2 km within the project site);** and
- to the **Eskom BLOUWATER distribution substation via up to two 132 kV power lines approximately 6 km long (2 km within the project site).**

The proposed power line corridor runs parallel to existing Eskom high-voltage power lines and will cross through the following properties:

- Portions 1 (Remaining Extent) and 9 (Remaining Extent) of the Farm LANGEBOER 187
- Portions 1 (Remaining Extent) and Remainder of the Farm UYEKRAAL 189
- Remainder of the Farm EVERTS HOPE 190
- Farm WASCHKLIP 183
- Remainder of the Farm ZOUTEKUYLEN 179
- FARM 1162
- Portions 3 and 8 of the Farm LANGVERWACHT 178
- Remainder of the Farm ADJOINING SPRINGFONTEIN 174
- Portions 3 and 4 of the Farm DRIEHOEKS FONTEIN 176

Power line corridor - Surveyor-general 21 digit site codes:

C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	7	0	0	0	0	1
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	7	0	0	0	0	9
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	9	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	9	0	0	0	0	1
C	0	4	6	0	0	0	0	0	0	0	0	0	1	9	0	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	3	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	9	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	1	1	6	2	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	8	0	0	0	0	3
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	8	0	0	0	0	8
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	4	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	6	0	0	0	0	3
C	0	4	6	0	0	0	0	0	0	0	0	0	1	7	6	0	0	0	0	4

The power line study corridor is depicted in the drawing of the Annexure A of the EIA:

- **VRTHPP_00.1_r1 Locality Map and Power Line Study Corridor**

Eskom is the entity which should assess the connection solutions described in this Scoping Report. Eskom also coordinates the necessary liaising between Vortum Energy, Eskom Transmission, Eskom Distribution and Eskom Land & Rights.

All or part of the infrastructure required for the connection may be owned and/or operated by Eskom Distribution and this will depend on the Eskom grid code in relation to the IPP's (Independent Power Producers) and on the Connection Agreement to be finalized prior to or simultaneously with the conclusion of the

PPA (Power Purchase Agreement) in respect of the options of retaining ownership of the connection works once completed.

The **first phase** of the project will be an **Open Cycle Gas Turbine (OCGT) power plant fuelled by diesel** (or other type of liquid fuel, such as LPG), to be operated as Peak Power Plant, i.e. few hours per day, during the peak hours of the electricity demand, when required by the grid to fulfil the customer's requirement.

During the first phase of the development (OCGT power plant fuelled with liquid fuel), liquid fuel will be imported (in liquid form) from the oil pier of the Port of Saldanha and delivered to the Vortum Thermal Power Plant by means of an **underground pipeline approximately 12 km long and with a throughput capacity up to 2327 m³/day and a diameter up to 0.4 m.**

During the earlier stage of the first phase of the project, **oil tank trucks** will be used until the pipeline is built. Liquid fuel will be loaded to **on-site storage tanks**, while gas (second phase) won't require any storage facility.

During the second phase of the development (CCGT power plant fuelled with liquid natural gas), natural gas will be imported (in gas form) from the planned location of the LNG Import and Re-gas Facility proposed by the DoE and delivered to the Vortum Thermal Power Plant by means of an **underground pipeline approximately 12 km long and with a throughput capacity up to 3171 ton/day and a diameter up to 0.4 m.**

Two alternative routes have been proposed for the liquid fuel pipeline, as indicated in the drawing of the Annexure A of the EIA:

- **VRTHPP_00.2_r0 Access road and fuel pipeline alternatives 1 & 2**

The alternative routes may cross through the following properties (please refer to the map enclosed to the Annexure A):

- Portions 1 (Remaining Extent) and 9 (Remaining Extent) of the Farm LANGEBOER 187
- Portion 1 (Remaining Extent) of the Farm UYEKRAAL 189
- Portions 2, 9 and Remainder of the Farm YZERVARKENSRUIG 129
- Portions 1, 2, 7 and Remainder of the Farm HOPEFIELD 195
- Portion 13 of the FARM 127
- Portion 7 of the Farm PIENAARS POORT 197
- FARM 1185

Fuel pipeline route (Alternatives 1 & 2) - Surveyor-general 21 digit site codes:

C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	7	0	0	0	0	1
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	7	0	0	0	0	9
C	0	4	6	0	0	0	0	0	0	0	0	0	1	8	9	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	2	9	0	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	2	9	0	0	0	0	2
C	0	4	6	0	0	0	0	0	0	0	0	0	1	2	9	0	0	0	0	9

C	0	4	6	0	0	0	0	0	0	0	0	0	1	9	5	0	0	0	0
C	0	4	6	0	0	0	0	0	0	0	0	0	1	9	5	0	0	0	1
C	0	4	6	0	0	0	0	0	0	0	0	1	1	9	5	0	0	0	2
C	0	4	6	0	0	0	0	0	0	0	0	0	1	9	5	0	0	0	7
C	0	4	6	0	0	0	0	0	0	0	0	0	1	2	7	0	0	0	3
C	0	4	6	0	0	0	0	0	0	0	0	0	1	9	7	0	0	0	7
C	0	4	6	0	0	0	0	0	0	0	0	1	1	8	5	0	0	0	0

The Western Cape Department of Transport and Public Works indicated in their letter dated 6 July 2015 that no direct access will be permitted to the development area from either Trunk Road 77/1 (TR 77/1) or Trunk Road 85/1 (TR85/1) or the so-called R27. The Department indicated that access to the development area can be obtainable **via a planned internal road network within the proposed industrial area envisaged in the area.**

In order to undertake the construction of the proposed thermal power plant, Vortum Energy must receive an environmental authorization granted from the National Department of Environmental Affairs (DEA), under the terms of the EIA Regulations, 2014 published on 4 December 2014 under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998).

The application for environmental authorization process is managed in consultation with ***Western Cape Department of Environmental Affairs and Development Planning (WC DEA&DP).***

The independent Environmental Assessment Practitioners (EAP's) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2014 EIA Regulations are **AGES Limpopo.**

1.1 PROJECT OBJECTIVE

This Environmental Management Programme (EMPr) is an environmental management tool used to prevent or mitigate avoidable adverse impacts of the construction, operation and decommissioning of the proposed Vortum Thermal Power Plant.

This EMPr can also be considered a tool useful for the enhancement of the positive benefits of the project.

This EMPr is done with the objective to supply the Department of Environmental Affairs (DEA) in consultation with the *Western Cape Department of Environmental Affairs and Development Planning (WC DEA&DP)* with the necessary environmental information to make a decision regarding the approval of the proposed development, providing consistent information and guidance for the management and monitoring measures and helping in achieving environmental policy goals.

In order to comply with the Environmental Impact Assessment Regulations released on 4 December 2014 under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998), the EIA report must contain an Environmental Management Programme.

1.2 AND AIMS OF THE EMP

This Environmental Management Programme is compiled with reference to the requirements of the EIA Regulations 2014.

The mitigation measures stated in the Environmental Management Programme (EMPr) should be observed during the different phases of the development.

In this EMPr all possible impacts and mitigations are assessed for **construction and operation**. As far as the decommissioning phase is concerned, this phase will be subject to a decommissioning plan once the project is nearing its operational life (40 to 60 years). Decommissioning will also be subject to an environmental authorization.

The mitigation and management measures in the Environmental Impact Assessment process are systematically addressed in this EMPr which ensures the minimisation of adverse environmental impacts to an acceptable level.

In particular, the objectives of this EMPr are:

- to outline mitigation measures and environmental specifications required for the three phases of the project in order to manage and minimise the potential environmental impacts associated with the thermal power plant;
- to ensure that the three phases have not adverse environmental impacts and that any potential environmental benefits are improved;
- to detect the responsible people/entities for the implementation of the measures, outlining functions and responsibilities;
- to state mechanisms and frequency for preventing long term or permanent environmental degradation;
- to facilitate responses to unforeseen events or changes in the project implementation not considered in the EIA process.

In order to achieve the goal of good and correct environmental management, the role of the contractor is very important. The contractor must be aware of the responsibilities of the relevant environmental legislation and of the specific contents of this EMPr. Specifically, the contractors must ensure that employees have a basic understanding of the environmental features of the site and of the surrounding environment and that are familiar with the requirements of this EMPr having also attended an environmental awareness training course. A copy of the EMPr needs to be available to all on-site staff members.

2 AUTHORITIES, LEGAL CONTEXT AND ADMINISTRATIVE REQUIREMENTS

The legislative and regulatory framework of reference for the Vortum Thermal Power Plant project includes statutory and non-statutory instruments by which National, Provincial and Local authorities exercise control throughout the development of the same project.

The development and the environmental assessment process of a thermal power plant project involve various authorities dealing with the different issues related to the project (economic, social, cultural, biophysical etc.).

2.1 LEGISLATION, REGULATIONS AND GUIDELINES

A review of the relevant legislation involved in the proposed development is detailed in Table 1 below.

Table 1: Review of relevant legislation

National Legislation	Sections applicable to the proposed project
Constitution of the Republic of South Africa (Act no. 108 of 1996)	<ul style="list-style-type: none"> • Bill of Rights (S2) • Rights to freedom of movement and residence (S22) • Environmental Rights (S24) • Property Rights (S25) • Access to information (S32) • Right to just administrative action (S33)
Fencing Act (Act no. 31 of 1963)	<ul style="list-style-type: none"> • Notice in respect of erection of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for purpose of boundary fencing (S18)
Conservation of Agricultural Resources Act (Act no. 43 of 1983) (CARA)	<ul style="list-style-type: none"> • Prohibition of the spreading of weeds (S5) • Classification of categories of weeds & invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148) • Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)
Environment Conservation Act (Act no. 73 of 1989)	<ul style="list-style-type: none"> • National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act no. 36 of 1998)	<ul style="list-style-type: none"> • Entrustment of the National Government to the protection of water resources (S3) • Entitlement to use water (S4) - Schedule 1 provides the purposes which entitle a person to use water (reasonable domestic use, domestic gardening, animal watering, fire-fighting and recreational use) • Duty of Care to prevent and remedy the effects of water pollution (S19) • Procedures to be followed in the event of an

	<p>emergency incident which may impact on water resources (S20)</p> <ul style="list-style-type: none"> • Definition of water use (S21) • Requirements for registration of water use (S26 and S34) • Definition of offences in terms of the Act (S151)
National Environmental Management Act (Act no. 107 of 1998)	<ul style="list-style-type: none"> • Definition of National environmental principles (S2): strategic environmental management goals and objectives of the government applicable within the entire RSA to the actions of all organs of state, which may significantly affect the environment • NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014) • Requirement for potential impact on the environment of listed activities to be considered, investigated, assessed and reported on to the competent authority (S24 - Environmental Authorisations) • Duty of Care (S28): requirement that all reasonable measures are taken in order to prevent pollution or degradation from occurring, continuing and recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment • Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)
National Heritage Resources Act (Act no. 25 of 1999)	<ul style="list-style-type: none"> • SAHRA, in consultation with the Minister and the MEC of every province must establish a system of grading places and objects which form part of the national estate (S7) • Provision for the protection of all archaeological objects, paleontological sites and material and meteorites entrusted to the provincial heritage resources authority (S35) • Provision for the conservation and care of cemeteries and graves by SAHRA, where this is not responsibility of any other authority (S36) • List of activities which require notification from the developer to the responsible heritage resources authority, with details regarding location, nature, extent of the proposed development (S38) • Requirement for the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites for promotion of tourism (S44)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	<ul style="list-style-type: none"> • Provision for the MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems and in need of protection (S52) • Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) • Provision for the Member of the Executive Council for Environmental Affairs/Minister to publish a list of:

	<p>critical endangered species, endangered species, vulnerable species and protected species (S56(1) - see Government Gazette 29657</p> <ul style="list-style-type: none"> Three government notices have been published up to date: GN R150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened Protected Species Regulations)
<p>National Environmental Management: Air Quality Act (Act No. 39 of 2004)</p> <p>National Environmental Management: Air Quality Amendment Act (Act No. 20 of 2014)</p> <p>GN No. 551 of 12 June 2015, Subcategories 1.2 (Liquid Fuel Combustion Installations) and 1.4 (Gas Combustion Installations)</p>	<ul style="list-style-type: none"> Provision for measures in respect of dust control (S32) Provision for measures to control noise (S34) Emission limits for combustion installations
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	<ul style="list-style-type: none"> Waste management measures Regulations and schedules Listed activities which require a waste licence
Western Cape Nature and Environmental Conservation Ordinance 19 Of 1974 as amended by the <i>Western Cape Nature Conservation Laws Amendment Act, 2000 (Act 3 of 2000)</i>	<ul style="list-style-type: none"> To protect animal and plant species within the Province which warrant protection Laws relating to nature and environmental conservation and to provide for matters incidental thereto
Occupational Health and Safety Act (Act No. 85 of 1993)	<ul style="list-style-type: none"> Health and safety of all involved before and after construction must be protected.
Western Cape Provincial Noise Control Regulations: PN 627 of 1998	<ul style="list-style-type: none"> The control of noise in the Western Cape is legislated in the form of the Noise Control Regulations of the Environment Conservation Act No. 73 of 1989 applicable to the Province of the Western Cape, Provincial Notice 627 of 20 November 1998.

Guideline Documents	Sections applicable to the proposed project
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA no. 107 of 1998	<ul style="list-style-type: none"> Impact of noise emanating from a proposed development may have on occupants of surrounding land by determining the rating level Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	<ul style="list-style-type: none"> The Guidelines outline rules and conditions related to transport of abnormal loads and vehicles on public roads and detailed procedures to be followed for the grant of exemption permits

Policies and White Papers	Sections applicable to the proposed project
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	<ul style="list-style-type: none"> The White Paper supports investment in energy initiatives, such as the proposed thermal power plant project.

Integrated Resource Plan (IRP1) Integrated Resources Plan 2010-2030 (IRP 2010)	<ul style="list-style-type: none"> The first Integrated Resource Plan (IRP1) was released in late 2009. Subsequently the DoE decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called Integrated Resources Plan 2010-2030 (IRP 2010). The IRP1 and the IRP 2010 outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa.
Equator Principles (July 2006)	<ul style="list-style-type: none"> The Equator Principles provide that future developments with total project capital costs of US\$10 million or more shall be financed only if socially and environmentally sustainable

2.2 SPATIAL PLANNING CONTEXT

The Project Site is proposed in an area with a mixed land use character which includes a mixture of natural environment, rural, agricultural and industrial land uses in the area. The general character is therefore regarded as a mixture of rural, agricultural and industrial themes. Farm portions in the vicinity are also used for farming (grazing) purpose but many industrial uses are found nearby - such as the ArcelorMittal, Saldanha Steel Works, Tronox Namakwa Sands - Saldanha Smelter, Duferco Steel Processing and the Sishen–Saldanha railway line/Orex Service area. The Project Site is situated in an area earmarked for industrial land uses.

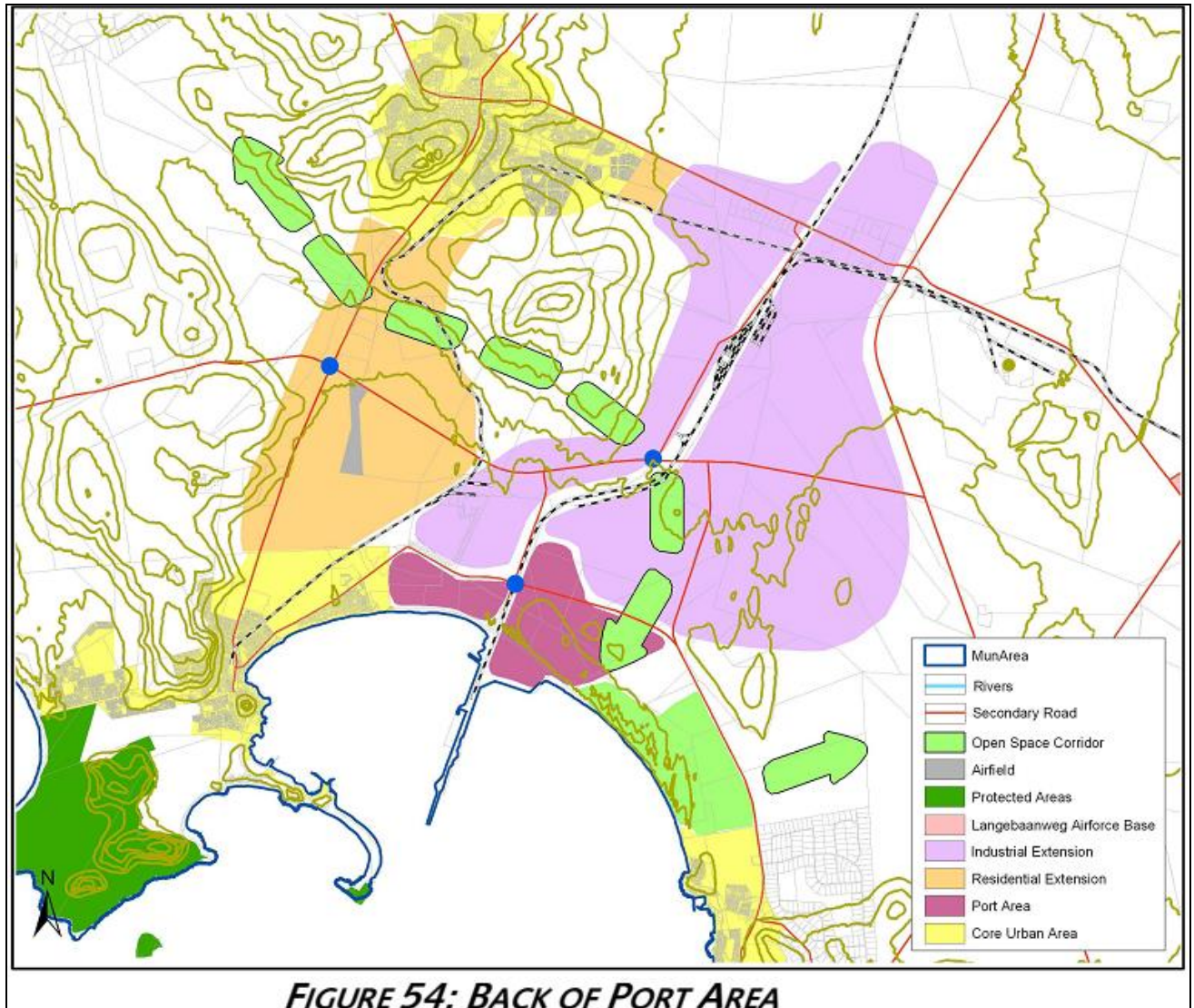
The **Saldanha Bay Municipality Spatial Development Framework (SDF)** highlighted the overall Spatial Management Concept with specific areas of major growth (level 1) as **Vredenburg, Saldanha** and the **Saldanha Port**. Vredenburg and Saldanha have both been identified by the Growth Potential of Towns (according to the Provincial Government of the Western Cape (PGWC), 2005) as towns with a relatively high growth potential in the Western Cape Province. Significant growth is therefore expected within these urban areas and thus the spatial management concept proposes to focus this growth inwards via corridors and nodes and form a major growth centre. In the end it could result that Vredenburg, Saldanha and the Saldanha Port all grow together over time into a combined sustainable Metropolitan area

The SDF identified an "**Urban Activity Corridor**" between Saldanha and Vredenburg to link these two towns. The SDF states that higher densities and mixed land uses must be encouraged along the corridor. The corridor will consist of various projects that will be developed over time. The SDF also identified an "**Industrial Development Corridor**" between the Saldanha Port and Vredenburg. Saldanha Port and the "Back of Port" area in combination has been identified by the relevant authorities as the economic engine room of the Municipal area and is regarded as critical for the growth of the region and is seen as a major economic growth point in the Western Cape Province. The Saldanha Port falls under the jurisdiction of the National Ports Authority. Recently major provision has been made for the expansion of the port with an extensive Port Development Framework recently drafted. The SDF highlights the

need for sufficient transportation links with the Port to ensure the development potential in this area is adequately exploited and developed.

Figure 54 of the Saldanha Bay Spatial Development Framework (below) illustrates the "Back of Port" area, depicting the land earmarked for "**Industrial Extension**".

Figure 1. Figure 54 of the Saldanha Bay Spatial Development Framework



Following the proposed upgrading and expansion at the Saldanha Bay Port, it is expected that major industrial development will occur within the above illustrated "Back of Port" area. The anticipated "Back of Port industrial expansion" could be driving the growth of a major industrial corridor which, in the longer term, is envisaged to link the eastern part of Saldanha with the Port and the Port with the south-western section of Vredenburg (refer Figure 54 and Plan 30 of the Saldanha Bay SDF).

It is stated in the Saldanha Bay SDF that the most significant and unique comparative economic advantage of the Saldanha Bay Municipality is its deep water port facility and related industrial complex. A number of intensive development initiatives have seen the light, including amongst others:

- the development of Saldanha Port for 'bulk exports';
- the Saldanha-Sishen railway connection;
- the development of Saldanha Steel as a world-class "green" steel mill;
- the expansion of the Port's 'general cargo facilities';

The spatial development initiative known as the West Coast Investment Initiative; and The completion of the municipality's Integrated Development Planning Process.

The physical and spatial manifestation related to the above-mentioned industrial development(s) is considered to be one of the "critical success factors".

Local Economic Development Policy: On a municipal level, the aim of Local Economic Development (LED) should be to generate employment opportunities for local residents, alleviate poverty, and to redistribute resources and opportunities to the benefits of all communities within the municipal area. The most important economic asset of the municipal area is, the Saldanha Port as well as its transport links (rail, road and air), and its pristine coastline (Langebaan, and St. Helena Bay to Jacobs Bay). The region's potential to create more sustainable jobs as well as to expand its business activity should, thus, be closely linked to industrial development and the tourist opportunities offered by the coastline.

The Saldanha Port is strategically positioned to contribute to the economic growth of the municipal area since the port creates opportunities for exporting of local products (i.e. steel, agricultural products etc.). Other than Cape Town, the Saldanha Port is the only deep water harbour in the Western Cape, it can therefore provide a supplementary service to the Cape Town Port thus participating on a global level. The Saldanha Bay economy stands on the main pillars of the industrial, tourism and agricultural sectors. Due to mechanisation the agricultural sector however provides less and less job opportunities locally, making industrial and tourism development even more important.

The natural environment is seen as the main attraction for tourists to the western parts of Saldanha. Industrial developments in the municipal area should therefore take cognisance of the natural environment (particularly in the western parts) and in such a manner that it does not affect tourism attractions negatively.

Looking at the **Industrial Development Policy** of the Saldanha Bay Municipality, the development initiatives mentioned above played an important role in the industrial development of the area and contributed to the broadening of the economic base of the municipal area. The Port has a direct link with the main consumer markets and the industrial zone of the West Coast.

The Saldanha Bay Municipality's potential to create more sustainable employment opportunities (in the industrial sector) as well as to expand its business activity is therefore closely linked to opportunities that the port and coastline offer, for instance in the growth in the West African oil and gas industry. The South African National Government's own initiatives with the development of a Gas to Power Programme

leaves Saldanha Bay with added potential for industrial development in the gas industry.

Given these industrial development prospects along with the follow-on effects the Saldanha Steel Works, there is a definite need for industrial expansion areas in Saldanha, i.e. for future port expansion, as well as for downstream processing and industrial growth.

The proposed "**Industrial Activity Corridor**" and earmarked "**Industrial Expansion Land**" between the Port of Saldanha and Vredenburg between the Roads R45 and R27 will support the Municipality's Industrial Development Policy and strengthen the Municipality's LED goals in securing more employment opportunities and strengthening the local economy through industrial development. The envisaged development of the Vortum Thermal Power Plant within this industrial priority area will therefore result in the manifestation of the Saldanha Bay's Municipality's Spatial, Economic and Industrial Development Goals as outlined in the SDF.

The Project Site is presently zoned as "Agricultural" land and utilised for limited grazing activities. The project site is located 9 km North-East of the Port of Saldanha Bay, West of the regional road R27, in an area excluded from the provisions of the Subdivision of Agricultural Land Act (Act 70 of 1970) and already earmarked for Industrial Uses. A formal application for the change of land use rights (Rezoning) along with a sub-division application will be submitted to the Saldanha Bay Municipality to apply for the applicable "Industrial" rights on approximately 130ha of the Property. The applications will be submitted in terms of the Spatial Land Use Management Act, 2013 (Act No. 16 of 2013) or any other relevant legislation required to permit the use of the Project Site for the envisaged Vortum Thermal Power Plant.

Where applicable, the consent of the Western Cape Government Department of Transport and Public Works, South African National Roads Agency Limited (SANRAL), Civil Aviation Authority (CAA) and other authorities, as well as any registered bondholder(s) will be obtained as part of the land use rights application. The envisaged "Industrial" rights are in line with the Saldanha Bay's Spatial Development Framework (SDF).

2.3 LISTED ACTIVITIES IN TERMS OF NEMA

The Listed Activities published on 4 December 2014 under section 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (new EIA Regulations 2014) potentially triggered by the proposed development are indicated in the table below.

Table 2: Listed Activities in terms of sections 24(5) and 44 of NEMA potentially triggered by the proposed development (EIA Regulations 2014)

Listed activities under EIA Regulations 2014	Description of project activities that trigger listed activities
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<p>GN R.984, Item 2</p> <p>The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.</p>	<p>Vortum Thermal Power Plant will consist of construction, operation and maintenance of an energy generation facility (Thermal Power Plant) with a generation capacity exceeding 20 MW (up to 1200 MW). The proposed thermal power plant will be a Combined Cycle Gas Turbine (CCGT) power plant, to be fuelled with natural gas. Should natural gas not be available at commissioning, the proposed facility will be fuelled with liquid fuel (diesel or other types of liquid fuels, such as LPG). Due to current electricity shortages and urgent need for new power generation units in the Country, Vortum Thermal Power Plant will operate as an Open Cycle Gas Turbine (OCGT) power plant (up to 800 MW) as a first phase. During the second phase, with the "closure" of the open cycle (by means of steam turbine units added to the gas turbine units), the Power Plant will operate as a Combined Cycle Gas Turbine (CCGT) power plant (up to 1200 MW).</p>
<p>GN R.984, Item 4</p> <p>The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.</p>	<p>Should natural gas not be available at the time of commissioning of Vortum Thermal Power Plant, the proposed facility will be fuelled with liquid fuel (diesel or other types of liquid fuels, such as LPG). In this early phase, the project will require construction of facilities and infrastructure for storage and handling of liquid fuel, with a combined capacity of more than 500 m³: up to 6 fuel storage tanks of 5,400 m³ each are planned (total: 32,400 m³ storage capacity).</p>
<p>GN R.984, Item 6</p> <p>The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent</p>	<p>The operation of Vortum Thermal Power Plant will entail the management, filtration and emission in the atmosphere of the exhaust gases coming from the combustion of the fuel (natural gas, diesel or other types of fuels).</p>
<p>GN R.984, Item 7</p> <p>The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods -</p> <p>(i) in gas form, outside an industrial complex, using pipelines, exceeding 1000m in length, with a throughput capacity of more than 700t per day;</p>	<p>During the first phase of the development (OCGT power plant fuelled with liquid fuel), liquid fuel will be imported (in liquid form) from the oil pier of the Port of Saldanha and delivered to the Vortum Thermal Power Plant by means of an underground pipeline approximately 12 km long and with a throughput capacity up to 2327 m³/day and a diameter up to 0.4 m.</p> <p>During the second phase of the development (CCGT power plant fuelled with liquid natural gas), natural gas</p>

<p>(ii) in liquid form, outside an industrial complex, using pipelines, exceeding 1000 metres in length, with a throughput capacity of more than 50 cubic metres per day</p>	<p>will be imported (in gas form) from the planned location of the LNG Import and Re-gas Facility proposed by the DoE and delivered to the Vortum Thermal Power Plant by means of an underground pipeline approximately 12 km long and with a throughput capacity up to 3171 ton/day and a diameter up to 0.4 m.</p>
<p>GN R.984, Item 9 The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.</p>	<p>The connection of Vortum Thermal Power Plant to the Eskom grid will be according to the Eskom connection solution, which requires one on-site 400 kV substation with 400 kV power transformers and a 400 kV bus bar (switching station), to connect to the Eskom AURORA MTS (main transmission substation), via up to three new 400 kV power lines approximately 29 km long. The connection solution may also entail intervention on Eskom grid. The new power lines will run outside urban areas.</p>
<p>GN R.984, Item 15 The clearance of an area of 20 hectares or more of indigenous vegetation</p>	<p>The construction of the Vortum Thermal Power Plant will require clearance of indigenous, where the total area to be transformed (footprint of the plant) will be bigger than 20 ha (up to 60 ha).</p> <p>The liquid fuel and natural gas underground pipelines will be 12 km long each and will require the clearance of an area of 9.6 ha (2 x 12 km x 4 m) of indigenous vegetation.</p>
<p>GN R.984, Item 28 Commencing of an activity, which requires an atmospheric emission license in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)</p>	<p>Operation of Power Plant will entail management, filtration and emission in the atmosphere of exhaust gases from combustion of fuel (natural gas, diesel or other kinds of fuels). An atmospheric emission license in terms of National Environmental Management: Air Quality Act, 2004 is required.</p>
<p>GN R.983, Item 11 The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.</p>	<p>Connection of Power Plant to Eskom grid will be according to Eskom connection solution, which requires:</p> <ul style="list-style-type: none"> • one on-site 400 kV substation with 132 kV and 400 kV power transformers and 132 kV and 400 kV bus bars; • up to three new 400 kV power lines ±29 km long for connection to existing Eskom AURORA MTS (main transmission substation); • up to two new 132 kV power lines (double circuits) ±6 km long for connection to existing Eskom BLOUWATER DS (distribution substation).

	<p>Connection solution may also entail intervention on Eskom grid.</p> <p>The on-site high voltage substation and the first 2 km of the 132 kV and 400 kV power lines are planned on the project site, in area earmarked for Industrial Use.</p> <p>The last 4 km of 132 kV power lines and the last 27 km of the 400 kV power line are planned outside urban areas and industrial complexes.</p>
<p>GN R.983, Item 24</p> <p>The development of -</p> <p>(ii) a road with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m</p>	<p>Access to the development area will be obtained via planned internal road network in proposed industrial area in the area. Internal road network of industrial area will gain access to proclaimed provincial road network at a point ± 3.4 km on TR85/1. During construction phase, access road will have a reserve wider than 13.5 m to allow the transportation of abnormal goods (e.g. power transformers, turbines, etc.).</p>
<p>GN R.983, Item 28</p> <p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development:</p> <p>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares</p>	<p>The Vortum Thermal Power Plant will consists of an industrial development, where the total area to be transformed (footprint) will be bigger than 5 ha (up to 60 ha).</p> <p>The project site is located in an area already earmarked for Industrial Uses which was long ago used for agriculture crop farming. The project site is currently being used for livestock grazing.</p>
<p>GN R.985, Item 12</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation:</p> <p>(a) In Western Cape province:</p> <p>(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>(ii) Within critical biodiversity areas identified in bioregional plans</p>	<p>The new power lines for the connection of Vortum Thermal Power Plant of the Eskom Aurora MTS (main transmission substation) will cross endangered ecosystem (Saldanha Limestone Strandveld) in terms of section 52 of the NEMBA and critical biodiversity areas identified in the Fine-Scale Biodiversity Planning (FSP) project led by Cape Nature in partnership with the South African National Biodiversity Institute (SANBI), part of the C.A.P.E. (Cape Action for People and the Environment) programme.</p>

3 TRAFFIC MANAGEMENT PLAN

3.1 TRAFFIC DURING THE CONSTRUCTION PHASE

The construction phase will last approximately **18 months for the Phase 1 (OCGT plant)**, and **additional 12 to 18 months for the completion of the phase 2 (CCGT plant)**.

Approximately 300 people are expected to be employed during the construction period (30 months in total), although this number can increase to 450 for short spaces of time during peak periods.

A small accommodation area with few prefabricated buildings inside the work site may be needed if accommodation facilities in Saldanha and other surrounding residential areas are not sufficient to accommodate all workers.

Medium and heavy trucks will access / leave the site only during the working days (Monday to Friday), during daytime. The provision of a fuelling area on the work site could reduce the load of heavy vehicles on public roads. The installation of two steel fuel tanks (capacity of 30,000 litres each) is recommended.

The table below shows the expected heavy traffic during each 18 month construction period (for phase 1 and 2).

The construction phase of the power lines will last approximately **10 months** and will involve a **team of 15 to 20 people**. Power line structures installation will not require the establishment of a permanent construction site, but will be done step-by-step, in order to only affect small stretches of corridor and for a short time.

The site preparation will consist of the clearing of the power line servitude; vegetation removal will be done only within the servitude, for the minimum width required by the installation activities and by the Eskom security rules: the vegetation should not interfere with the high-voltage cables.

In a similar way, the construction phase of the fuel pipeline will last approximately **8 months** and will involve a **team of 15 to 20 people**. Pipeline installation will not require the establishment of a permanent construction site, but will be done step-by-step, in order to only affect small stretches of corridor and for a short time.

Table 3: Construction timeframe: average daily trips of medium and heavy vehicles

		CONSTRUCTION TIMEFRAME: MEDIUM AND HEAVY VEHICLE TRIPS PER MONTHS									
Transportation of:	months	1	2	3	4	5	6	7	8	9	10
fencing and tools	trips/month	20	20	20	20	20	20	20	20	20	20
clearance of the site (vegetation transportation)	trips/month	20	0	0	0	0	0	0	0	0	0
sands & gravel for on-site concrete production	trips/month	280	280	280	280	280	280	280	280	280	280
steel for reinforced concrete	trips/month	20	20	20	20	20	20	20	20	20	20
Turbine generators / cooling system components	trips/month	0	0	0	50	50	50	50	50	50	50
Water / fuel storage tanks	trips/month	0	20	20	20	20	20	20	20	20	20
HV substation and generators components	trips/month	0	30	30	30	30	30	30	30	30	30
Control rooms / warehouses	trips/month	30	30	30	30	30	0	0	0	0	0
Average trips per month	trips/month	370	400	400	450	450	420	420	420	420	420
Average trips per working day (*)	trips/day	16.8	18.2	18.2	20.5	20.5	19.1	19.1	19.1	19.1	19.1

		CONSTRUCTION TIMEFRAME: MEDIUM AND HEAVY VEHICLE TRIPS PER MONTHS								
Transportation of:	months	11	12	13	14	15	16	17	18	TOTAL
fencing and tools	trips/month	20	20	20	20	20	20	20	20	360
clearance of the site (vegetation transportation)	trips/month	0	0	0	0	0	0	0	0	20
sands & gravel for on-site concrete production	trips/month	280	280	280	280	280	280	280	0	4760
steel for reinforced concrete	trips/month	20	20	20	20	20	20	20	20	360
Turbine generators / cooling system components	trips/month	50	50	50	50	0	0	0	0	550
Water / fuel storage tanks	trips/month	20	20	0	0	0	0	0	0	220
HV substation and generators components	trips/month	30	30	30	30	30	0	0	0	420
Control rooms / warehouses	trips/month	0	0	0	0	0	0	0	0	150
Average trips per month	trips/month	420	420	400	400	350	320	320	40	6840
Average trips per working day (*)	trips/day	19.1	19.1	18.2	18.2	15.9	14.5	14.5	1.8	17.3

(*) considering 22 working days per month

The provision of a fuelling area on the work site could reduce the load of heavy vehicles on public roads. The installation of two steel fuel tanks (capacity of 30,000 litres each) is planned.

- Medium and heavy trucks should access / leave the site **only during the working days (Monday to Friday), on the daytime (08h00 - 17h00)**.
- Vehicles must be well serviced so that it does not produce excessive smoke and noise.
- Construction vehicles must be well maintained and serviced to minimise leaks and spills.
- Spill trays must be used during refuelling of vehicles on site.
- Speed of construction vehicles should be kept as low as possible to reduce the generation of dust and noise.
- Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Oil traps must be installed in the vehicle wash bay to prevent pollution. Oil traps must be serviced on a regular basis by an approved service agent.
- Diesel storage must not exceed 30,000 litres at construction camps. Diesel tanks and other harmful chemicals and oils must be within a bunded area.
- The vehicle maintenance yard and construction storage area should be placed 100 m away from watercourses. This area should have bund walls and lined with impermeable material to prevent ground and surface water pollution.
- The Contractor shall conform to the Occupational Health and Safety act (Act 85 of 1993) and regulations applicable. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Proper access control (I.D. cards) should be enforced to ensure that no authorised persons enter the site.
- A fence should be constructed along the boundary of the development.

3.2 TRAFFIC DURING THE OPERATION PHASE

Liquid fuel (diesel) will be imported from the oil pier of the Port of Saldanha by means of a fuel pipeline (preferred option).

Tank trucks can also be used to transport the fuel, especially in the case of delay of the commissioning of the fuel pipeline. Each tank truck can transport approximately 30

m³ of diesel. In the case of a 100% delivery by tanks: **Up to 6.5 tank trucks per hour, 12h per day, will unload diesel to the six storage tanks.** The unloading time is approximately 20 minutes per tank truck (flow rate: 1.4 m³/minute).

- Trunk Road 77/1 has a proclaimed width of 60 m.
- Trunk Road 85/1 has a proclaimed width of 40 m and is in the process of being widened.
- A 500 m building restriction is applicable to the intersection of TR77/1 with TR85/1. A grade separated interchange is in the planning stage for this intersection.
- There is a 95 m building restriction along the TR77/1 measured from the centre line of the road.
- There is a 5 m building restriction from the boundary of the road reserve on all proclaimed roads.
- No direct access will be permitted from either TR77/1 or TR85/1 and access to the development area will be obtainable via a planned internal road network within the proposed industrial area envisaged in the area. The internal road network of the industrial area will gain access to the proclaimed provincial road network at a point ±3.4 km on TR85/1.
- From this point access will furthermore be in a west to east direction along an internal road for the proposed industrial development. This internal road will pass north of the development area situated on the Remaining Extent of the farm Langeberg, 188 and continue via an underpass under TR77/1 to provide access to the remainder of the farm situated on the eastern side of the R77/1.
- It is furthermore understood that traffic from the south will be able to access the proposed industrial area at the point ±3.4km on TR85/1 with a “left-in” access only and traffic from the north will have to follow the TR85/1 up to a new planned cloverleaf junction, turn around and access the development from the internal road mentioned above, at the point ±3.4km on TR85/1. No exit from the proposed industrial development (and the proposed Vortum Thermal Power Plant) will be permitted onto TR77/1.

The necessary applications in terms of the Roads and Ribbon Development Act, 1940 (Act 21 of 1940) and the Road Ordinance, 1976 (Ordinance 19 of 1976) will be submitted to the Department of Transport and Public Works for the building restrictions (where applicable) and for all formal access points as far as it affects the Provincial Road networks. A formal Traffic Impact Study (drafted in conjunction with the Traffic Impact Study of the larger industrial area planned in the vicinity) will also be submitted to the Department prior to the construction phase.

4 EROSION MANAGEMENT PLAN

A major component of construction is the clearing and grading of land, which exposes, disturbs, and moves the soil. This inevitably increases an area's susceptibility to erosion. Since in these situations it is not feasible to eliminate all erosion risk factors and, thus, all erosion, the goal of implementing erosion control measures is primarily to minimize erosion.

Erosion, by the action of water and wind, is a natural process in which soil and rock material is loosened and removed. There are two major classifications of erosion:

- (1) Geological erosion, and
- (2) Man-made erosion.

Geological erosion, which includes soil-forming as well as soil-removing, has contributed to the formation of soils and their distribution on the surface of the earth.

Man-made erosion, which can greatly accelerate the natural erosion process, includes the breakdown of soil aggregates and the increased removal of organic and mineral particles; it is caused by clearing, grading, or otherwise altering the land. Erosion of soils that occurs at construction sites is **man-made erosion**.

Human activities can cause compaction of the soil, or disturbance of the soil. This hardening of the soil prevents water from effectively infiltrating the soil. This then results in larger volumes of water which moves quickly across a site carrying sediment to streams and rivers away from the site.

The main factor causing or helping erosion on is erosion by water. This is the loosening and removal of soil and rock particles from a piece of land by running water, mostly caused by rain storms. There are a number of factors influencing or affecting erosion namely soil characteristics, climate, rainfall intensity and duration, vegetation or other surface cover and topography

4.1 PROBLEMS CAUSED BY EROSION

The most important effect of erosion is the permanent loss of valuable topsoil at a site. If it is not controlled from the onset of a project and through the duration of the project, it will cause a loss of topsoil and can degrade the area permanently. The sediment that is transported by the rain water can end up in surface streams and drainage lines and other water bodies.

4.2 ACTIONS TO STOP OR MINIMISE EROSION ON A SITE

The affected area must be stabilised as soon as possible during or after construction

on the area. Preserving of existing vegetation or re-vegetation of disturbed soil as soon as possible after construction is usually the most effective way of controlling erosion.

A vegetation cover acts in the following ways to reduce potential erosion:

- Shielding the soil against the direct impact of rain drops falling on the ground.
- It improves the soil water storage porosity, and more water filters into the ground.
- It slows down runoff so that the sediment can settle on the land.
- It holds the soil in place through the plant root system.

Areas which cannot be re-vegetated must be shaped or changed to effectively slow down the speed of the water over the area or by preventing the water to flow over such an area by diverting it away from the site.

Mechanical ways can also be used to minimise or control erosion on a site.

4.3 PRESERVING OF NATURAL VEGETATION

By preserving natural vegetation on the site that does not interfere with the construction process, should be left undisturbed or maintained to minimize damage. It will minimise erosion potential and aesthetically is pleasing which beneficial.

- Do not let any vehicles drive around apart from the designated driveways. This will prevent the compaction of the soil and the destruction of the vegetation in those areas.

4.3.1 Advantages of preserving natural vegetation

- Can handle higher volumes of storm water runoff than newly seeded areas.
- Does not require time to establish. Increases the filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas
- Enhances aesthetics
- Provides areas for infiltration, reducing the volume and velocity of storm water runoff.
- Usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.

It does however require good planning to be able to preserve natural vegetation.

4.3.2 Planting of new vegetation

It is important to establish permanent vegetation to minimize soil exposure to water and wind erosion. Vegetation/plants that have fibrous root system with fast establishment of roots and ground cover are good options

The grass cover can be sown by hand or machine sowing after scarifying the soil. Keep the planted area moist if possible so that the seeds can germinate quickly. Do not move over these areas again until a grass cover has been established.

4.3.3 Mulching

Similar to seeding, mulching is a method of applying plant or non-plant materials on the surface of the land to cover bare soil surface. Materials used are grass, hay, woodchips, wood fibres, straw, or gravel that is placed on the soil surface. The main goal of mulching is to protect the surface of the soil from the impact of erosive forces like the falling raindrops. In construction sites, mulch can be placed to minimize wind and water erosion.

However, the type of mulching selection depends on the land (i.e., slope). Heavy and large sized mulch would be more appropriate for a steep slope. In steep or gentle slopes, matting can be done to hold the mulch in place and reduce its movement by wind or water.

When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilizers, and topsoil in place, by helping to retain moisture (conserve moisture), and by insulating against extreme temperatures. If the mulch is plant-based or organic, it also increases the soil fertility. Mulching can provide immediate, effective, and inexpensive erosion control.

4.3.4 Advantages of mulching

- Provides immediate protection to soils that are exposed and that are subject to heavy erosion
- Retains moisture, which may minimize the need for watering
- Requires no removal because of natural deterioration of mulching

4.3.5 Disadvantages of mulching

- It can delay germination of some seeds because cover reduces the soil surface temperature
- Mulch can be easily blown or washed away by runoff if not secured
- Mulch may absorb nutrients necessary for plant growth

4.4 STRUCTURAL MEASURES TO CONTROL EROSION

4.4.1 Berms

Berms can be constructed around a site on especially the upstream side to keep extra water out of the site. This will minimise the volume of water flowing over a site which limits the erosion on the site

Berms can also be constructed on road surfaces with a gradient to slow down the velocity of the water and to divert the water off the road into storm water drains on the site.

4.4.2 Storm water drains

The storm water drains can be packed with rocks on short intervals and at the end to slow down the velocity of the flowing water and to dissipate the energy of the water where it leaves the site.

4.4.3 Gabions

Gabions of wire packed with rocks and lined with geotextile can slow down the water especially where the slope is steep. The geotextiles can also aid in trapping the sediment. This can be used in storm water drains next to roads by installing flat gabions on the drain surface to prevent unnecessary scouring of the soil surface in the drains if it is not constructed of concrete.

4.5 MONITORING OF EROSION ON SITE

During the planning stage of the construction period, the site manager must appoint a person who will be on site for the duration of the construction period. This person will have the responsibility to monitoring the risk of erosion and actual erosion arising from activities on site. His responsibilities must include:

- Monitoring the movements of vehicles and construction equipment on site to ensure that there is minimal movement in the veld areas off the normal roads and agreed drive lanes between the project components.
- Monitor the preservation of the vegetation in open spaces to ensure the integrity of the vegetation and soil is kept intact.
- Ensure that only the necessary areas are cleared of vegetation according to the site plans
- Ensure that only the planned roads are graded on the site.
- Ensure that gravel roads are kept moist during dry times to prevent the wind from blowing dust away and thus causing erosion in this manner.
- Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed should be rectified as soon as possible.
- Monitor any erosion damage after rains events so that repairs to damaged areas can be done before the next rain event.
- Oversee the re-vegetation/mulching of cleared areas as soon that it is possible and to prevent unnecessary re-entry or movement in these areas.

5 MONITORING GUIDE

Construction at the project site will inevitably use equipment and vehicles that contain hazardous substances or which has the potential to spill hazardous substances on the site. There will also be chemicals and other hazardous substances which are used on site, which needs to be stored on site. This creates the potential for possible spillages and the potential that these substances can pollute soil and water systems on site. It needs to be handled with care and strict control needs to be exercised over the handling and use of such substances.

5.1 POSSIBLE SOURCES OF HAZARDOUS SUBSTANCES

The following substances are potentially stored or used on site:

- Most of the construction vehicles and equipment used on site runs on diesel. The diesel is stored either in stationary tanks or in mobile fuel trailers or bowzers on site.
- The oils needed for lubrication of the equipment and vehicles.
- Hydraulic oils used in drills and equipment like cranes, TLB's and graders.
- Paints used on site.
- Petrol cans for supplying fuel to four wheeler motor cycles used on site.
- Other chemicals and detergents used on site.

5.2 MEASURES TO STORE HAZARDOUS SUBSTANCES ON SITE

All hazardous substances on site must be handled in the following ways:

- All access to any of these substances must be controlled access which means that the substances must be locked away.
- All containers or store rooms where these substances are kept must have an impermeable floor and must be able to contain the substance in the room/store where it may be cleaned up.
- Where the floor is not impermeable, the substances will be stored in a drip tray capable of containing any spills from these containers
- Material Safety Data Sheets (MSDS) for the specific substances must be available in a central file and at the place where the substance is stored.
- All substances will only be issued against a signature - records will be kept.
- Stationary diesel tanks will be kept in a concrete bunding able to contain at least 110% of the volume of the tank. The tap to drain storm water inside this bunding must run through and oil/water separator. All oils and fuel from this separator must be taken to an oil recycling company. Keep records of all oil/fuel removed in this way.
- Fuel trailers must be parked either with sufficient drip trays underneath or it must be parked on an area where there is plastic sheeting underneath the soil to prevent ingress of the fuel/oil into the subsoil or groundwater. Polluted soil has to be removed from time to time to a site registered to accept this material.

5.3 HANDLING OF SPILLS

5.3.1 Small spills on the ground

- Pick up the soil to a depth where it is clean from the substance and store it in a closed container from where it cannot leak and closed to rain.
- Have this soils removed by a registered contractor and keep records of volumes and details of each removal.

5.3.2 Large spills on the ground

- Keep spill kits available on site.
- Contain the spill by either using a spill absorbent sock from the spill kit or by making a soil berm around the spill.
- Scoop or pump out as much as possible of the pollutant into a closed container.
- Remove the polluted soil to a depth below the pollutant and place on a large sail to prevent any leaching of the pollutant to the soil and groundwater.
- Close the sails to prevent the ingress rainwater.
- Have the soil removed form site by a company registered to do that to a permitted waste site or let the company treat the soil on site until the pollutants levels are low enough to dispose of the soil on site again.
- If there is any possibility that there is pollution of groundwater or surface water, samples have to be taken to be analysed to ensure that pollution can be treated if necessary.

5.4 TRANSPORTATION OF HAZARDOUS SUBSTANCES

- It is the responsibility of the transportation company to train their drivers and crews to handle the packaging and transportation of hazardous substances safely and environmentally responsible.
- All vehicles transporting hazardous substances to the project site must carry spill response kits as first line treatment of spillages of hazardous substances from their freight.
- Material Safety Data Sheets (MSDS) for the specific substances transported must be available in the vehicle used for the transportation of the substances.

5.5 TRAINING OF STAFF

- All staff working on site and responsible for a specific area must be trained in the detection of incidents and the reporting there-of.
- All staff on site must be trained in the using of the spill response kit.
- All staff must be trained in the using of MSDS's and first aid kits should it be necessary during any spill incident.
- The staff must undergo an environmental consciousness course.

5.6 GENERAL

All spill incidents must be reported to the environmental control officer who must then report it to the authorities as required by law.

Each pollution incident must be entered into a register on site. All details about the spill, the emergency measures taken and the clean-up done must also be part of the entry in the register.

Preventative measures must be drawn up to prevent recurring of the incident.

The incident register must be available for scrutiny by IAP's should it be requested.

6 OPEN SPACE MANAGEMENT PLAN

Open space is any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Open space can include: green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). In the case of a power plant, the space is defined as green space as it is usually covered by vegetation, but it is not accessible by the public.

6.1 RISKS AND MANAGEMENT ON SITE

The open spaces present certain risks to the site and have to be operated and maintained for the safe and effective operation of the facility.

6.2 FIRE RISK ON SITE

The vegetation on the site and specifically on the open areas needs to be managed to have a low fire risk.

- Tall woody plants will have to be cut on a regular basis and removed to minimise the fire risk.
- The grass cover will also have to be kept short to minimise the fire risk.
- NO fires will be allowed within the site.
- Fire breaks will have to be maintained. The roads network around the fence must be planned to act as fire breaks.

6.3 EROSION RISK ON SITE

An open area where vegetation is removed during construction is prone to erosion by wind or by water. Erosion has to be prevented and minimised as far as possible.

- Demarcate clearance areas and minimise surface disturbance. Do not remove vegetation on areas where there will not be construction and which will be used as open space.
- Rehabilitate cleared sites as soon as possible.
- Minimise erosion risks. Do not drive in areas designated as open spaces except on roads constructed for driving.
- Monitor the site regularly for erosion especially after rain events.
- Follow the measures in the erosion management plan.
- Implement dust suppression measures.

6.4 ALIEN VEGETATION

Open areas can get infested by alien invasive plants as the plants can spread easily in an area in different ways. Open areas need to be regularly monitored for alien invasive vegetation and this vegetation must be controlled at a young stage according to the

alien invasive management plan.

6.5 LITTERING

There is the risk that an open space can get polluted by littering which could come from workers inside the site or which can be windblown from outside the site. Control littering through good housekeeping and by minimising waste on site.

6.6 SUMMARY

Soil is a very valuable resource that needs to be conserved. Construction site managers need to plan well and make sure that measures are in place for managing the impacts of the construction process on aspects like erosion.

Conserving the soil on a construction site is far less expensive than mitigation of the damage afterwards. It is also far more efficient to maintain existing vegetation cover to limit erosion than planting of new vegetation on the site afterwards.

All pollution incidents, especially with regard to leakages or spillages of hazardous substances, are important and should be reported and investigated to prevent recurrence of such incidents. It is the duty of each worker and staff member to take the responsibility to monitor their work surroundings for spill incidents and to report it should it happen. This will ensure continual improvement in the environmental performance of the construction and operations teams on the site

Open spaces should be kept clean and well managed so that it forms part of the visual appeal of the site. It should be managed in such a way as to preserve biological integrity of the site as well as to limit fire risk on the site.

Figure 2: Proposed Layout plan of the Vortum Thermal Power Plant

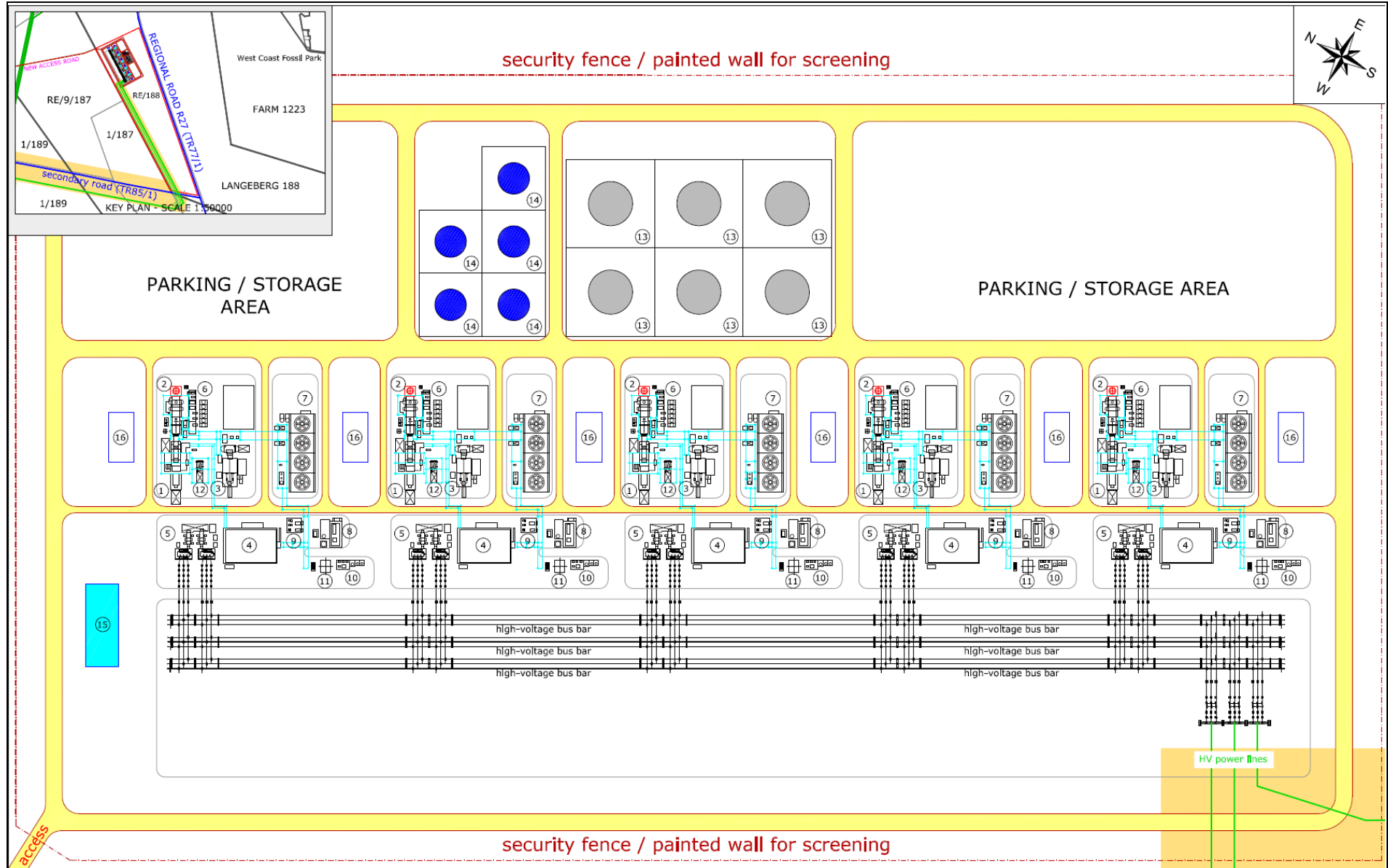


Figure 3: Layout Plan and Construction Camp

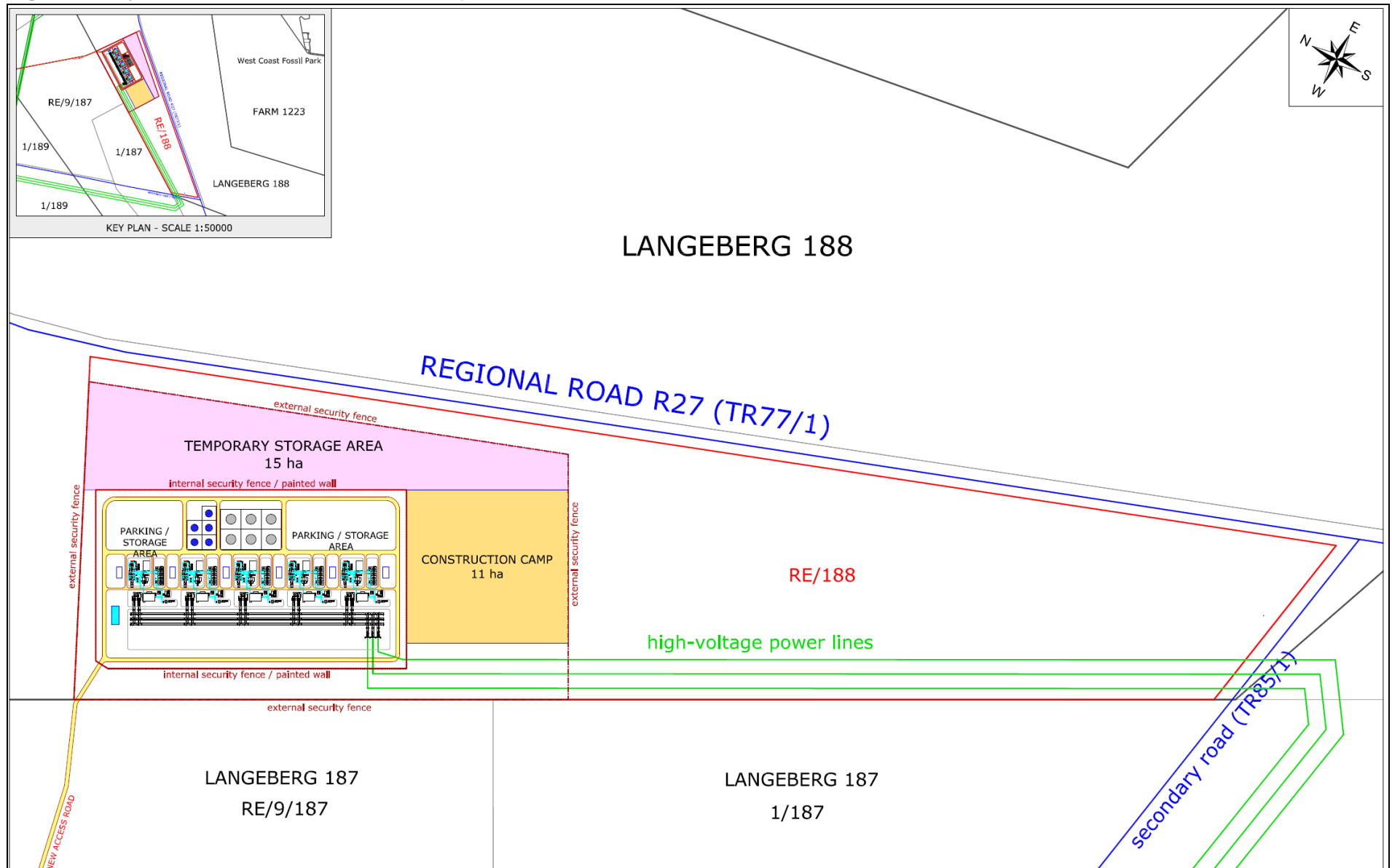


Figure 4: Vegetation Map

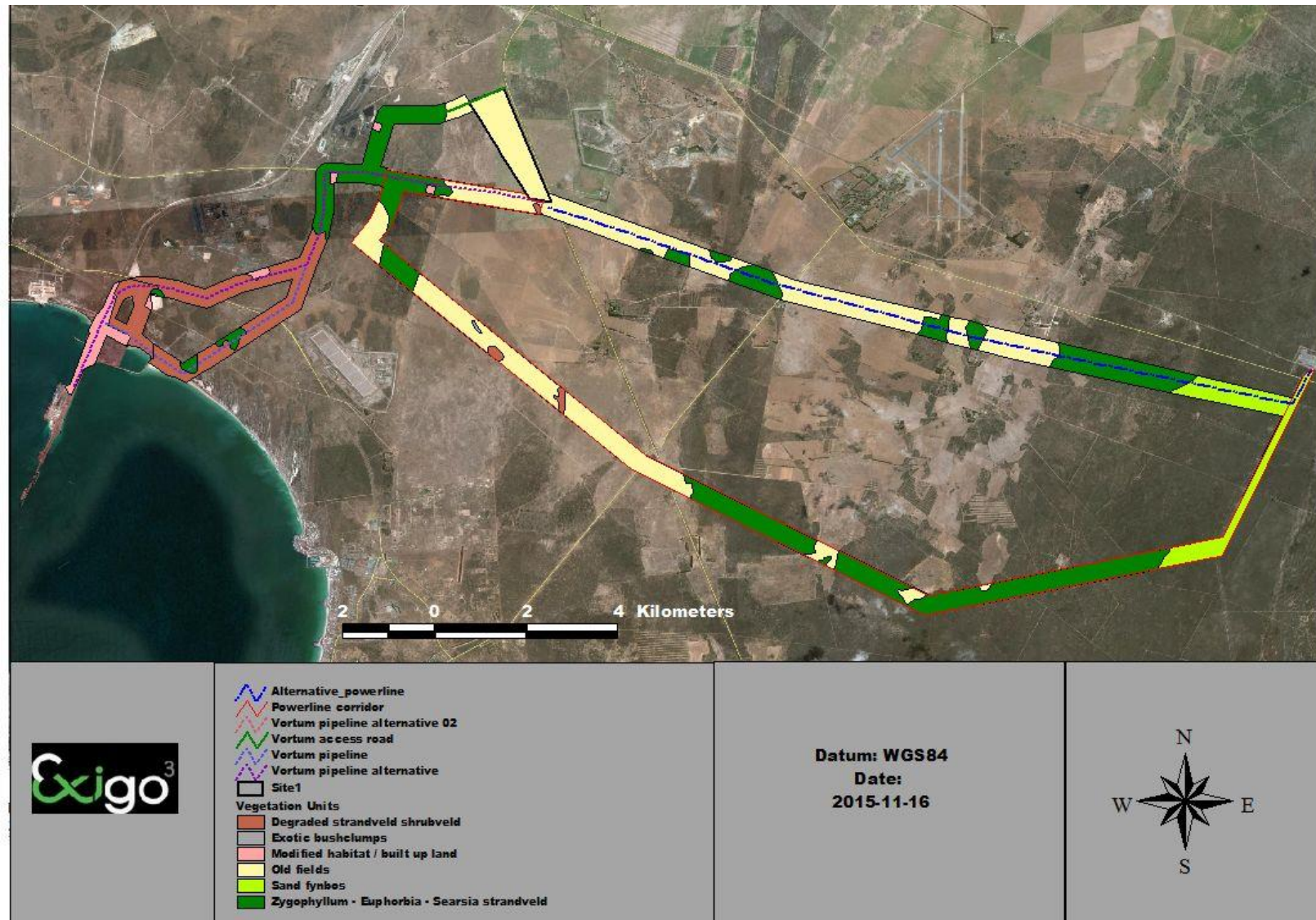
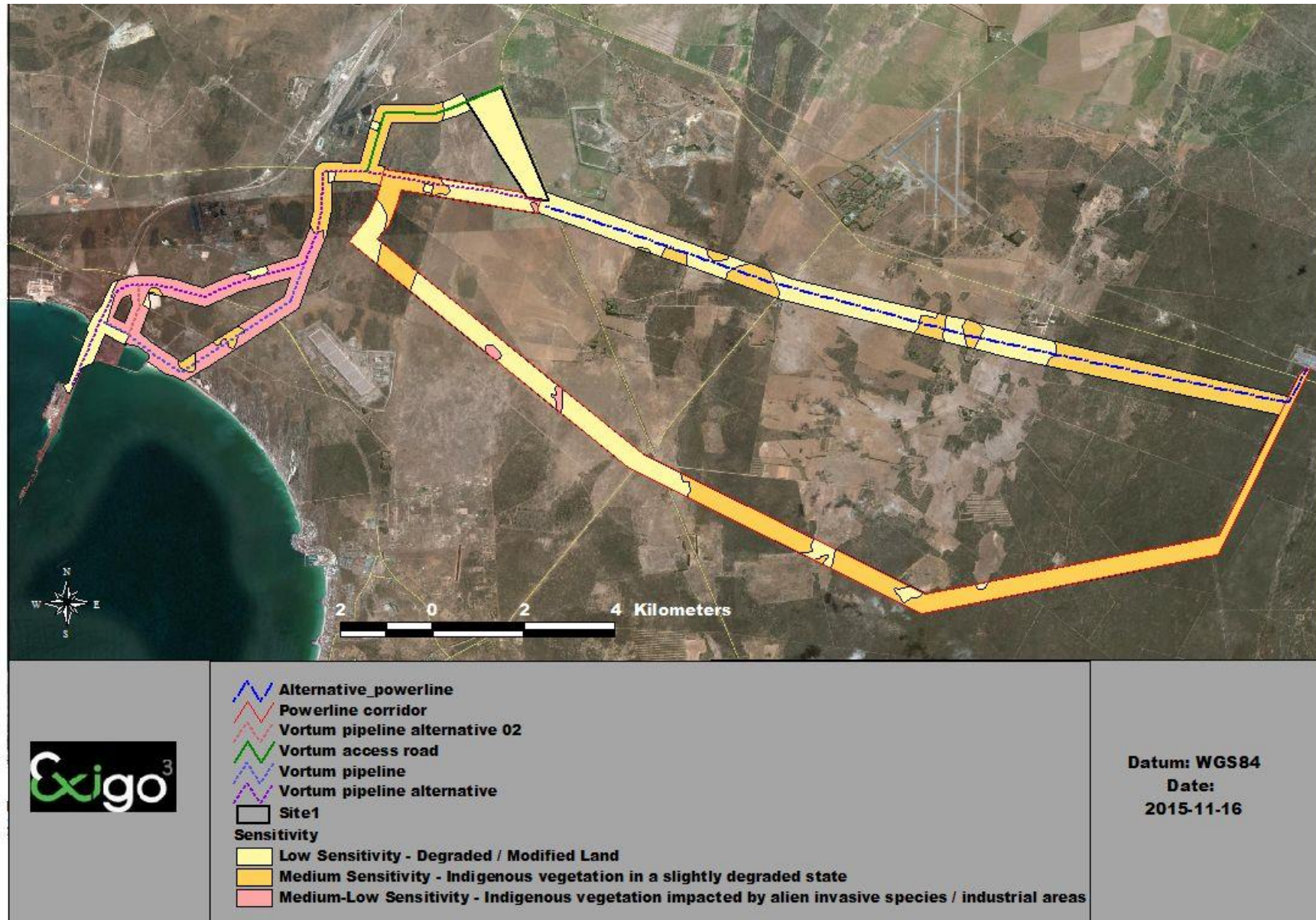


Figure 5: Sensitivity Map



ENVIRONMENTAL MANAGEMENT PROGRAMME

7 ENVIRONMENTAL MANAGEMENT PROGRAMME - POWER PLANT AND CONNECTION INFRASTRUCTURE

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Air quality			
Earthworks and vegetation clearance by construction vehicles and equipment	Air Pollution by excessive dust formation	<ul style="list-style-type: none"> Construction areas can be damped to prevent excessive dust formation. Clearing of the construction sites should be done in phases as the construction progresses. Cleared topsoil should be stockpiled in such a way that transportation by wind or rain is limited. This can be done by e.g. restricting the height of stockpiles, covering it and/or sandbagging. 	Contractors
Movement of vehicles and construction equipment on site	Air pollution caused by excessive smoke and fumes	<ul style="list-style-type: none"> Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke and noise. Contractors must comply with all noise regulations. The construction machinery must be fitted with noise mufflers and maintained properly. 	Contractors
	Air Pollution by excessive dust formation	<ul style="list-style-type: none"> Speed of construction vehicles should be kept as low as possible to reduce the generation of dust and noise. It should be ensured that the construction personnel comply with speed restriction of between 10-20 km per hour within the site boundaries to reduce the generation of dust and noise. Gravel roads must be dampened to prevent excessive dust formation, especially during the winter months. Internal roads must be maintained on a regular basis during construction. Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an ongoing basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays. 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Burning of waste and cleared vegetation The use of fires for cooking and heating at the construction site	Air pollution by excessive smoke	<ul style="list-style-type: none"> Solid waste generated by the construction teams may not be burned on site or the surrounding areas. Solid waste should be kept in animal proof bins from where they will be removed to the Saldanha Bay Municipality's landfill site on a regular basis e.g. weekly. Cleared vegetation waste may not be burned on site, but removed to various recycling stations in the Saldanha Bay Municipality on a regular basis. No open fires are allowed at construction sites. Fires for cooking should be restricted to <u>designated areas</u>, extra care should be taken to ensure to prevent veld fires from occurring. Fire belts must be made around the development according to the regulations of the Veld and Forest Fire Act. The cleared vegetation must be stock-piled and should be removed to a licensed waste disposal site on a regular basis. A waste management and recycling plan should be compiled for the construction phase of the development. The aim of the plan should be to ensure that the construction materials/debris generated on site be <u>reduced, reused and recycled</u>. This plan should be compiled in consultation with the contractors and engineers. 	Contractors & Engineers
Noise			
Operation of construction vehicles and equipment	Disturbance & nuisance to surrounding properties	<ul style="list-style-type: none"> Contractors must comply with all noise regulations .It should be ensured that the construction personnel comply with speed restriction of between 10-20 km per hour within the site boundaries to reduce the generation of dust and noise. Construction vehicles are to be serviced on a regular basis to ensure that they do not make excessive noise. The construction machinery must be fitted with noise mufflers and be maintained properly. Construction of the Power Plant and its connection should only take place between sunrise and sunset from Monday to Saturday. No construction activities should be allowed to take place on Sunday, unless an agreement has been reached with the surrounding properties owners. 	Contractors
Groundwater and surface water pollution			
Sanitation seepage and spillage from temporary chemical toilets	Biological pollution of freshwater	<ul style="list-style-type: none"> Chemical sanitation facilities should be used on site and regularly serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
	resources Impact on the health of humans & bio-diversity	<p>take place.</p> <ul style="list-style-type: none"> The ratio of one toilet for every 15 workers on site should be maintained. The temporary sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place. 	
Clearing of vegetation	Biological pollution of freshwater resources Impact on the health of humans & bio-diversity	<ul style="list-style-type: none"> Clearance of vegetation and construction activities should be restricted to the proposed footprints. Cleared areas should be rehabilitated by reintroducing a vegetation layer as soon as possible to limit the occurrence of water and wind erosion. 	Contractors
Leakage of oil from power HV substation and generators components of the on-site	Chemical pollution of freshwater resources Impact on the health of humans & bio-diversity	<ul style="list-style-type: none"> The on-site HV substation and generators components should be built according to the Eskom standards and guidelines. According to the <i>Eskom Oil Clean-Up and Rehabilitation Standards</i>, the containment of a spillage should involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering the development site's stormwater systems. Containment of oil pollution can be done using one or more of the following: <ul style="list-style-type: none"> soil barriers; sand bags; bund walls; and absorbent materials Polluted soils must be removed to a waste site where it is authorized. 	Contractors
Spillage of fuel and lubricants from construction vehicles	Chemical pollution of freshwater resources Impact on the health of humans & bio-diversity	<ul style="list-style-type: none"> Construction vehicles should be serviced on a regular basis to prevent or minimize the risk of spills or leakages. All construction vehicles should be inspected for oil and fuel leaks regularly and frequently. Vehicles must be parked with spill pans underneath the vehicles Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or chemicals should be removed from the site and discarded in an environmental friendly way. Vehicle maintenance will not be done on site except in emergency situations in which 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		case mobile drip trays will be used to capture any spills.	
Spillages and leaks from temporary fuel tanks and construction activities (e.g. mixing of concrete, cement, paints etc.).	Surface groundwater contamination &	<ul style="list-style-type: none"> Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products. Drip pans can also be placed underneath stationary construction vehicles and equipment. The used or spilled oil should be taken to the nearest oil refiner or recycling plant for recycling. Oil traps must be installed in the vehicle wash bay to prevent pollution. Oil traps must be serviced on a regular basis by an approved service agent. Diesel tanks and other harmful chemicals and oils must be within a bunded area. Any water from out of this bunding must flow through an oil/water skimmer. The temporary vehicle maintenance yard and storage area should be fenced off. Diesel storage must not exceed 30,000 litres at construction camps. A bund wall should be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. Spilled fuel should be disposed of at the nearest approved fuel recycling collection point. Alternatively drip pans can be placed underneath temporary fuel tanks. Diesel storage tanks must be installed according to Sections 4 & 5 of SANS 10089-1:2008 (Storage and distribution of petroleum products in above-ground bulk installations). All construction vehicles should be inspected for oil and fuel leaks regularly. The vehicle maintenance yard and construction storage area should have bund walls and lined with impermeable material to prevent ground and surface water pollution. Mixing of cement, concrete, paints etc. must be done at designated areas within concrete aprons or on protected plastic linings to contain any possible spillages into surface or groundwater resources. Accidental spillages must be contained and cleaned up promptly according to an applicable procedure as determined by a plan of action for the specific type of disturbance Spill kits should be on-hand to deal with spills immediately Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Storage and disposal of waste and littering on site	Pollution of freshwater resources Impact on the health of humans & bio-diversity	<ul style="list-style-type: none"> Solid waste generated by the construction teams may not be burned on site or the surrounding areas. Solid waste should be kept in animal proof bins at the construction camp and construction sites and be removed to the Saldanha Bay Municipality's landfill site on a regular basis. Building rubble should be removed to the Saldanha Bay Municipality's landfill site as the development progresses. A comprehensive waste and recycling management plan should be compiled for the construction phase. The aim of the plan should be to ensure that the construction materials/debris generated on site be <u>reduced, reused and recycled</u>. This plan should be compiled in consultation with the contractors and engineers. Regular clean-up programs should be put into effect throughout the premises to limit the impact of littering caused by construction activities. 	Contractors & Engineers
Storage of chemicals	Water pollution	<ul style="list-style-type: none"> Chemicals should be stored on an impervious surface protected from rainfall and storm water run-off. 	Contractors
Storm water run-off over cleared areas and roads	Increased turbidity and decrease in water quality	<ul style="list-style-type: none"> Clearance of vegetation should be restricted to the proposed footprint and new access roads. Construction activities should be restricted to these footprints. Cleared areas should be rehabilitated by reintroducing a grass layer as soon as possible to limit the occurrence of erosion. Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area. Trenches for pipes or cables will be constructed following the shortest and the most efficient possible route in order to connect all the plant components, where possible the construction of these trenches will be dug next to the roads where it will have the smallest impact. Any trenches that are dug for the supply of services to the various buildings of the Power Plant must be filled up and compacted well and slightly higher than the areas around it. This would allow for settling of the soil without trenches or erosion gullies forming again. 	Contractors
The use of herbicides to control exotic invasive vegetation species	Pollution of freshwater resources Impact on human & bio-diversity health	<ul style="list-style-type: none"> An eradication and rehabilitation plan should be compiled for the exotic invasive plant species present on site. An ecologist should be consulted to assist in this regard. The use of eco-friendly products to control pests / vermin and invasive plants should be promoted and an ecologist be consulted before use. 	Contractors, Developer and Ecologist

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Water quantity			
Construction activities and dust abatement along internal roads and at construction sites	Depletion of groundwater resources	<ul style="list-style-type: none"> Water should be used sparingly and it should be ensured that no water is wasted. Roads should be treated with dust abatement chemicals to reduce the use of water. Washing of construction vehicles should be limited to once or twice a month and must be done with high pressure sprayers to reduce water consumption. Water tanks should be regularly inspected to ensure that no leaks occur. 	Contractors
Water use by exotic invasive plant species	Depletion of surface and groundwater water resources	<ul style="list-style-type: none"> Current exotic weed species should be eradicated, increasing water seepage towards the surface and groundwater resources. 	Contractors
Ecology (Fauna and Flora)			
Earthworks and vegetation clearance	Loss of indigenous plant species & disturbance to sensitive habitat	<ul style="list-style-type: none"> Clearance of vegetation should be restricted to the proposed footprint and new access roads. Construction activities should be restricted to these footprints. The project should comply with the Western Cape Nature and Environmental Conservation Ordinance Amendment Act, 1999 During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts Clearly demarcate the entire development footprint prior to initial site clearance and prevent construction personnel from leaving the demarcated area. Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance must occur outside these areas Care must be taken that unnecessary clearance of natural vegetation does not take place. Cleared areas should be re-vegetated allowing a grass layer to re-establish as soon as possible to limit erosion. Unnecessary driving around in the veld or bulldozing natural habitat must not take place. The herbaceous layer should be revived after clearance of the vegetation and actively 	Developer & Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<p>managed through slashing during the entire lifetime of the project to help prevent fires in the panel area.</p> <ul style="list-style-type: none"> Trenches pose a risk to ground-living animals and must be cordoned off and backfilled as soon as possible during construction to prevent animals from falling into the trenches The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging and avoiding steep slopes. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation Staff that will stay on site should be accommodated in one location of the site to ensure that the impact will be minimal on the larger area. 	
Vegetation clearance and the use of herbicides to control re-growth	<p>Eradication & control of exotic invasive plant species</p> <p>Loss of indigenous plant species</p>	<ul style="list-style-type: none"> Herbicides used to control the invasive plant species should be chosen in consultation with an ecologist, as some of the agents might be detrimental to the surrounding indigenous fauna and flora e.g. Roundup is extremely toxic to frogs. Exotic and invasive plants should be eradicated as the construction progresses. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds Institute strict control over materials brought onto site, which should be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site. Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. 	Developer & Contractors
Materials brought onto site	Spreading of invasive animal	<ul style="list-style-type: none"> Institute strict control over materials brought onto site, which should be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
	species	<p>to the site</p> <ul style="list-style-type: none"> Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. 	
Control of animals on site. Killing, poisoning or hunting of animals	Loss of indigenous fauna to the area	<ul style="list-style-type: none"> The project should comply with the Western Cape Nature and Environmental Conservation Ordinance Amendment Act, 1999. No animals may be killed, captured or hunted or fed on site by construction workers. No poison should be used to control any animals without the input of an ecologist/zoologist. Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and being trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process. Limit pesticide use to no-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife. 	Developer & Contractors
Increase in traffic on the site	Increase in road kills (e.g. small mammals, reptiles and amphibians).	<ul style="list-style-type: none"> The speed of construction vehicles on the internal roads should be kept as low as possible (10-20 km/h) to reduce the incidence of road kill. Use existing roads to minimise new disturbance in the area Construction activities must remain within defined construction areas and the road servitudes. The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. 	Contractor
Occurrence of veld fires on site	Destruction of flora/habitats Loss of indigenous fauna	<ul style="list-style-type: none"> The cleared vegetation should not be burned on site. The cleared vegetation should be stockpiled and taken to closest available landfill site. Educate construction workers regarding risks and correct disposal of cigarettes Fires should only be allowed in designated places within the construction camp and extra 	Contractors & Developer

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<p>care should be taken to prevent veld fires from occurring.</p> <ul style="list-style-type: none"> Firebreaks should comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks). A fire hydrant system should be designed and installed. 	
Littering (e.g. cans & plastics) along access road & at construction sites	Disturbance & nuisance to surrounding properties /death of indigenous fauna	<ul style="list-style-type: none"> Solid waste must be kept in adequate animal proof waste bins at the construction camp and construction sites. Building rubble and various wastes should be removed on a regular basis to the Saldanha Bay Municipality's landfill site. A recycling program must be designed in order to minimise production of solid waste (e.g. organic waste will be made into compost, the rest will be sorted and taken to various recycling stations in the Saldanha Bay Municipality). Regular clean-up programs should be put into effect along the access road and throughout the premises to limit the impact of littering caused by construction activities. 	Developer
Land and soils			
Clearing of vegetation	Erosion & siltation of streams	<ul style="list-style-type: none"> Clearance of vegetation and construction activities should be restricted to the proposed footprints. Cleared areas should be rehabilitated by reintroducing a vegetation layer as soon as possible to limit the occurrence of water and wind erosion. Minimise bare areas. Re-vegetate as soon as possible to prevent soil erosion. 	Contractors
Spilling of oil/diesel by construction machines or tanks	Contamination of topsoil	<ul style="list-style-type: none"> Construction vehicles must be well serviced and maintained regularly to prevent oil and fuel leaks. Vehicle maintenance will not be done on site except in emergency situations in which case mobile Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products. Drip pans should be used when refuelling and servicing construction vehicles or equipment. Drip pans can also be placed underneath stationary construction vehicles and equipment. Used or spilled oil should be taken to the nearest oil refiner or recycling plant for recycling. The vehicle maintenance yard and construction storage area should have bund walls and lined with impermeable material to prevent ground and surface water pollution. The temporary vehicle maintenance yard and storage area should be fenced off. Diesel 	Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<p>storage must not exceed 30,000 litres at construction camps. A bund wall should be constructed around the fuel tank structures and the run-off diverted to a conservancy tank. The spilled fuel should be disposed of at the nearest approved fuel recycling collection point. Alternatively drip pans can be placed underneath temporary fuel tanks.</p> <ul style="list-style-type: none"> Prevent spillage of fuel or oil onto the soil, and put in place measures to ensure that any accidental spillages can be contained and cleaned up promptly Spill kits should be on-hand to deal with spills immediately All construction vehicles should be inspected for oil and fuel leaks regularly and frequently. 	
Leakage of oil from the power HV substation and generators components on-site	Contamination of topsoil	<ul style="list-style-type: none"> The on-site HV substation and generators components should be built according to the Eskom standards and guidelines. According to the <i>Eskom Oil Clean-Up and Rehabilitation Standards</i>, the containment of spillage should involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering the stormwater system. Containment of the oil near the source will minimize pollution and will enable easy clean-up and/or remediation. This shall be done using one or more of the following: <ul style="list-style-type: none"> soil barriers; sand bags; bund walls; and absorbent materials Polluted soils must be removed to a waste site where it is authorized. 	Contractors
Spillage from temporary chemical toilets	Contamination of soils	<ul style="list-style-type: none"> Chemical sanitation facilities should be used on site and regularly serviced by registered companies to ensure that no spills or leaks from toilets to groundwater or surface water take place. The ratio of one toilet for every 15 workers on site should be maintained. The temporary sanitation system in the construction site should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place. 	Contractors
Storage and disposal of building rubble, waste and littering on site	Soil pollution and nuisance	<ul style="list-style-type: none"> Solid waste must be kept in adequate animal-proof waste bins at the construction camp and at the construction sites. Building rubble and waste should be removed on a regular basis to the Saldanha Bay Municipality's landfill site. Any building rubble must be removed to a licensed disposal site on a regular basis during 	Contractors & Developer

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<p>construction.</p> <ul style="list-style-type: none"> A comprehensive waste management plan should be compiled for the construction phase of the development. The aim of the plan will be to ensure that the construction materials/debris generated on site be <u>reduced, reused and recycled</u>. Regular clean-up programs should be put into effect throughout the premises to limit the impact of littering caused by construction activities. 	
Storage of chemicals/fuels on site	Soil pollution	<ul style="list-style-type: none"> Chemicals to be stored on an impervious surface protected from rainfall and storm water run-off 	
Excavation for cabling and pipes laying	Soil degradation/erosion	<ul style="list-style-type: none"> Trenches for pipes or cables will be constructed following the shortest and the most efficient possible route in order to connect all the plant components where possible the construction of this trenches will be dug next to the roads where it will have the smallest impact. Any trenches that are dug for the supply of services to the different buildings of the Power Plant must be filled up and compacted well and slightly higher than the areas around it. This would allow for settling of the soil without trenches or erosion gullies forming again. Slopes produced by removing soil must be kept to a minimum to reduce the chances of erosion damage to the area. Soil should be handled when dry during removal and placement to reduce the risk of compaction. Repair all erosion damage as soon as possible and in any case not later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth. Sufficient drainage should be provided along access roads to prevent erosion. 	Engineers & Contractors
Storm water over roads and cleared areas	Soil degradation/erosion and ponding of water along the lower lying areas	<ul style="list-style-type: none"> Cleared areas should be re-vegetated allowing a grass layer to re-establish as soon as possible to limit erosion. Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. Ensure the amount of bare soil exposed is minimized by staging earthworks in phases and leaving as much ground cover intact as possible during construction. 	Engineers, Contractors and Developer

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<ul style="list-style-type: none"> Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. Develop and implement stringent erosion and dust control practices. The clearing of the site should be done in phases as the construction progresses. An efficient erosion control and slope-stabilizing program should be designed and implemented along the steep slopes of the site to reduce the risk of erosion. Conservation of topsoil should be prioritized on site. Maintain topsoil stockpiles in a weed free condition. Institute a storm water management plan. Sufficient drainage should be provided along access roads to prevent erosion and pollution of adjacent watercourses or wetlands Have both temporary (during construction) and permanent erosion control plans. Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area. Institute a storm water management plan including both temporary (during construction) and permanent erosion control plans. 	
Handling of soils	Soil compaction	<ul style="list-style-type: none"> Soil should be handled when dry during removal and placement to reduce the risk of compaction. The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging and avoiding steep slopes. During construction, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it. Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed. 	Developer, Contractors and Engineers

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		<ul style="list-style-type: none"> • Stockpile topsoil separately from subsoil. • Stockpile in an area that is protected from storm water runoff and wind. • Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible. • Maintain topsoil stockpiles in a weed free condition. 	
Geo-technical characteristics of soils at sites	Damage to structures and infrastructure	<ul style="list-style-type: none"> • The recommendations with regard to the geo-technical characteristics of the underlying soils should be adhered to. • It is proposed that a more detailed and extensive engineering geological investigation than the one already done, be conducted in order to determine the precise geo-technical character with regard to the design and the construction of the access road, the foundations of the buildings and the suitability of the underlying soil material as construction materials. 	Developer, Contractors and Engineers
Archaeological, palaeontological, cultural and social features			
Earth moving and soil clearance	Destruction of archaeological and heritage remains	<ul style="list-style-type: none"> • The coastal dune veld of the project locales along the second option for the gas / fuel pipeline constitutes the area of main heritage conservation priority where a Colonial Period occupation site (Exigo-VTP-HP01) was recorded. It is primarily recommended that Option 2 be excluded for consideration for the gas / fuel pipeline because of the presence of a Colonial Period occupation site that was recorded. • Should Option 2 remain for consideration, it is recommended that a conservation buffer zone of 100m be implemented around the heritage site. • The design of the pipeline should be adjusted to avoid the site and of the proposed conservation buffer. A heritage site management plan should be compiled in order to stipulate consecration measures for the site. • Should impact on the site prove inevitable a Phase 2 archaeological specialist assessment of the site will be required. This measure should be undertaken subject to the relevant permitting requirements from the competent heritage authority (HWC). A destruction permit should be obtained prior to the final destruction of the site. • Care must be taken during the construction process that anything of archaeological value 	Developer and Archaeologist

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
		that is unearthed must be recorded and the archaeologist, SAHRA informed of the discovery.	
Construction activities	Loss or injury to human life	<ul style="list-style-type: none"> The Contractor shall conform to all the stipulations of the Occupational Health and Safety act (Act 85 of 1993) and any Regulation applicable at the time of starting of construction. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed. 	Developer and Contractors
Construction activities	Nuisance to people	<ul style="list-style-type: none"> Construction activities must be restricted to working hours Monday to Saturday, unless otherwise approved by the appropriate competent person in consultation with the affected residents. 	Developer and Contractors
Unauthorized entrance to construction areas and construction workers staying overnight at construction site	Elevated crime levels	<ul style="list-style-type: none"> Only key construction workers and security personnel should be allowed to overnight on the site. Proper access control (I.D. cards) should be enforced at the entrance gate to ensure that no unauthorised persons enter the site. Security personnel should be appointed to enforce strict access control. Transportation should be pre-arranged for the construction worker to ensure that the workers from the surrounding local communities have daily transportation available to and from the site. A boundary fence can be constructed around the site, which will act as a security barrier. A temporary fence should be erected around the construction camp and storage area. Security lights and where possible infra-red video surveillance will be installed at the construction camp and storage area in such a manner that it does not become a nuisance to the surrounding properties. 	Developer & Contractors
Occurrence of veld fires caused by the negligence of construction workers	Loss of human life and construction equipment etc.	<ul style="list-style-type: none"> It must be ensured that the development complies with the requirements of the National Veld and Forest Fire Act, 1998 (Chapter 2: Fire Protection Associations and Chapter 4: Duty to Prepare and maintain firebreaks). The construction workers should be educated about the risk of fires in the area and how to prevent them. No solid waste or vegetation may be burnt on the premises or surrounding areas. No fires will be allowed outside designated areas (construction camp). 	Developer & Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Long and short-term Employment of workers	Direct & indirect Job creation. Skills development of local workforce. Local & regional Economic growth.	<ul style="list-style-type: none"> Adherence to the Local and District Municipality's guidelines, principles and policies is imperative. During the construction and operational phases, jobs must be created for unemployed local people and skills must be transferred to them. Where viable, the work must be executed in a labour intensive manner to create as many jobs possible. 	Developer & Contractors
Visual			
Construction activities and temporary structures	Visual disturbance	<ul style="list-style-type: none"> Earth works should be executed in such a way that only the footprint and a small 'construction buffer zone' around the proposed components are exposed. In all other areas, the natural occurring vegetation, more importantly the indigenous vegetation should be retained. The materials and colours used in the construction of structures and infrastructure should give preference to natural and eco-friendly choices, if possible to minimize the visual impact on the aesthetic character of the surrounding area. 	Developer & Contractors
Plant & Security lights	Visual disturbance and nuisance	<ul style="list-style-type: none"> The plant lights during construction should be screened and should shine downwards in order to minimise the impact on surrounding roads. The security lights at the temporary maintenance yard and storage area should shine directly down and directed towards the site away from the surrounding properties. A video-surveillance system using infrared or microwave video cameras, which do not need a switched on lighting system, is recommended. Adherence to the Visual Impact Assessment mitigation measures. Refrain from causing 'light spillage' beyond the construction camp by installing light fixtures with directional illumination. Keep lighting to a minimum by installing low-level bollard type lights instead of post top lights along walkways between buildings. Where possible avoid high flood lights, and instead use lower locally lit installations. In general, lighting should be carefully directed and only be used where absolutely necessary 	Developer & Contractors

7.1 CONSTRUCTION PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Thermal Plant	Visual disturbance and nuisance	<ul style="list-style-type: none"> Where possible and required, careful placement of newly planted vegetation in areas relevant to VSR site lines. Where possible use earthy tones to greys with toned-down hues, instead of whites and creams, as such combinations are recessive to the eye and tend to be slightly less noticed. Do not keep to a uniform colour but break up the components with slightly different colour tones. In order to further mitigate the visual impact, the footprint should be surrounded by a 5m high wall which can be painted by South African artists with colours and patterns harmonising with the surrounding landscape. 	Developer & Contractors
Power Lines	Visual disturbance	<ul style="list-style-type: none"> The 400kV pylons should be "Guyed V tower" type, because this type of structure is the least intrusive in terms of visual impact. 	Developer & Contractors

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Air quality			
Burning of natural gas or diesel to create heat for the generation of electricity will create emissions	Air pollution by excessive smoke	<ul style="list-style-type: none"> PM₁₀: No specific particulate control measures currently specified for the OCGT and CCGT phases and the cooling towers for PM₁₀ mitigation. NO₂: Process design specification provides for Dry Low NO_x (DNL) emission control technology for the OCGT and CCGT phases of the project. This technology can potentially reduce process emissions to 9 parts per million (PPM). Impact from process can be further reduced by applying additional best available industry techniques, such as Selective Catalytic Reduction (SCR), in combination with DNL emission control. SO₂: No specific sulphur dioxide control measures currently specified for the OCGT phase of the project. Refer to additional control measures discussed in Sections 3.2 and 4.4 of the Air Quality Impact Study for PM₁₀, NO₂ & SO₂. 	Developer & plant manager
Burning of vegetation refuse and solid waste	Air pollution by excessive smoke	<ul style="list-style-type: none"> Speed of vehicles on roads should be controlled e.g. speed bumps and speed restrictions. All roads should preferably be sealed to eliminate dust formation caused by strong winds and vehicle movement. Solid waste may not be burned on the project area. A recycling management plan should be compiled for the proposed development. This plan should focus on reducing, recycling and reusing the waste generated during operation. Vegetation refuse should be composted if possible and re-used. The solid waste or vegetation refuse may not be burned on site. Fire belts around the development must be made according to the regulations of the Veld and Forest Fire Act. Vegetation refuse should be composted if possible and re-used. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Noise			
Operation of plant	Disturbance and nuisance to surrounding properties	<ul style="list-style-type: none"> All efforts should be made to minimise noise disturbance originating from the Power Plant and its operations. 	
Increase in vehicle movement along access roads & internal roads	Disturbance and nuisance to surrounding properties	<ul style="list-style-type: none"> Speed of vehicles along the internal roads of the development should be controlled e.g. speed bumps and speed restrictions (10-20 km/h). This will reduce the noise levels associated with the increase in vehicle movement 	Developer
Groundwater and surface water pollution			
Disposal and storage of waste	Pollution of freshwater resources. Impact on the health of humans and bio-diversity	<ul style="list-style-type: none"> Solid waste or vegetation refuse may not be burned on site. Solid waste may not be disposed or stored in areas other than designated waste disposal areas e.g. waste disposal bins. Solid waste must be kept in adequate waste bins and removed on a weekly basis to a waste disposal site. The Developer should collect and dispose of the waste to the Saldanha Bay Municipality's landfill site on a weekly basis. A comprehensive waste and recycling management plan should be compiled for the proposed development. This plan should focus on reducing, recycling and reusing the waste generated during operation. 	Developer
Leakage of oil from the power HV substation and generators components on-site	Pollution of freshwater resources. Impact on the health of humans and bio-diversity	<ul style="list-style-type: none"> The on-site HV substation and generators components must be monitored for spills and any spills must be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site. It is vital to prevent any oil spill from entering the development site's stormwater systems. All maintenance work must be done in terms of the Occupational Health and Safety Act (Act No.85 of 1993). Polluted soils must be removed to a waste site where it is authorized. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Spillage of fuel and lubricants from construction vehicles	Pollution of freshwater resources. Impact on the health of humans and bio-diversity	<ul style="list-style-type: none"> Construction vehicles must be well maintained and serviced to minimise leaks and spills. All vehicles transporting hazardous substances to the project site must carry spill response kits as first line treatment of spillages of hazardous substances from their freight. 	
Spillage of fuel from bulk storage tanks and pipelines	Pollution of freshwater resources. Impact on the health of humans and bio-diversity	<ul style="list-style-type: none"> Diesel storage tanks must be installed according to Sections 4 & 5 of SANS 10089-1:2008 (Storage and distribution of petroleum products in above-ground bulk installations). 	Developer
Leaks from the permanent sewerage system	Biological pollution of freshwater resources Impact on the health of humans & bio-diversity	<ul style="list-style-type: none"> The permanent sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place. 	Developer
Use of herbicides and insecticides	Biological pollution of freshwater resources	<ul style="list-style-type: none"> The use of eco-friendly products e.g. Organic Compost, herbicides and insecticides should be promoted. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Stormwater run-off		<ul style="list-style-type: none"> • Clearance of vegetation should be restricted to the proposed footprint and new access roads. Construction activities should be restricted to these footprints. • Cleared areas should be rehabilitated by reintroducing a grass layer as soon as possible to limit the occurrence of erosion. • Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area. Trenches for pipes or cables will be constructed following the shortest and the most efficient possible route in order to connect all the plant components, where possible the construction of these trenches will be dug next to the roads where it will have the smallest impact. Any trenches that are dug for the supply of services to the various buildings of the Power Plant must be filled up and compacted well and slightly higher than the areas around it. This would allow for settling of the soil without trenches or erosion gullies forming again. 	
Water quantity			
Completion of Plant	Depletion of water resources: Water consumption	<ul style="list-style-type: none"> • Water should be used sparingly and it should be ensured that no water is wasted. • Washing of construction vehicles should be limited to once or twice a month and must be done with high-pressure sprayers to reduce water consumption. • A dry cooling system must be installed that will reduce water use for cooling by approximately 95%. • Water storage tanks to provide water to the cooling system during water shortages must be installed. • Dirt roads should be treated with chemicals to lower the use of water. • Workers should not waste any water. In the buildings and offices half flush systems in the toilets as well as water aerators in all taps must be installed to reduce water consumption. • The workers should be educated on the value of water and how to use it sparingly. • Only indigenous trees and plants should be planted around the buildings and offices. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Ecology (Fauna and Flora)			
Rehabilitation of cleared areas	Spreading of exotic invasive plant species Loss of habitat and indigenous flora	<ul style="list-style-type: none"> The exotic invader plant species should be kept under control and removed during operation. No herbicides should be used to control the vegetation on at these areas without consulting a competent ecologist. Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented. The use of eco-friendly products e.g. organic compost and/or Effective Micro-organisms (EM), which reduce the frequency of application of conventional fertilizers, herbicides and insecticides, should be promoted. The two high sensitivity areas (Endorheic Pans) located on the south western corner of the site and close to the northern boundary of the planned footprint should remain undeveloped, providing a buffer zone 32 m wide. The northern side of the property, of high ecological sensitivity, should remain undeveloped. 	Developer
Periodical vegetation clearing within the corridor of the two new sections of power line	Loss of habitat and indigenous flora	<ul style="list-style-type: none"> Vegetation clearing will consist of trimming, cutting and clearing the minimum amount of vegetation necessary for the safe electrical operation of the power line. Servitude areas shall be cleared in accordance with Eskom's procedure for vegetation clearance and maintenance of overhead power line servitudes. Minimal disturbance shall be caused to vegetation where such vegetation does not interfere with operation of the line. 	Developer
Spillages from sewage systems	Deterioration in the habitat for avifauna and aquatic life	<ul style="list-style-type: none"> Diesel storage tanks must be installed according to Sections 4 & 5 of SANS 10089-1:2008 (Storage and distribution of petroleum products in above-ground bulk installations). 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Disposal and storage of solid waste and littering	The death/loss of indigenous fauna e.g. raptors, mammals and reptiles	<ul style="list-style-type: none"> Solid waste must be kept in animal proof waste bins. 	Developer
The control of pests and vermin	Killing and poisoning of fauna feeding on the poisoned vermin or pest	<ul style="list-style-type: none"> An ecologist should be consulted on the use of herbicides/eco-friendly products to control exotic tree and shrub species. Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. The impact on the flying invertebrates will be minimized through the use of sodium vapour (yellow) lights as outside lighting. 	Developer
Occurrence of veld fires	Loss of indigenous fauna and flora	<ul style="list-style-type: none"> Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks). It is further proposed that 10 000m³ of water will be stored in up to 5 storage tanks (2,000 m³ each) which will also be available for fire fighting purposes 	Developer
Birds colliding with power lines	Electrocution of birds	<ul style="list-style-type: none"> Mitigation measures to minimise electrocution of birds as described in section 6.3.2 of the Avifauna report must be instituted. T he high-risk sections of the power line should be marked with a suitable anti-collision marking device on the earth wire as per the Eskom guidelines and section 6.4.2 of the Avifauna report. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Control of animals on site. Killing, poisoning or hunting of animals	Loss of indigenous fauna to the area	<ul style="list-style-type: none"> No animals may be killed, captured, hunted or fed on site by workers. No poison should be used to control any animals without the input of an ecologist/zoologist. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. The use of eco-friendly products e.g. Organic Compost and/or Effective Microorganisms (EM), which reduces the frequency of application of conventional fertilizers, herbicides and insecticides, should be promoted. 	Developer
Land and soils			
Disposal and storage of waste and littering	Soil pollution and nuisance	<ul style="list-style-type: none"> Solid waste or vegetation refuse may not be burned on site. Solid waste may not be disposed or stored in areas other than designated waste disposal areas e.g. waste disposal bins. The Developer should collect and dispose of the waste to the Saldanha Bay Municipality's landfill site on a weekly basis. A recycling management plan should be compiled for the proposed development. This plan should focus on <u>reducing, recycling and reusing</u> the waste generated during operation. 	Developer
Spillages from fuel tanks and pipes and HV substation and generators components	Chemical soil pollution	<ul style="list-style-type: none"> The on-site HV substation and generators components must be monitored for spills and any spills must be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site. Diesel storage tanks must be operated according to Sections 6 & 7 of SANS 10089-1:2008 (Storage and distribution of petroleum products in above-ground bulk installations). All maintenance work must be done in terms of the Occupational Health and Safety Act (Act No.85 of 1993). Polluted soils must be removed to a waste site where it is authorized. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Use of fertilizers, insecticides and herbicides	Soil pollution	<ul style="list-style-type: none"> The use of eco-friendly products e.g. Organic Compost, herbicides and insecticides should be promoted. 	Developer
Increased run-off after heavy precipitation events	Erosion of topsoil and ponding of water next to buildings and structures at lower lying areas	<ul style="list-style-type: none"> Given the low rainfall, flat topography and low flow speed of run-off, no formal storm water structures are required as the proposed gravel roads should be developed at ground level so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated and the existing drainage patterns should be left undisturbed. Maintenance of the roads must be kept up to standard to prevent and reduce the incidence of erosion next to roads. The surface drainage system should be monitored after storms and storm water damage should be repaired. Revegetate bare areas to minimise soil pollution during wind- and rain storms. 	Developer
Archaeological, palaeontological, cultural and social features			
Operational activities of development	Destruction of archaeological and heritage remains	<ul style="list-style-type: none"> During operation any discoveries of archaeological importance must be reported to the archaeologist for comments and future mitigations. 	Developer
Luminance caused by plant and security lights	Visual disturbance, nuisance to surrounding properties	<ul style="list-style-type: none"> Plant and Security lights should shine directly down and be directed in such a way that it does not become a nuisance to the surrounding neighbours and roads A video-surveillance system using infra-red or micro-wave video-cameras, which do not need a switched on lighting system, is recommended. <p>Adherence to the Visual Impact Assessment mitigation measures.</p>	Developer
The functioning of the proposed development	Elevated crime levels	<ul style="list-style-type: none"> A security fence should be maintained around the perimeters of the sites to increase security. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
The risk of veld fires caused by natural or human induced negligence	Loss of human life, infrastructure etc.	<ul style="list-style-type: none"> Maintenance of the vegetation buffer zone will limit or eliminate the occurrence or risk of fires. Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks). It is further proposed that 90,000 l of water should be stored in storage tanks which is also available for fire fighting purposes 	Developer
Visual			
Operational activities of development	Destruction of archaeological and heritage remains	<ul style="list-style-type: none"> During operation any discoveries of archaeological importance must be reported to the archaeologist for comments and future mitigations. 	Developer
Thermal Plant	Visual	<ul style="list-style-type: none"> Where possible and required, careful placement of newly planted vegetation in areas relevant to VSR site lines. Where possible use earthy tones to greys with toned-down hues, instead of whites and creams, as such combinations are recessive to the eye and tend to be slightly less noticed. Do not keep to a uniform colour but break up the components with slightly different colour tones. In order to further mitigate the visual impact, the footprint should be surrounded by a 5m high wall which can be painted by South African artists with colours and patterns harmonising with the surrounding landscape. 	Developer

7.2 OPERATIONAL PHASE OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE

Activity causing the impact	Specific Impacts	Mitigation measure	Responsible Person
Plant & Security lights	Nuisance	<ul style="list-style-type: none"> The plant lights during construction should be screened and should shine downwards in order to minimise the impact on surrounding roads. The security lights at the temporary maintenance yard and storage area should shine directly down and directed towards the site away from the surrounding properties. A video-surveillance system using infrared or microwave video cameras, which do not need a switched on lighting system, is recommended. Adherence to the Visual Impact Assessment mitigation measures. Refrain from causing 'light spillage' beyond the construction camp by installing light fixtures with directional illumination. Keep lighting to a minimum by installing low-level bollard type lights instead of post top lights along walkways between buildings. Where possible avoid high flood lights, and instead use lower locally lit installations. In general, lighting should be carefully directed and only be used where absolutely necessary 	Developer
Electrical lines	Visual	<ul style="list-style-type: none"> The 400kV pylons should be "Guyed V tower" type, because this type of structure is the least intrusive in terms of visual impact. 	Developer

8 ENVIRONMENTAL MONITORING PROGRAMME - POWER PLANT AND CONNECTION INFRASTRUCTURE

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
Air quality and Noise								
Dust especially on roads & construction sites caused by construction vehicles and equipment and clearance of vegetation						Visits to the sites where construction occurs	Follow up with contractor when it is observed Dust abatement program as required	Contractors
Smoke from open fires Burning of cleared vegetation & solid waste						Visual inspection	No burning of waste or open fires beyond designated areas. Fines to contractors if it occurs	Contractors
Excessive fumes from construction vehicles						Visual inspection	Vehicle maintenance program to be followed	Contractors
Noise from construction vehicles and equipment						Measure if necessary	Correct when necessary. Work will only be allowed during daylight hours Monday - Saturday. Permission required on Sundays.	Contractors
Burning of natural gas or diesel to create heat for the generation of electricity will create emissions						Continuous ambient PM10, NO2, SO2 and VOC monitoring should commence at least one year before the construction phase of the project.		Developer

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
Groundwater and surface water pollution								
Sanitation - Possible leaks/spills from e.g. chemical toilets. Ensure ratio of 1 toilet for every 15 workers are maintained. Correct placement of temporary sanitation facilities.						Visual inspection / Inspect service agreement with contractor	Remedial action as required	Contractors
Spillage of fuel/lubricants from construction vehicles						Visual inspection Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary Stick to maintenance program	Contractors
Spillages and leaks from temporary fuel tanks and construction activities (e.g. mixing of concrete, cement, paints etc.)						Visual inspection Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary Remedial action as required	Developer & Contractors
Leakage of oil from HV substation and generators components of the on-site						Visual inspection Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary Remedial action as required	Developer & Contractors
The storage and disposal of building rubble, waste and littering on site						Visual inspection Request for agreement letter between the municipality & contractor regarding disposal	Remedial action as and when required. Ensure that adequate waste disposal bins are available at construction camp and construction sites	Developer & Contractors
Storm water run-off over cleared						Visual inspection	Remedial action as required	Developer,

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
areas & roads							Contact engineers if necessary	Contractors & Engineers
Solid waste separation						Visual inspection	Follow mitigation steps Remedial action as required	Contractors & Developer
Control of exotic invasive vegetation species.						Visual inspection	Contact ecologist if deemed necessary	Contractors, Developer and Ecologist
Storage of chemicals						Visual inspection	Remedial action as required Contact engineers if necessary	Developer, Contractors & Engineers
Water quantity								
Water consumption from construction activities.						Visual inspection Check total flow meters.	Follow mitigation steps. Remedial action as required. Fines to contractors if water is wasted.	Developer & Contractors
Water consumption for dust suppression						Visual inspection Check total flow meters	Follow mitigation steps Remedial action as required	Contractors
Water consumption by exotic invasive vegetation						Visual inspection/ Check rehabilitation program	Contact ecologist if deemed necessary	Developer & Contractors
Ecology (Fauna and Flora)								
Earthworks and vegetation clearance at construction site						Visual inspection	Fines if there is unnecessary or uncontrolled clearing	Contractors

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
Rehabilitation of cleared areas & control of grass layer re-growth at development areas						Visual inspection. Check rehabilitation program	Contact ecologist if deemed necessary	Developer & Contractor
The risk of veld fires						Visual inspection	Fines to contractors if open fires are observed outside designated areas. Remedial action as required	Developer & Contractors
Littering along access road & construction sites						Visual inspection	Follow mitigation steps. Remedial action as required.	Contractors & Developer
Poisoning/Killing/Snaring of animals						Visual inspection	Fines to transgressors and contractors if it occurs Contact ecologist, DENC and DEA immediately for remedial steps to be taken.	Contractors
Land and soils								
Pollution from spillage of fuel/lubricants from construction vehicles						Visual inspection Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary Stick to maintenance program	Contractors
Pollution from spillage of fuel from temporary fuel tanks, oil and chemicals						Visual inspection. Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary	Developer & Contractors
Leakage of oil from the HV substation and generators components on-site						Visual inspection Agreement letter from fuel/oil recycling plant if necessary	Clean up if necessary Remedial action as required	Developer & Contractors

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
Waste storage and disposal and littering						Visual inspection Request for agreement letter between the municipality and contractor regarding waste disposal	Remedial action as and when required Follow mitigation steps	Developer & Contractors
The regular removal of building rubble during and after construction						Visual inspection	Fines and clean up if necessary	Developer & Contractor
Erosion damage and ponding of water after heavy precipitation events						Visual inspection	Improve storm water management on roads if necessary and correct damages Contact engineers if necessary	Developer, Civil Engineers and Contractors
Erosion damage at service trenches and foundations						Visual inspection	Remedial action as and when required Contact engineers if necessary	Developer & Contractors
Damage to structures and infrastructure as a result of the adverse characteristics of the underlying soils						Visual inspection Request the detailed engineering geological investigation report	Contact engineers if deemed necessary	Developer and Civil Engineers
Ensure that the current developments corresponds with the original layout plan						Visual inspection Request for layout map	Contact Environmental Assessment Practitioner and DEA if necessary	Developer
Archaeological, palaeontological, cultural and social features								
Archaeological discoveries						Visual inspection	Call in the SAHRA representatives for investigation if deemed necessary by archaeologist	Developer, Contractors and Archaeologist
Safety of workers and public during						Visual inspection	Fines, correct actions and clean up if	Developer &

8.1 CONSTRUCTION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	Once off per site	When applicable	Continuously/ daily	Weekly	Quarterly			
Environmental Aspects:								
the construction phase							necessary	Contractors
Safety of properties						Visual inspection	Fines to contractors where workers other than the key workers and security personnel are staying overnight. SAPS if criminal elements take place. Security company responsibility Adherence to Farm Visit Protocol	Contractors & Developer
Fire hazard – open fires outside designated areas etc.						Visual inspection	No burning of waste. No open fires beyond designated areas. Fines to contractor if it occurs	Developer & Contractors
The employment of construction workers						Request for appointment letters , identification cards etc.	Remedial action as and when required	Developer & Contractors
Visual								
The positioning of security lights						Visual inspection	Remedial action as and when required	Developer
The positioning of the Plant						Visual inspection	Initial Site Visit with Municipality	Developer & Contractors

8.2 OPERATION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	When applicable	Continuously / daily	Weekly	Monthly	Quarterly			
Environmental Aspects:								
Air quality and Noise								
Burning of natural gas or diesel to create heat for the generation of electricity will create emissions						Continuous ambient PM10, NO2, SO2 and VOC monitoring be conducted at the collection of sensitive receivers, north north-west of the plant, for the operational life of the project. Monitoring should commence at least one year before the construction phase of the project.		Plant manager
The burning of vegetation refuse and solid waste						Visual inspection	No vegetation or solid waste to be burned on site	Developer
Groundwater and surface water pollution								
The disposal and storage of waste and vegetation waste						Visual inspection of waste bins at waste disposal transfer station. Request a copy of waste management and recycling plan	Remedial action as required	Developer

8.2 OPERATION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
Environmental Aspects:	When applicable	Continuously / daily	Weekly	Monthly	Quarterly			
Leakage of oil from HV substation and generators components of the on-site						Visual inspection Agreement letter from fuel / oil recycling plant if necessary	Clean up if necessary Stick to maintenance program	Developer
The leaks from the permanent sewerage system						Visual inspection Details of reported incidents	Contact maintenance contractor Remedial action as required	Developer
The use of fertilizers, insecticides & herbicides						Visual inspection Request for rehabilitation and maintenance plan	Contact ecologist if deemed necessary	Developer
Water quantity								
Water use of Plant						Visual inspection	Remedial action as required	Developer
Ecology (Fauna and Flora)								
Rehabilitation of cleared areas						Visual inspection Request for rehabilitation and maintenance plan	Contact ecologist if deemed necessary Remedial action as and when required	Developer
Disposal of solid waste and littering						Visual inspection of waste bins at the waste disposal transfer station Request a copy of waste management program if necessary	Contact engineers Remedial action as required	Developer

8.2 OPERATION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	When applicable	Continuously / daily	Weekly	Monthly	Quarterly			
Environmental Aspects:								
The positioning of the fences and the construction of the roads						Visual inspections Request for original layout plan	Remedial action as required	Developer
Land and soils								
The storage and disposal of waste and littering						Visual inspection of waste bins at waste disposal transfer station. Request copy of waste management & recycling plan. Request for agreement letter between development & private contractor	Contact engineers Remedial action as required	Developer
Leakage of oil from the HV substation and generators components on-site						Visual inspection Agreement letter from fuel / oil recycling plant if necessary	Clean up if necessary Stick to maintenance program	Developer
Erosion damage by storm water run-off e.g. roads and storm water systems						Visual inspection	Improve storm water management if necessary and correct damages	Developer

8.2 OPERATION OF THE POWER PLANT AND CONNECTION INFRASTRUCTURE								
Action or key area to be monitored	Monitoring frequency					Monitoring method	Action/Remedial action	Responsible person
	When applicable	Continuously / daily	Weekly	Monthly	Quarterly			
Environmental Aspects:								
Archaeological, palaeontological, cultural and social features								
Archaeological discoveries						Visual inspection	Contact the archaeologist and SAHRA representative for investigation if archaeologist discoveries are unearthed.	Archaeologist &Developer
The security measures at the development						Visual inspection	Remedial action if required	Developer
Visual								
Buildings and lights- nuisance and pollution						Visual inspection	Remedial action as required Ensure that the agricultural guidelines and building restrictions are adhered to	Developer

