11 ENVIRONMENTAL MANAGEMENT PROGRAMME

This Environmental Management Programme (EMPr) is included in the Final EIR, dated 19 October 2016.

11.1 OVERVIEW

ArcelorMittal, the Project Applicant, has appointed Environmental Resources Management (Pty) Ltd (hereafter ERM) to prepare the Environmental Management Programme (EMPr) for the development of a proposed 1507 MW gas fired power plant. The Project is to be developed on a green field site owned by ArcelorMittal within the IDZ of Saldanha Port. The site is located less than 1 km to the east of the existing ArcelorMittal Saldanha Steel, immediately adjacent to the Blouwater substation.

The aim of the EMPr is to provide a set of guidelines and actions aimed at addressing potential environmental risks and impacts associated with the construction, operation and decommissioning phases of the project, and will be included in contract documentation between the Project Company and its contractors. The EMPr also provides assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met, and provides a framework for compliance auditing and inspection programs. It becomes a legally binding document on the environmental authorisation of the Project.

11.2 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

ERM was appointed by the Project Company as the Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment and application for environmental authorisation for the proposed CCGT gas fired power plant. ERM and the specialists appointed by ERM have no financial ties to nor are they a subsidiary, legally or financially, of the Project Company. Remuneration for the services by the Project Company in relation to the EIA and EMPr is not linked to approval by any decision-making authority and ERM has no secondary or downstream interest in the development.

ERM is a leading global provider of environmental, health, safety, risk, social consulting, and sustainability services. ERM has over 150 offices in more than 40 countries and territories with a staff complement in excess of 5,000 people. ERM is committed to providing a consistent, professional, quality service that creates value for our clients in the mining, oil and gas, power, manufacturing, chemical and pharmaceutical, ports and infrastructure sectors. Over the past three years we have worked for more than 50 percent of the Global Fortune 500 companies delivering innovative solutions for business and selected

government clients, helping them understand and manage the sustainability challenges they face.

ERM has been involved in projects across every country in Africa for over 36 years, and in 2003 established a permanent presence in Sub-Saharan Africa to meet the growing needs of our clients. ERM is one of the largest sustainability consulting firms in the region with offices in Kenya (Nairobi), Mozambique (Maputo) and South Africa (Cape Town, Durban and Johannesburg). With over 180 dedicated staff involved in environmental and social projects throughout the continent, ERM offers clients effective, cost-conscious solutions using experienced local and global expertise.

Details of the EAPs are provided in *Table 11.1* below.

Table 11.1 Details of Environmental Assessment Practitioners

Name	Stuart Heather-Clark
Responsibility	Partner in Charge
Qualification	MPhil Environmental Science and BSc Civil Engineering
Professional registration	Certified EAPSA
Experience in years	18
Experience	Experience in EIA in South Africa and various African countries.

Name	Stephan Van Den Berg
Responsibility	Project Manager
Qualification	BSc (Hons)
Experience in years	9 years
Experience	Experience in EIA in South Africa and various African countries.

11.3 PROJECT DESCRIPTION

A detailed project description can be found in Chapter 3 of the EIR.

11.3.1 Project Background

The International Power Consortium South Africa (IPCSA), have developed a solution to ArcelorMittal Saldanha Steel's requirement for stable, economical electricity over the long term. The solution will supply baseload power and cater for a peaking demand up to 250MW and consists of a 1507 MW (net capacity) Combined Cycle Gas Turbine (CCGT) power plant to be erected adjacent to the ArcelorMittal's Saldanha Steel site (1). This will ensure the medium to long term sustainability of ArcelorMittal's Saldanha Steel as well as the surrounding economy it operates in.

(1)In order for the solution to achieve the economy of scale required to allow for cost effective gas importation, it is designed as a 1507 MW (net capacity) Combined Cycle Gas Turbine (CCGT) power plant.

ArcelorMittal and IPCSA have signed a Power Generation and Natural Gas Project Development and Pre-Off Take Agreement that binds both parties to certain deliverables in developing the project up to the Bankable Feasibility Study (BFS) completion.

The Project is primarily a power supply project to the Saldanha Steel Plant. Additionally, the proposed power plant will tie into the Department of Energy's (DoE) Gas to Power (G2P) programme [(1)]. The project will support Liquefied Natural Gas (LNG) as its main fuel. LNG will be supplied by ship to the Port of Saldanha, where it will be regasified and then offloaded via a submersible pipeline either from a mooring area located off shore or a berthing location in the Port in Saldanha. Initial discussions have been held with Transnet National Ports Authority (TNPA) in Saldanha in this regard.

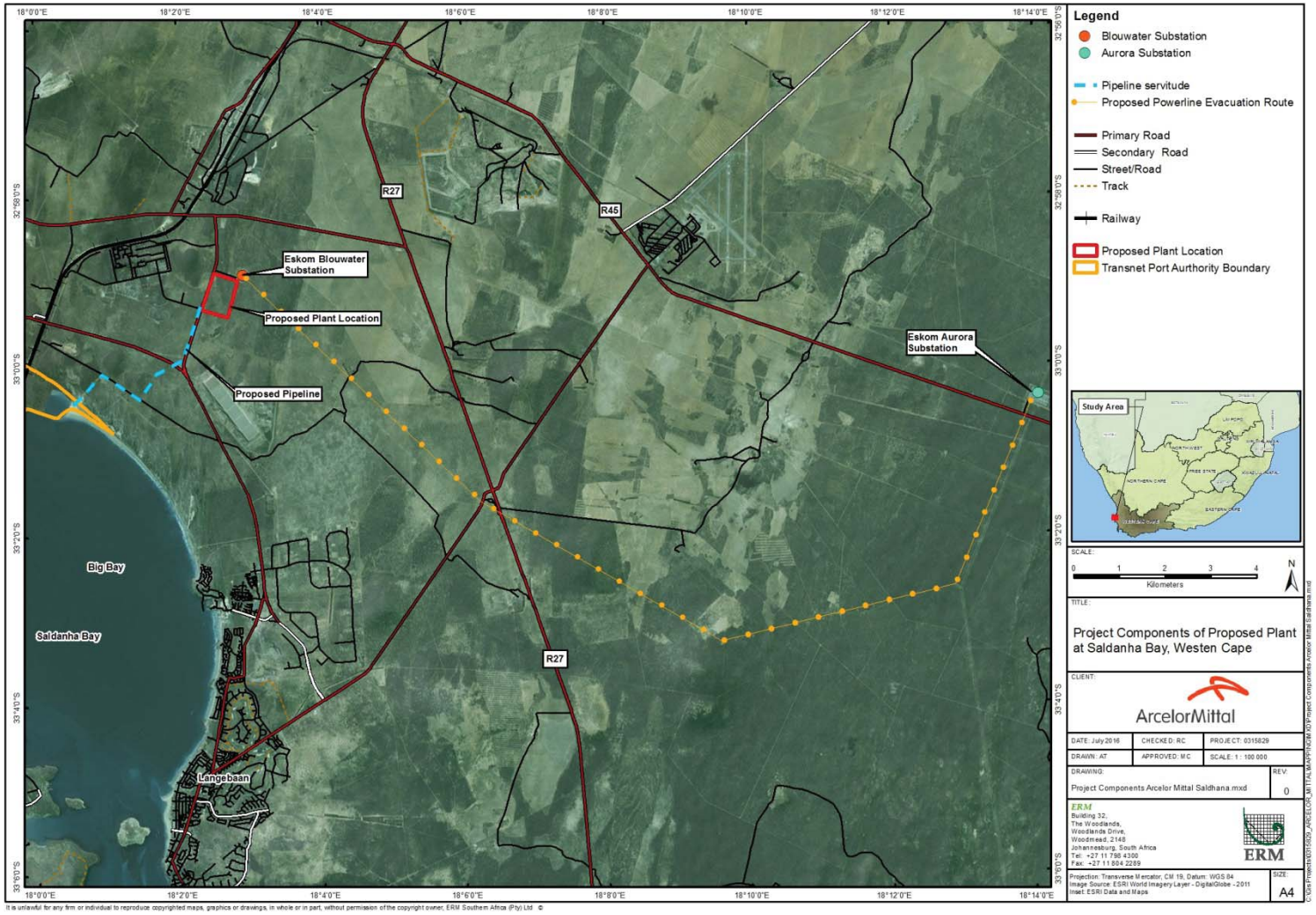
The Project will supply the power needs of ArcelorMittal Saldanha Steel (+/- 160 MW of base load energy, peaking up to 250 MW) and excess electricity will be made available to industries within the Saldanha Industrial Development Zone (IDZ) and/or Municipalities within the Western Cape Province.

11.3.2 Project Location

The Project is to be developed on a green field site owned by ArcelorMittal, approximately 5 km northeast of the Port of Saldanha (*Figure 11.1*). The site is located less than 1 km to the east of the existing ArcelorMittal Steelworks, immediately adjacent to the Blouwater substation. The site is located within an area identified for industrial development according the Saldanha Bay Municipal Spatial Development Framework (2011).

(1) In 2012, the Minister directed in her Determinations that new generation capacity should be procured from hydro, coal and gas sources to support the South Africa's base load energy mix and generation from gas and cogeneration as part of the medium-term risk mitigation project programme. The Determinations require that 3126MW of baseload and/or mid-merit energy generation capacity is needed from gas-fired power generation to contribute towards energy security. The gas required for such power generation will be from both imported and domestic gas resources. (https://www.ipp-gas.co.za/)

*Figure 11.1 Project location and key components**



*Note: 400kV transmission line is shown only for illustration purposes and is not included in the scope of this EIA.

11.3.3 Land Ownership and Acquisition

The two properties on which the proposed power plant site is located are detailed in *Table 11.2.*

Table 11.2 Properties which are intersected by the power plant footprint

Farm Name	Portion Number	Parcel Number	SG Code
Yzervarkensrug	129	Remaining Extent	W014C04600000000012900000
Jackels kloof	195	2	W014C04600000000019500002

The proposed pipeline corridor intersects with the properties as listed in *Table* 11.3.

Table 11.3 Properties which are intersected by the pipeline corridor

Farm Name	Portion Number	Parcel Number	SG Code
None	0	1185	W014C04600000000001185000000
STATE LAND 196	0	196	W014C04600000000000196000000
HOPEFIELD 195	195	0	W014C04600000000000195000001
HOPEFIELD 195	7	195	W014C04600000000000195000070
HOPEFIELD 195	1	195	W014C04600000000000195000010
HOPEFIELD 195	2	195	W014C04600000000000195000020
None	0	1132	W014C04600000000001132000000
YZERVARKENSRUG 129	0	129	W014C04600000000000129000001

11.3.4 Project Components

The key project components considered in this EIA are as follows:

- Pipeline;
- Power plant; and
- Power evacuation and connection to the grid (1).

These are discussed in detail in the sections below. The general surface areas for the project components are listed in *Table 11.4* below.

Table 11.4 Project components general surface areas and lengths

Project Component	Area / Length
Power Plant total surface area	45.83 ha
Length of pipeline	4.6km
Pipeline construction (temporary) RoW (36m width)	30.49 ha
Pipeline permanent easement (6m width)	2.76 ha

(1) Note: The transmission connection for Phase 1, i.e. the 132 kV connection to Saldanha Steel, is included in this EIA. The transmission connection for Phase 2, i.e. the 400 KV connection to Eskom's Aurora substation, will be considered in a separate EIA application. See Section 3.4 for details about the phases referred to here.

Project Component	Area / Length
132kV feeder transmission line to ArcelorMittal length	2.4km
132kV feeder transmission line to ArcelorMittal RoW (30m width)	7.22 ha
Proximity to grid connection	150m

It is envisaged that LNG will be supplied by ship to the Port of Saldanha where it will likely be offloaded to a Floating Storage Regasification Unit (FSRU). The FSRU will regasify the LNG and pump it via a pipeline to the power plant. The supply of fuel and import facilities have not been considered in this EIA. The Department of Energy initiated a project in 2015 to permit the construction of an LNG import terminal at the Port of Saldanha, it was understood that individual developers were not required to undertake the EIA for this component. Should this information change, a separate EIA for the import of gas will be undertaken.

Power Plant

Figure 11.2 shows the proposed plant layout. Current plans include:

- six Trent 60 DLE (low NOx) 50 MW turbines in open cycle; and
- three identical but independent 435 MW SCC5 4000F single shaft generating trains in combined cycle.

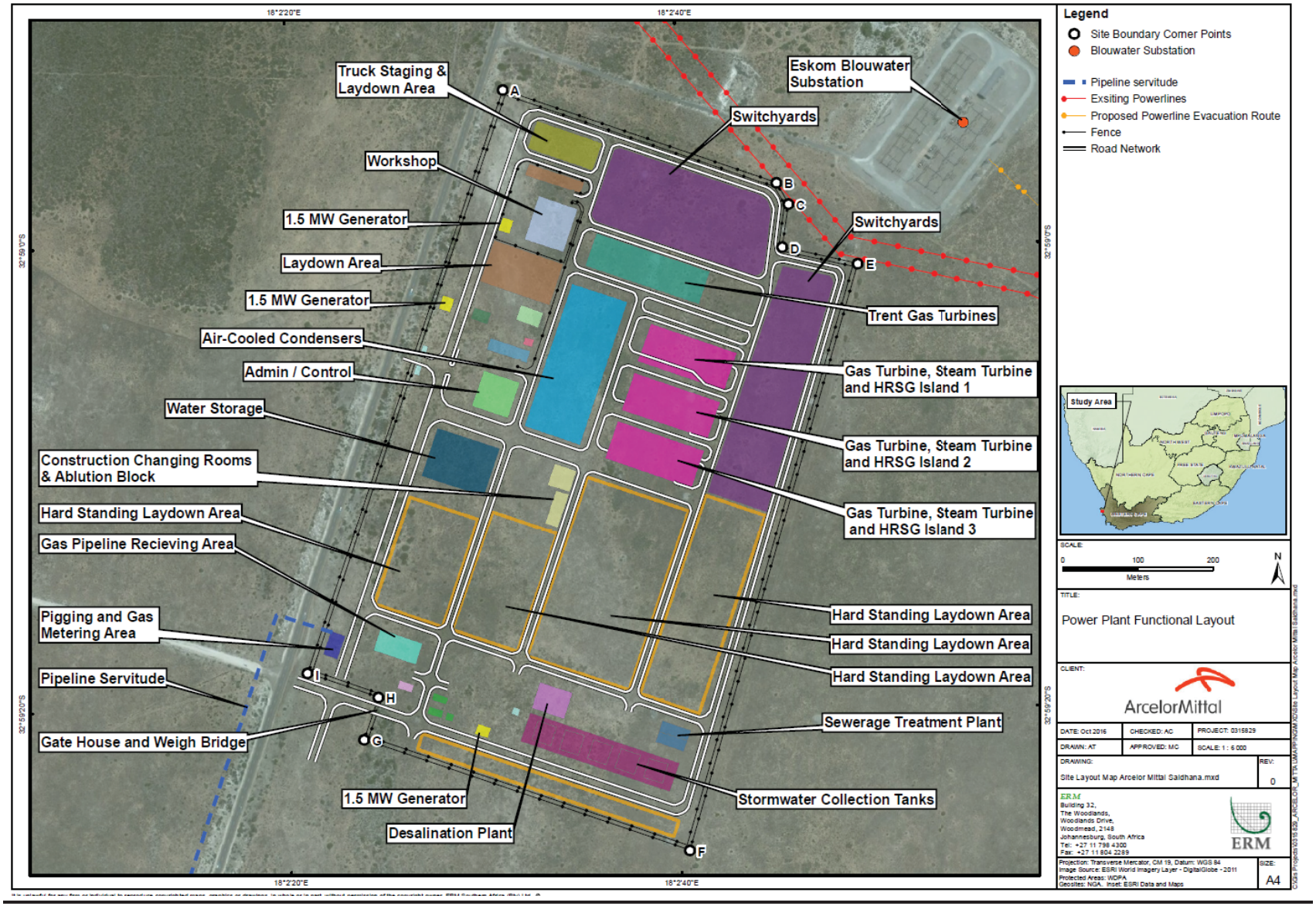
Other infrastructure on site is reflected in *Table 11.5.*

Table 11.5 Power Plant components and their respective footprint areas / lengths

Project Component	Area
1.5 MW Generator	0.09 ha
132KV Switchyard	2.4 ha
440KV Switchyard	2.48 ha
Admin, Control, Laboratory	0.25 ha
Air-Cooled Condensers	1.56 ha
Canteen, Changing Rooms, Ablutions	0.09 ha
Clinic	0.01 ha
Construction Changing Rooms & Ablution Block	0.18 ha
Emergency Assembly Point	0.04 ha
Gas Pipeline Receiving Area	0.18 ha
Gas Turbine, Steam Turbine and HRSG Island 1	1.89 ha

Project Component	Area
Hard Standing Laydown Area	9.64 ha
Laydown Area	0.69 ha
Other miscellaneous infrastructure	0.03 ha
Pigging and Gas Metering Area	0.07 ha
Reverse Osmosis, MSFD, Salt Residue	0.05 ha
Sewerage Treatment Plant	0.12 ha
Stormwater Collection Tanks	1.2 ha
Trent Gas Turbines	0.73 ha
Truck Staging & Laydown Area	0.36 ha
Visitors and Training Centre	0.07 ha
Water Filtration	0.02 ha
Water Treatment, Raw Water Storage, Fire Fighting Water	0.59 ha
Workshop Warehouse and Spares	0.33 ha
Road surface area (total)	6.9ha
Propane storage vessels	3
Propane storage volume on site (total)	30 m^2
Height of stacks	60m (max)
Capacity of on-site substation	132 KV substation for phase 1 400 KV substation for Phase 2
Type of perimeter fencing	ClearVu Reinforced
Perimeter fence length	2.8km
Perimeter fence height	3 m

Figure 11.2 Power plant functional layout



Access routes and roads

The Project has accounted for certain road works, described below, deemed necessary for safety and compliance with regional legislative requirements. Permissions have not yet been sought for the proposed road works, the costs of which will be borne by the project and executed according to local Council and/or Department of Roads and Traffic and/or Committee of Transport Officials (COTO) regulations, requirements and guidelines; in particular Road Infrastructure Strategic Framework for South Africa (RISFSA) of the South African Department of Transport (DOT, 2006)

All of the approximately 6,900 m of road access on the 45.83 ha site will be concrete- paved. The total area of roads is 5.59 ha which represents approximately 12.4 percent of the fenced-in site area. Most roads are 8m width and others 12m. The 12 m concrete-paved roads will be constructed early after commencement of construction works and will serve to carry heavy load traffic (mobile cranes, multi axle heavy equipment trailers, cement delivery trucks, etc.) during the early stages of construction.

All concreted roads will play an important role for rainwater harvesting, in addition to the concreted lay-down areas. The site's natural slope is towards the south where the raw water storage tanks will be situated. The east-west thoroughfares ('streets') will channel rainwater into the rain-water drains of the north-south thoroughfares ('avenues'). Rainwater will run southwards to the bulk water storage tanks.

Approach to the Power Plant

For road safety considerations and in light of the increased traffic (particularly during construction phase) the provincial road leading past the two power plant entrances will be widened from 11 m to a 20 m wide over-taking 4- lane section.

For the office and administration gate a wide entrance (12 m) and a 12 m radius bend into the power plant site and offices from the access road to the gate house is planned.

Pipeline

General

The pipeline transport system from the point of arrival on-shore to the power plant site will consist of the following:

- A gas and sea-water forwarding station at the start of the land-based pipeline system;
- A dual, parallel gas pipeline for security of gas supply;

- A sea water pipeline to provide the power plant with sea water for desalination;
- A power cable to provide motive power for a projected air compressor and actuated isolation valves and instrumentation along the pipeline route; and
- A gas and sea-water receiving station at the power plant.

The LNG pipeline (regasified gas) and sea-water supply servitude will run from the pipeline entry point connecting to the power plant boundary. The gas pipeline will be buried to a depth of 3 to 4 m, cover a servitude width of approximately 15 – 20 m and be approximately 4600 m in length.

The gas and sea-water supply pipelines commence from the routing point #1, where the regasified LNG arrives on shore and enters the land-based servitude section of the supply line to the 1507 MW power plant.

The pipeline will run along the indicated servitude approximately 4600 m to the gas receiving station within the power plant boundary. Over the 4600 m the pipeline will not intersect with any water courses.

The proposed pipeline system will be buried underground with the pipeline servitude extending 6m on either side of the pipeline trench.

Where the pipeline passes through sensitive areas the temporary RoW will be kept to between 20-25m in order to minimise impacts.

The pipeline arrangement will consist of the following elements:

- Two steel gas pipelines with a clearance of 0.3m (as per EN 1594:2000);
- One steel water pipeline; and
- One electrical conduit (plastic compound).

Power Evacuation and Connection to the Grid

132 kV Feeder line to ArcelorMittal Steel Works

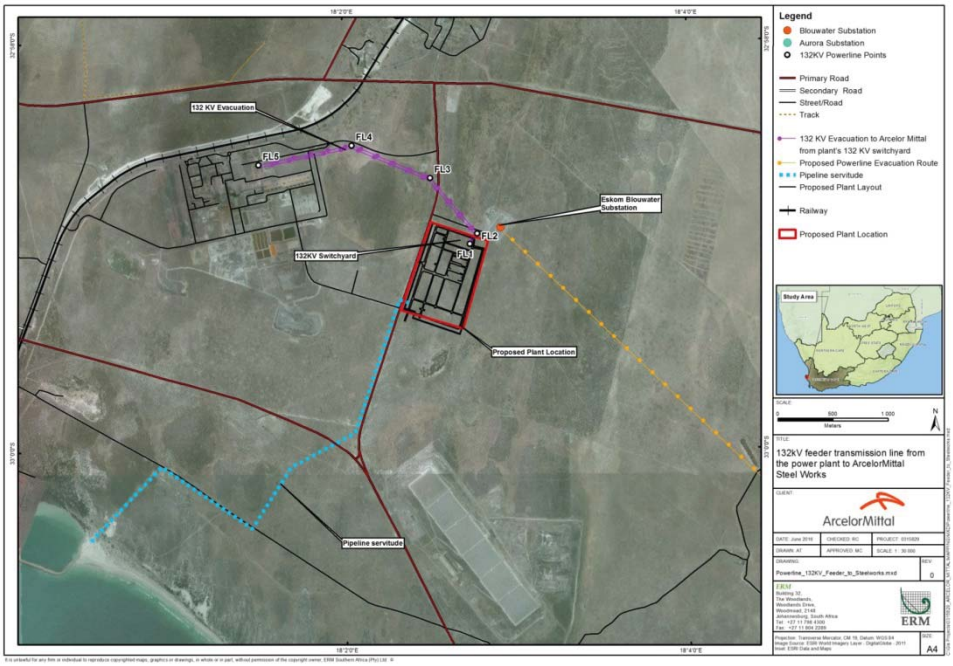
The feeder power line for the initial 160 MW base load (peaking to 250 MW) from the power plant to the ArcelorMittal Steel Works will be the first priority. This 132 kV feeder line will be sized for a capacity of 400 MW. The proposed routing of the transmission line is illustrated in *Figure 11.3*.

The Project plans on utilising the existing 132 KV lines; towers and conductors. The 132 KV plant substation would join directly on to these existing lines. It is noted that there are currently no observed bird deterrent measures on the existing lines. This may need to be introduced, however this would need to be determined between IPCSA and Eskom.

400 kV Transmission line to Aurora Substation

The additional 1103 MW (1400 MVA) of power generated at the plant will be evacuated through the construction of a new 22 km High Voltage (HV) 400 kilo Volt (kV) line from the power plants own switch yard to the existing Aurora 400 kV substation, following the existing Aurora to Blouwater 132 kV feeder servitude. This transmission line in not considered as part of this EIA process and will be considered in a separate EIA process in coordination with Eskom.

Figure 11.3 ***132kV feeder transmission line from the power plant to ArcelorMittal Steel Works***



11.3.5 Project Phasing and Schedule

Construction Phase

The proposed project will be implemented in two phases. Phase 1 and 2 combined will produce approximately 1500 MW net out-put.

Phase 1 and 2 will consist of six Siemens Trent60 50 MW nominal (Installed Gross capacity) gas turbines in open cycle (labelled T1 through to T6) and three Siemens SCC5-4000F 435 MW (Installed Gross capacity) nominal combined cycle plants, labelled UNIT 1, UNIT 2 and UNIT 3 respectively and will be erected on three self-contained power 'islands' each approximately 150 m long x 60m wide.

Phase 1 of the project will constitute the following components:

- Site entrance with truck staging areas, hard standing areas;
- Offices and control room;

- Warehouse areas and workshops;
- Installation of six open cycle Siemens Industrial Trent 60 gas turbines (T1, T2, T3, T4, T5 and T6), one of which will be a redundant unit to ensure uninterrupted supply;
- Associated step-up transformers for every generating unit;
- 132KV and 400 kV switchyard;
- Site drainage;
- Gas receiving, conditioning and forwarding;
- Waste-Water treatment and water reclamation plant; and
- Storm water collection reservoir (25,000 m^3) and water treatment plant.

Construction period: 15 -18 months
Completion Phase 1: September 2019 commercial operation

Construction of Phase 2 of the project will include the following components:

- Installation of complete UNIT 1, UNIT 2 and UNIT 3 open cycle Siemens SCC5-4000F gas turbine (total approx. 1305 MW nominal (Installed Gross capacity) combined cycle plants);

- Associated step-up transformers, and station switchyard.

Construction period: 18 - 20 months
Completion Phase 2: Mid- 2020 - Early 2021

Employment during the Construction Phase

During peak construction activity, it is expected that up to approximately 450 workers will be directly employed (*Figure 11.4*). Most of this workforce will be employed by the engineering, procurement and construction (EPC) contractor and will consist in semi-skilled to skilled workforce. The breakdown of skills required during the construction phase will be as follows:

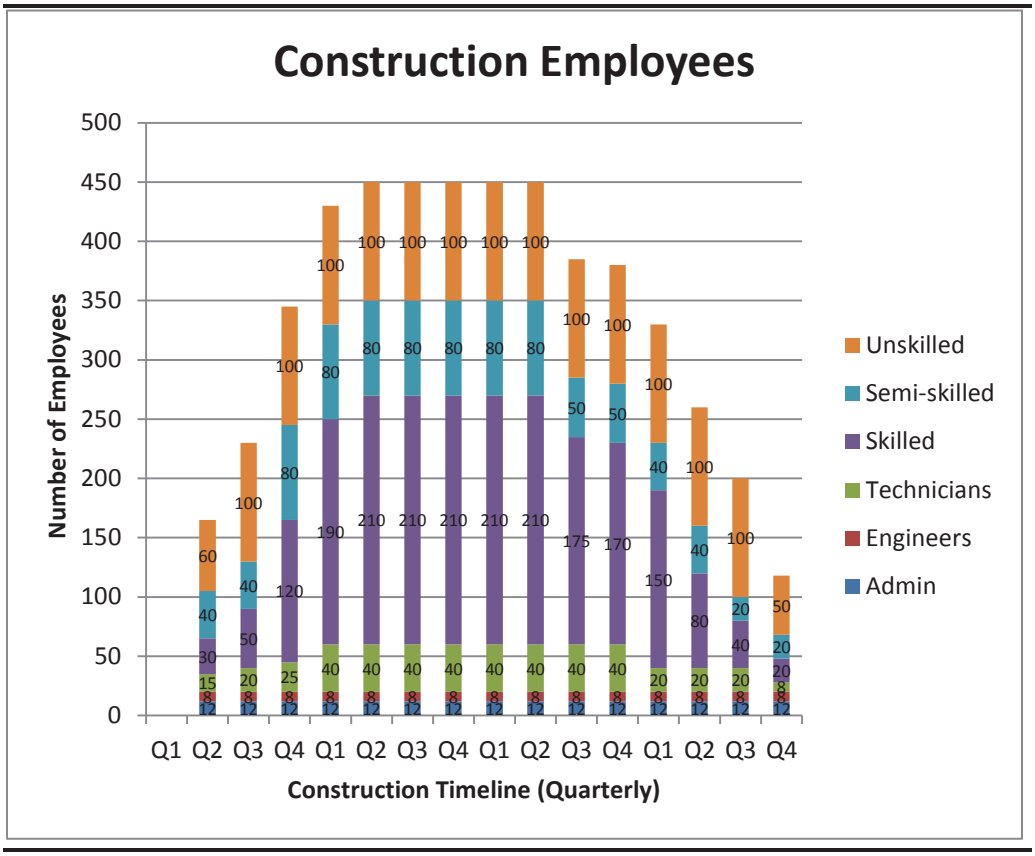
- Skilled labour: 58 percent;
- Semi-skilled labour: 20 percent; and
- Unskilled labour: 22 percent.

A further breakdown of the employment opportunities is provided in *Table* 11.6.

Table 11.6 Estimated Employment Positions Available During Construction

Employment Position	**Number of Positions**
Admin	12
Engineers	8
Technicians	40
Skilled	210
Semi skilled	80
Unskilled	100
Total	**450**

Figure 11.4 Employment requirements during the construction phase



It is understood that there will be no worker accommodation on site during construction. The unskilled workforce will, as far as possible be employed from the local community, reducing the need to the provision of accommodation. The skilled and semi-skilled workforce from outside the area will be housed within Saldanha Bay Local Municipality.

Traffic Requirements During the Construction Phase

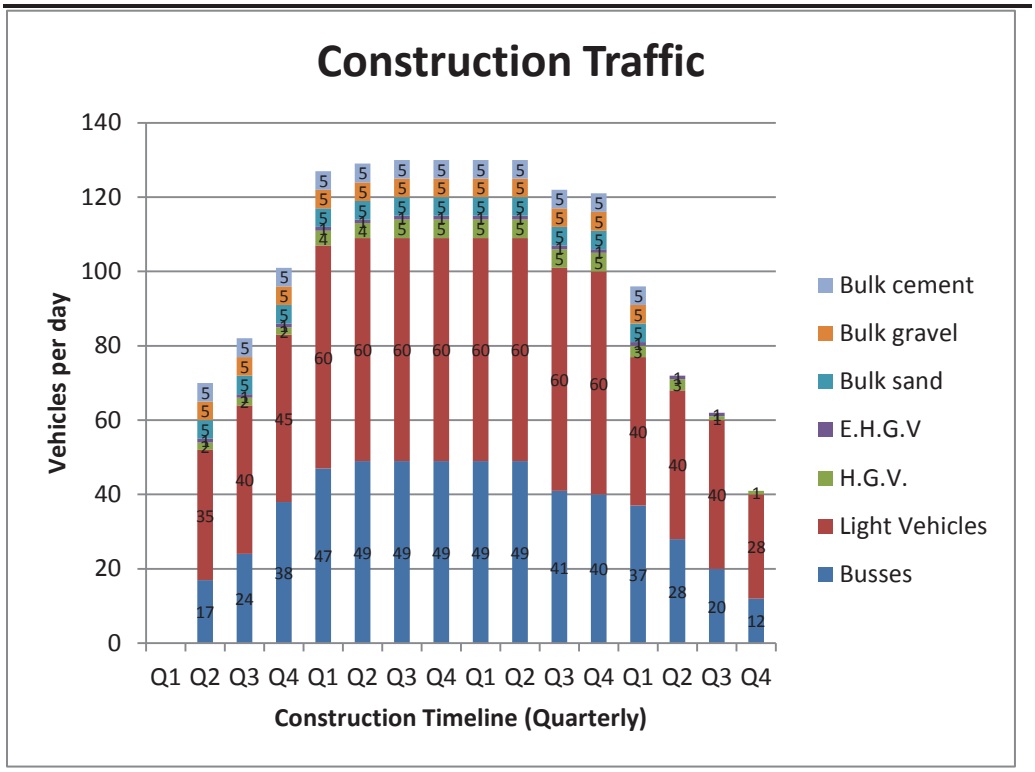
Approximately 35,000 tons of bulk cement and concrete aggregate, 800 tons re-bar steel, and 6,500 tons equipment and structural steel will need to be transported to the construction site.

It is envisaged that construction staff, up to a maximum of 350 persons, would be bussed to site in 8-seater or 10- seater mini busses and pass through this gate; about 40 - 50 busses per day, twice a day. Light vehicle traffic due to construction will start at around 35 vehicles per day and increase rapidly to 60 per day where it will remain for the bulk of the construction period.

There will be an expected 5 vehicles per day of HGV's, bulk gravel, bulk sand, and bulk cement respectively for the duration of the construction phase right up to Q1 of year 4, after which it tails off rapidly.

The gas turbines and other heavy equipment will be delivered via truck. This will involve some abnormal loads being moved on the roads during this time.

Figure 11.5 Predicted traffic loads during the construction phase



Water Requirements During the Construction Phase

During the construction phase the main water requirement will be for the concrete batching plant. It is estimated that 30 000m³ of water will be required for the concrete batching. Additional water will be required for:

- Off-site dust control: Post treatment recycled water will be used for dust control on unsurfaced roads where required during high traffic periods and during construction. Estimated temporary provision of 5,000 m³ per annum in 2017 and 2018.

- Domestic purposes by on site workers: Maximum water usage during peak construction period (600 site personnel) is estimated to be 60 m³/day. This peak requirement is estimated to be needed for approximately 2 years – 2017 and/ 2019.

- Construction and on-site dust control: Water is required for the manufacture of concrete during construction. The power plant will require approximately 80,000 – 90,000 m³ of concrete for foundations, road works, hard standing and other site works. Estimated temporary provision of 5,800 m³ per annum - 2017 and/ 2019.

During the commissioning phase the following water will be required:

- 2,000 – 5,000 m^3 for blow-out of the steam piping (Testing/commissioning);
- 2,000 – 5,000 $m^3$for blow out and chemical clean of the Benson boilers; and
- 23 000m3 (approximately) for pipeline cleaning and hydraulic pressure testing.

Initially water will be trucked in 30 m^3 loads from local farms (ground and surface water sources) (1). It will be transferred to a temporary stainless-steel tank for immediate use in preparing concrete for a small lay-down area and foundations for the first permanent raw-water storage tanks.

Operation Phase

The power plant will be operated on a 24 hour, 7 days a week basis. The position and location of the buried gas pipeline will be indicated above-ground by special marker beacons laid above the pipeline in line-of-sight of each other along the pipeline servitude route (*Figure 11.6*). The markers will be able to collect and transmit essential pipeline information.

Figure 11.6 Example of a marker indicating pipeline below ground

The pipeline is expected to operate continuously, for 8760 hours per year, only the flow rate will vary.

(1) Agreements with land owners are currently in the process of being developed.

Employment during the Operation Phase

The number of workers on site during operations will be about 107 operational employees and up to 70 part-time employees. These will include plant management and maintenance staff, skilled mechanical and electrical technicians, drivers, medical, quality control, and cleaning staff and a number of experienced plant operators who will operate and maintain the plant, and who are expected to be a mix of expatriate and local staff.
As the plant will operate 24 hours a day, three full-time shifts will be created per day, and the breakdown of the skills required will be as follows:

- Skilled labour: 65 - 70 percent;
- Semi-skilled labour: 15 - 20 percent; and
- Unskilled labour: 10 - 15 percent.

A further breakdown of the employment opportunities is provided in *Table* 11.7.

Table 11.7 Estimated Employment Positions Available During Operation

Position	**Number of Positions Available**
Admin	4
Security	15
Warehouse and Stores	6
Medical	6
Plant Control	15
Engineers	9
Technicians	9
Skilled	9
Unskilled	9
Tuition and Training	4
Quality Control, Water	3
Canteen	6
Total	**95**

It is understood that there will be no worker accommodation on site during operation. The unskilled workforce will, as far as possible be employed from the local community, reducing the need to the provision of accommodation. The skilled and semi-skilled workforce from outside the area will be housed within Saldanha Bay Local Municipality.

Traffic Requirements during the Operation Phase

During commercial operations there will be some traffic bringing supplies and spares to the power plant. This will increase during shutdowns and periods of major maintenance.

Maintenance activities will be undertaken by an Operations and Maintenance (O&M) contractor.

Water Requirements during the Operation Phase

Water during operation will be required for the following activities:

- Motive steam for the combined cycle (1): Estimated annual provision 1500 m^3.

- Annual Cooling water for condensation of steam from steam turbine seals and vacuum plant seals: Estimated annual provision of 500 m^3 (Phase 1 and Phase 2).

- Cooling of lubrication oil for gas turbine, alternators and steam turbine generator, gas compressor air: Estimated annual provision of 500 m^3per year.

- As water/glycol for combustion air inlet cooling: A cooled water closed-loop is used to cool down the inlet combustion air to as close to 15 °C as possible. Estimated annual provision of 1500 m^3 per year.

- Make-up water for treated water replacement in event of any boiler blow-down requirement: Estimated annual provision of 1000 m^3 per year.

- Fire abatement: Estimated storage provision of 3000 m^3.

Water requirements during the operational phase are estimated as follows:

- Combined Cycle circuit, replacement feed water: 1 500 m^3/y
- Potable water: 200 m^3/y
- Water for ablutions during construction 25 m^3/day: 1 250 m^3/y
- Vacuum system and steam seal evaporative water loss: 500 m^3/y
- Sundry cooling system evaporative losses: 250 m^3/y
- Water/glycol cooling circuit losses: 1 500 m^3/y
- Other evaporative losses PV system washing):1,500 m^3/y Water will be produced by at least two methods:
    - Harvesting of rain water climate change dependent: 5 000 m^3/y
    - Desalination of sea water, 20 - 45 m^3/day, potable, up to 14 000 m^3/y. Sea-water to be pumped up to plant along gas servitude. This intended to be a ZLD (zero liquid discharge) process.
    - A third patented process currently being assessed: Recovery by vapour condensation in gas turbine exhaust.

It has been estimated that a provision of 25 000 m^3/year of water would be sufficient for operation of Phase 1 and Phase 2 of the power plant, this water would be sourced as follows:

(1) The Benson boiler does not consume water, in that there is no water discharge to out of battery limits, the quantity indicated here is a provision over and above what may be used for startup

- Trucking from local farms during the construction phase;
- Collection of annual precipitation in 5 x 2000m^3 storage tanks;
- A Reverse Osmosis plant on site using sea water that will be pumped up from the coast along the gas pipeline servitude. The RO process will be a zero discharge process; and
- Water recovery by condensation from the gas turbine exhaust.

Services

The following services will be provided by the project itself, managed by a services department on site or contracted to a third party:

- Electricity;
- Gas;
- Raw water treatment, including filtration RO and demineralisation;
- Water recovery from waste water;
- Sewage treatment;
- Boiler feed water;
- Boiler blow-down recovery;
- Condensate;
- Fire water;
- Cooling water;
- Hydrogen generator cooling system;
- CO^2 fire abatement system; and
- Compressed air.

11.4 STRUCTURE OF THE EMPR

The structure of the EMPr is indicated *Table 11.8*.

Table 11.8 Structure of the EMPr

Section	Heading	Content
Section 11.1-11.5	Introduction	Background information regarding the Site, Project Development and the EMPr.
Section 11.6	Implementation of the EMPr	Provides details of the communication and organisational structures within which the EMPr will be implemented, responsibilities of key role players, and provides the terms of reference for the construction team and Environmental Control Officer who will be utilised for all phases of the Project (ECO).
Section 11.7 – 11.16	Mitigation and Monitoring Measures	Mitigation and Monitoring measures for the Planning and Design, Construction, and Operational phases of the plant.

11.5 IMPLEMENTATION OF THE EMPR

11.5.1 Introduction

The EMPr details the mitigation measures which must be implemented during the development of the proposed Project and assigns responsibilities for specific tasks. The EMPr is applicable to all work activities during the pre-construction, construction, operation and decommissioning of the proposed gas fired power plant. It is an open-ended document implying that information gained during pre-construction, construction, operational and decommissioning activities and/or monitoring of procedures on the Site could lead to changes in the EMPr.

11.5.2 Environmental and Social Management System

An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by client/proponent, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders (see *Figure 11.7*). Drawing on the elements of the established business management process of "plan, do, check, and act," the ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.

The main elements of this approach comprise the following:

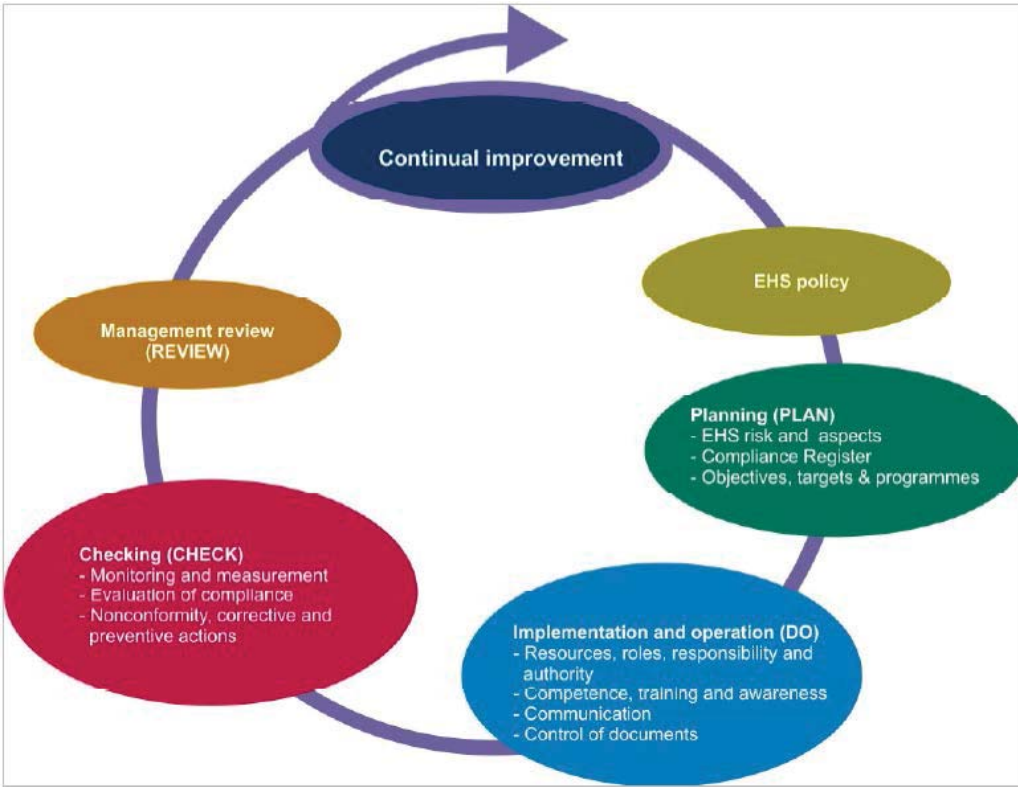
- **Planning**: Establishing actionable steps and key performance indicators, necessary to deliver results in compliance with regulations and obligations.

- **Doing**: Implementation of actionable steps, and assigning responsibilities for undertaking or implementing these requirements.

- **Checking**: Monitoring and measuring performance against key performance indicators, and other requirements, and reporting of the results.

- **Acting**: Taking actions to continually improve performance of the ESMP through the training of personnel and auditing of results.

Figure 11.7 Elements of an Environmental and Social Management System



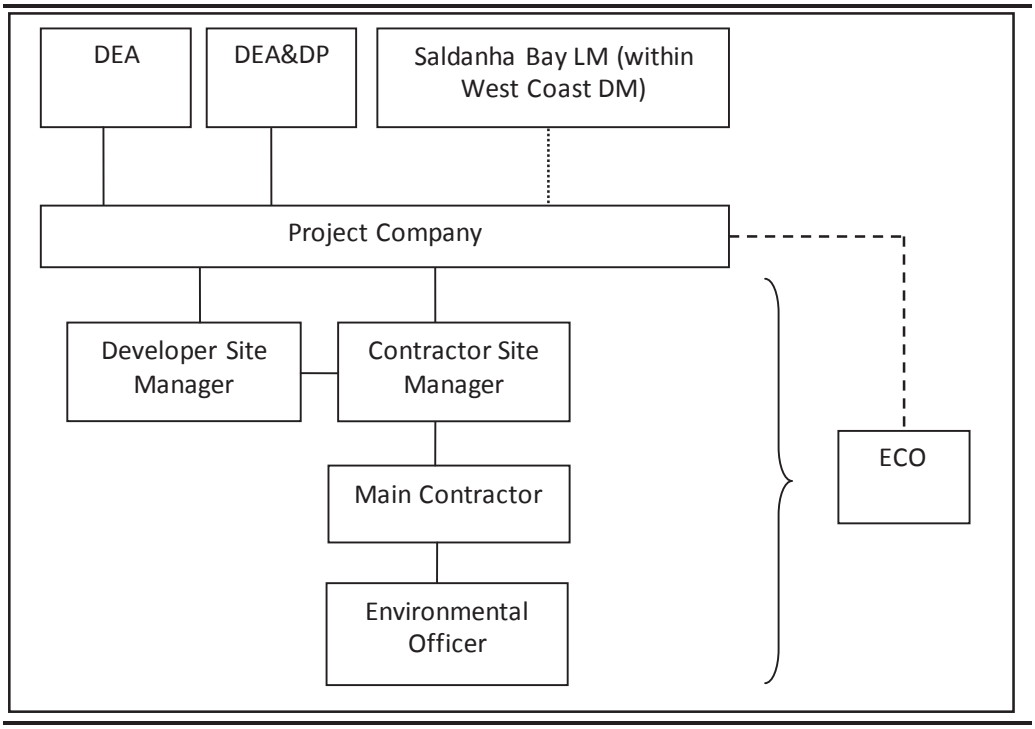
11.5.3 Roles and Responsibilities

The key role-players during the construction, operation and decommissioning phases of the plant, for the purposes of environmental management, include but are not limited to:

- the Project Company;
- Site Manager;
- Main Contractor;
- Environmental Control Officer (ECO); and
- Representatives of the relevant authority/ies.

Lines of communication and reporting between the various parties are illustrated in *Figure 11.8* below.

Figure 11.8 Roles and Responsibilities: Lines of Communication and Reporting



11.5.4 Communication Channels

Site Meetings during the Construction Phase

The ECO is required to attend regular meetings with the Project management team to facilitate the transfer of information and to update all parties on the environmental compliance of the project as a whole. The ECO will minute the discussions, and specifically any decisions arising relating to environmental management actions and responsibility.

The ECO will compile a summary report outlining the main construction activities relating to the environment, aspects of non-compliance, and document agreed environmental actions and dates of achieving compliance by the Main Contractor (MC). The summary report will form part of the construction phase EMPr records.

The following people should attend these meetings:

Project Company's (1) Representative;
- Site Managers (SM);
- ECO; and
- MC's representative.

(1) The Project Company refers to the company undertaking the project implementation.

Environmental Education and Awareness

The MC, in consultation with the ECO, shall arrange for a presentation to site staff to familiarise them with the environmental requirements of the construction phase of the EMPr within seven days from the commencement date of construction. This presentation should take cognisance of the level of education, designation and language preferences of the staff. General site staff would commonly receive a basic environmental awareness presentation or talk highlighting general environmental and social "do's and don'ts" (i.e. environmental induction), including good housekeeping practices. This information would be provided throughout construction in the form of regular toolbox (refresher) talks.

Management level staff on the Site, e.g. Site agents and foremen, who require more detailed knowledge about the environmental sensitivities on site and the construction phase requirements of the EMPr, will benefit from a separate and more detailed presentation of these issues. If required, the ECO may call upon the services of a professional trainer or environmental consultant to present the technical contents of the EMPr.

Environmental education of staff can be assisted by compilation of posters placed in staff venues e.g. canteens and site offices.

Method Statements

The MC must compile and provide Method Statements to the ECO and SM for approval prior to the commencement of construction activities. Method statements will be required for specific activities that are deemed or identified to pose a risk to the environment and/or which require site specific detail beyond that contained in the EMPr or when requested by the SM or ECO.

A Method Statement is a dynamic document in that modifications are negotiated between the MC and the ECO/project management team, as circumstances unfold. Changes to, and adaptations of, Method Statements can be implemented with the prior consent of all parties. All Method Statements will form part of the construction phase of the EMPr documentation and are subject to the terms and conditions contained within the construction phase of the EMPr.

Note that a Method Statement is a starting point for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

A Method Statement describes the scope of the intended work in a step-by-step description, in order for the ECO and the SM to understand the MC's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks.

For each instance where it is requested that the MC submit a Method Statement to the satisfaction of the SM and ECO, the format must clearly indicate the following:

- What - a brief description of the work to be undertaken;
- How - a detailed description of the process of work, methods and materials;
- Where - a description/sketch map of the locality of work (if applicable);
- When - the sequencing of actions with due commencement dates and completion date estimates;
- Who – The person/s responsible for undertaking the works described in the Method Statement; and
- Why – a description of why the activity is required.

ECO Diary/Logbook Entries

The ECO will maintain a Site diary or logbook that relates to environmental issues as they occur on the Site for record keeping purposes. Recorded issues will form part of feedback presented at Project meetings by the ECO.

Site Memo Entries

Site memos, stipulating recommended actions required to improve compliance with the EMPr by the MC will be issued by the ECO to the PM, who in turn will ensure that the MC is informed of the recommended instruction.

Comments made by the ECO in the Site Memo book are advisory and all consequential Site Instructions required may only be issued by the PM. Site Memos will also be used for the issuing of stop work orders to the MC for activities deemed to pose immediate and serious risk of unnecessary damage to the environment.

Dispute Resolution

Any environmentally related disputes or disagreements during the construction phase will firstly be referred to the SM or alternatively to the Department of Environmental Affairs (DEA) if no resolution on the matter is reached. Similarly, disputes or disagreements during the operations phase can be referred to the operational SM or the DEA if required.

Community Relations

The Project Company must continue to engage with stakeholders throughout the construction and operation phases. Communication with local communities and other local stakeholders will be a key part of this engagement process and will require the Project Company and MC to work closely together during the construction period. This should be facilitated

through a Stakeholder Engagement Plan (SEP) which would be developed prior to construction.

The objectives of communication and liaison with local communities are the following.

- To provide residents in the vicinity of the Site and other interested stakeholders with regular information on the progress of work and its implications.

- To monitor the implementation of mitigation measures and the impact of construction on communities via feedback from affected stakeholders in order to ensure that the mitigation objectives achieved.

- To manage any disputes between the Project Company, the contractors and local communities.

Grievance Procedure

The Project Company must develop a grievance procedure as part of the SEP to ensure fair and prompt resolution of problems arising from the project. The grievance procedure should be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders.

- Seek to resolve all grievances timeously.

- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for the resolution of grievances will lie with the Project Company and its contractors.

Social Responsibilities

The Project Company and MC must encourage and implement wherever possible the procurement of locally based labour, skills and materials.

- The Project will establish a recruitment policy which prioritises the employment of South African and local residents (originating from the Local Municipality). Criteria will be set for prioritising local residents and then other South Africans as part of the recruitment process.

A local procurement policy will be implemented to ensure that local procurement is maximised, the policy will include:

- Reasonable targets for using local suppliers.

- a clause of none discrimination on any grounds of gender, ethnicity, religion.

- Criteria for monitoring local procurement and reporting on supplier performance management.

- Clearly communicate the criteria and tendering process prior to the commencement of construction activities; and

- The procurement policy and tendering requirements must be easily accessible to potential suppliers.

The following will be implemented to enhance skills development and on-the-job training:

- Training plans will be developed according to each permanent employee' work agreement and relevant to their job description.

- Develop internal training 'certification' or reference letter provisions to those who receive internal training.

11.5.5 Review

Review of effectiveness of mitigation measures such as grievance measures; waste management; alien and open space management; re-vegetation and rehabilitation; plant rescue and protection; and traffic and transportation, will be undertaken periodically and recommendations included in the audit reports.

11.5.6 Auditing

The Project will be audited against the requirements of this EMPr by an independent third party. Auditing should be undertaken post construction and periodically thereafter. The audit reports will be provided to the competent authority and to other authorities on request.

11.6 MITIGATION AND MONITORING MEASURES

Mitigation and monitoring measures are presented in this section (*Table 11.9*) and reflect the relevant phase of applicability which may include:

- Planning and Design Phase (Pre-construction);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Mitigation and monitoring measures presented in the tables below have been prescribed by the EIA and specialist studies. The EMPr will require updating with conditions of the Environmental Authorisation and on the basis of the results of any monitoring programmes.

Table 11.9 Environmental Mitigation Measures

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
General									
General	Ensure legal compliance	Finalise layout of all components and submit to DEA for approval.	X				Approval of Final Layout	Project Company	Prior to commencement of construction
		Obtain any additional environmental permits required (e.g. AEL; permit to remove protected plant species etc.)	X				Permits as issued	Project Company	Prior to commencement of construction
		An upfront training session must be held to ensure all relevant personnel are aware of the provisions contained in the EMPr, any Environmental Authorisation, License or Permit issued and all agreed Method Statements	X				Training Records	Project Company and ECO	Once off at the start then as new personnel are hired
		Notify all registered I&APs and key stakeholders of the Environmental Authorisation and appeal procedure.	X				Proof of Notification	Project Company and appointed environmental consultant	Within 14 days of receipt of EA (EIA Regulations, 2014)
		Notify DEA prior to commencement of the activity.		X			Proof of Notification	Project Company and appointed environmental consultant	Timeframe stipulated in the EA
		Ensure that the EA and approved EMPr are available at the site.		X	X	X	Visual Inspection	Project Company and Contractors	Documents to be on site throughout Project life-cycle.
		EA and EMPr to form part of the contract with the Contractors appointed to construct the plant.	X	X			Signed commitment from all contractors	Project Company and Contractors	Contract signed prior to commencement of construction
	Audit Requirements	Appoint an independent ECO, who has expertise in the field, for the construction phase. The ECO will have the responsibility to ensure that the		X			Appointment of ECO	Project Company	Prior to commencement of construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		mitigation/rehabilitation measures and recommendations referred to in the EA are implemented and to ensure compliance with the provisions of the EMPr.							
		The ECO must maintain the following on site: • A daily site diary; • Copies of all reports submitted to the DEA; and • A schedule of current site activities including the monitoring of such activities.		X	X		Site Diary; copies of all reports and a project schedule	ECO	Throughout construction phase
		The Project Company must submit an environmental audit report to the relevant competent authority upon completion of the construction and rehabilitation activities.		X			Environmental Audit Report	Project Company and ECO	Upon completion of construction and rehabilitation activities.
Surface Water & Groundwater									
Impact on Surface and Groundwater	Implementation of Stormwater management principles to address runoff from disturbed portions of the site through appropriate design measures	Update and refine the Stormwater Management Plan (refer to *Section 11.15*) with engineering specifications.	X				Update of the Stormwater Management Plan	Project Company and civil engineers	Prior to construction during detailed design phase
		Implement energy dissipation structures where concentrated flows ensue.	X				Final SWMP	Project Company and civil engineers	Measure to be included in Final Design and implemented during construction
		Implement appropriate measures to trap sediment at sources where areas are going to be disturbed (e.g. construction materials laydown area). Mitigation measures could include sediment fences and erosion control blankets.	X				Final SWMP	Project Company and civil engineers	Measure to be included in Final Design and implemented during construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Design road networks to prevent the accumulation of high energy surface flows by specifying surface cross drains at regular intervals, by constructing roads to natural ground level or by including sufficient drainage in the form of culverts					Final SWMP and plant design	Project Company and civil engineers	Measure to be included in Final Design and implemented during construction
		Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into water courses.	X				Final Design	Project Company	Throughout period that workshops are present
		Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil.		X			Visual Inspection	Project Company and Contractors	During construction phase
		Stabilise all earthen berm structures by specifying adequate compaction and revegetating.		X			Visual Inspection	Project Company and Contractors	During construction phase
		Exercise good excavation practises during the construction phase. Backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.		X		X	Visual Inspection	Project Company and Contractors	During construction phase
		Implement free draining platforms (if required) for the substations and transformers to prevent the risk of flooding of infrastructure.	X				Visual Inspection	Project Company and civil engineers	Measure to be included in Final Design and implemented during construction
		Establish earthen berms to protect infrastructure against flooding.		X			Visual Inspection	Project Company and Contractors	During construction phase
		Implement attenuation facilities of areas that are drained.	X	X			Visual Inspection	Project Company and civil engineers	Measure to be included in Final Design and

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
									implemented during construction
	General conditions to minimise water use during construction and operation of the plant	Where feasible, use of closed circuit dry cooling system should be planned for to prevent unacceptable adverse impacts.	X				Final Design	Project Company	Measure to be included in Final Design and implemented during construction
		Project design to include measures for adequate water collection, spill control, leakage control systems and water-saving equipment e.g. low-flow toilets.	X				Final Design	Project Company	Measure to be included in Final Design and implemented during construction
	Minimise impacts on surface and groundwater due to run-off, erosion, spills of hazardous substances etc.	Fuel, oil, used oil and chemicals must not be stored where there can be accidental leakage in to surface or ground water. Methods for preventing leakage include appropriate bunding and other standard storage methods.		X	X	X	Method Statement for Storage of Hazardous Goods Visual Inspection	Project Company, Contractors	Throughout life cycle of the Project
		Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.		X		X	Maintenance records	Contractors	Throughout construction and decommissioning
		All surface water management infrastructure will be inspected and repairs made as soon as practically possible.			X		Visual Inspection	Project Company	Throughout construction and operation
Soils									
Impact on Soils	Minimise erosion, loss of topsoil and soil compaction during Project activities and try to conserve soil as a resource where	Implement the Erosion Management Plan as per *Section 11.16*. This includes the following:	X	X	X	X		Project Company, Contractors and ECO	Throughout life cycle of Project
		Restrict removal of vegetation and soil cover to the development footprint.		X		X	Visual Inspection	Project Company, Contractors	Throughout construction and decommissioning
		Soil stockpiles must be protected from		X		X	Visual Inspection	Contractors	Throughout

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
	practical and possible; or maximise the potential to re-use soils	wind or water erosion through placement, vegetation or appropriate covering.							construction and decommissioning
		Excavations/trenches should be backfilled slightly higher than the natural ground level to accommodate some degree of settlement of the backfill material.		X		X	Visual Inspection	Contractors	Throughout construction and decommissioning
		Exercise good excavation practises - backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.		X			Excavation Method Statement	Contractors	Throughout construction
		Construction vehicles will remain on designated and prepared roads. Special care should be taken to avoid driving on any sand dunes in the vicinity of the site.		X		X	Visual Inspection	Project Company, Contractors	Throughout construction and decommissioning
		Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil against erosion.		X			Visual Inspection	Contractors	Throughout construction
		Foundations and trenches must be backfilled with originally excavated materials as far as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.		X			Visual Inspection	Contractors	Throughout construction
		Borrow materials must only be obtained from authorised and permitted sites.		X			Visual Inspection	Contractors	Throughout construction
		Although soil erosion is not considered significant, it might be necessary to implement control measures such as		X			Engineering Design	Contractors	Throughout construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		suitable location on flatter areas with low erosion potential and the rapid establishment of vegetation through seeding of the stockpiles, to promote and reserve indigenous seeds and (soil fertility) organic matter							
		Where space constraints are not limiting, topsoil stockpiles will be constructed as low and long facilities not higher than 2m, or where space constraints limit this, stockpiles will be constructed as terraced stockpiles.		X			Visual Inspection	Contractors	Throughout construction
		Compacted areas must have adequate drainage systems to avoid pooling and surface flow.		X	X	X	Final Design	Project Company, Contractors	Throughout construction and operational phases, and if applicable, decommissioning
		Rehabilitation activities must commence at work faces as soon as construction activities have concluded. Phased construction and progressive rehabilitation should be implemented where practicably possible.		X		X	Visual Inspection	Project Company, Contractors	Throughout construction and decommissioning phases
Flora									
Disturbance / destruction of flora due to clearing of vegetation during construction and operation	Limit the loss of flora species and ensure legal compliance	The pipeline construction corridor in the area between the High and Medium – High sensitivity areas, through the dune area in particular, will be minimised and kept as narrow as possible, and should ideally be less than 25m wide in this area, or 30m at most.	X	X			Final Design	Project Company, Contractors	Final design prior to construction and corridor restrictions to be implemented during construction.
		Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be		X			Visual Inspection	Contractors and ECO	Weekly

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		surfaced or prepared immediately afterwards.							
	v	The ECO will ensure that no disturbance occurs outside the approved development footprints of the power plant site or the pipeline route during construction.		X			Visual Inspection	ECO	Throughout construction phase
	Reduce the impact of the development of the Project on listed and protected plant species and their habitats during construction	Implement the Plant Rescue and Protection Plan as per *Section 11.11*. This includes:	X	X			Plant Rescue and Protection Plan	Project Company, Contractors	Prior to disturbance of any natural areas.
		Plant Search and Rescue will be undertaken in the entire pipeline development corridor south of the MR559, prior to any development. Search and Rescue will also be undertaken for selected species within the power plant footprint prior to development.		X				Appointed specialist	Prior to any vegetation clearing activities occurring, once permits have been obtained for removing plants (if necessary)
		All translocatable plant species will be bagged up and stored in a nursery for later use, once construction has been completed and rehabilitation is required.	X	X			Visual Inspection	Project Company, Contractors, Appointed specialist	Prior to any vegetation clearing activities occurring
		Replanting of these rescued specimens will be undertaken in the first autumn – winter (May – June) after construction has been completed, giving the plants maximum time to establish before the next summer dry period.					Replanting schedule	Project Company, Contractors, Appointed specialist	Post-construction, during rehabilitation
		Immediately after being transplanted, species should be adequately watered.		X				Project Company, Contractors, Appointed specialist	Following transplant
		The approved development footprint will be surveyed and clearly	X	X			Visual Inspection	Project Company,	Prior to any vegetation clearing

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		demarcated with wire or coloured rope, and strung with warning signs, prior to any construction.						Contractors, Appointed specialist	activities occurring and implemented throughout construction phases
		A Training and Awareness Programme will be developed for employees and contractors to allow for training with regard to the areas of High and Medium – High sensitivity. This will be undertaken in conjunction with an experienced botanist.	X	X			Training and Awareness Programme, Training Records	Project Company and Specialist	Prior to any activities of disturbance
	Maximise rehabilitation efforts to allow for the re-introduction of plant species: *General Management Principles*	Implement the Revegetation and Rehabilitation Plan as per *Section 11.12*, which includes:		X			Revegetation and Rehabilitation Plan	Project Company, Contractors	Revegetation and habitat rehabilitation plan to be finalised during planning and design phase and implemented through lifecycle of project.
		Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.		X				Project Company, Contractors	Rehabilitation post-construction
		Once revegetated, areas should be protected to prevent trampling and erosion.		X				Project Company, Contractors	Rehabilitation post-construction
		No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.		X			Visual Inspection	Project Company, Contractors	Rehabilitation post-construction
		Fencing should be removed once a sound vegetative cover has been achieved.		X			Visual Inspection	Project Company, Contractors	Rehabilitation post-construction
		Any runnels, erosion channels or wash-		X			Visual Inspection	Project	Rehabilitation

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.						Company, Contractors	post-construction
		The movement of people and vehicles within rehabilitated areas must be restricted and controlled.		X	X		Visual Inspection	Project Company. Contractors	Access to be restricted throughout rehabilitation.
	Maximise rehabilitation efforts to allow for the re-introduction of plant species: *Topsoil Management Principles*	Topsoil should be retained on site in order to be used for site rehabilitation. Topsoil must be excavated to the correct depth. It is recommended that no more than the top 10cm of topsoil are stored and used for rehabilitation.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Topsoil removed from the pipeline trench must be kept separate from other fill during the construction process, and must be replaced last, on the soil surface.					Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for a long time and should be used as soon as possible.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Ideally stored topsoil should be used within a month and should not be stored for longer than three months. In addition, topsoil stores should not be too deep, a maximum depth of 1m is recommended to avoid compaction		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		and the development of anaerobic conditions within the soil.							
		If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile in order to intercept any sediment, and runoff should be directed away from the stockpiles upslope.		X			Visual Inspection		Rehabilitation post-construction
	Maximise rehabilitation efforts to allow for the re-introduction of plant species: *Transplant Principles*	Plants for transplant should preferably be removed from areas that are going to be cleared.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Transplants should be placed within a similar environment from where they came in terms of aspect, slope and soil depth.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Transplants must remain within the site and may not be transported off the site.		X			Visual Inspection	Project Company. Contractors	Rehabilitation post-construction
		Additional rehabilitation of the pipeline servitude south of the MR559 will be undertaken using relevant locally indigenous species that are additional to those used in the Search and Rescue process.		X			Visual Inspection	Appointed specialist (i.e. experienced horticultural contractor)	Rehabilitation post-construction
		Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level			X		Visual Inspection	Project Company. Contractors	As necessary
Introduction of alien invasive species	Manage alien plant infestation during all phases through implementation of the Alien Invasive Management Plan	Implementation of the Alien Invasive Management Plan (refer to *Section 11.10*); which includes:		X	X	X	Implementation of the Alien Invasive Management Plan	Project Company, Contractors and ECO	Throughout life cycle of the Project
		Lighter infested areas should be cleared first to prevent the build-up of		X	X	X		Project Company,	Throughout life cycle of the Project

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		seed banks.						Contractors and ECO	
		No spraying of herbicide will be undertaken in rehabilitated areas as this kills numerous non-target species. The focus will be on removing (using CapeNature approved methodology) all alien invasive shrubs and large herbs, although in some cases it may be possible and necessary to also remove invasive alien grasses.		X	X	X		Project Company, Contractors and ECO	Throughout life cycle of the Project
		Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.		X	X	X		Project Company, Contractors and ECO	During construction phase
		Clearing of vegetation is not allowed within 32m of any wetland, 80m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas.		X	X	X	Visual Inspection Written permission from ECO	Project Company, Contractors and ECO	During construction phase
		Alien invasive species (such as ryegrass or oats) or straw containing any such species will not be used for temporary soil stabilisation of the pipeline corridor.		X		X		Project Company and ECO	During construction phase
		Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.		X		X	Visual Inspection	Contractors and ECO	Weekly inspections of stockpiles
		Per the Alien Invasive Management Plan, document and record alien invasive plant management including:		X	X	X	• Alien plant distribution map	Project Company, Contractors and	Throughout life cycle of the Project on a biannual basis

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		• alien plant distribution; • alien plant control measures implemented; and • evaluation of control success rate					• Record of clearing activities • Decline in documented alien abundance over time	ECO	
		Ongoing alien invasive plant management will be undertaken on a biannual basis within any undeveloped portions of the power plant site and within the full pipeline servitude.			X			Project Company	Biannual basis during operational phase
Fauna									
Loss of faunal habitat	Minimise impact to fauna during project activities as a result of habitat loss	Demarcate all areas to be cleared with construction tape or similar material.	X	X		X	Visual inspection	ECO and Contractors	Prior to clearance activities
		The ECO will provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially in the vicinity of sensitive features.		X		X		ECO	During construction and decommissioning vegetation clearing activities.
		All vehicles are to remain on demarcated roads and no driving in the veld will be allowed. The exception to this will be along the pipeline route during construction when all vehicles should follow the same track.		X		X		ECO and Contractors	
		There will be no fuelwood collection permitted on the site.		X		X	Visual inspection and ongoing monitoring	ECO and Contractors	Throughout construction and decommissioning activities
		No fires will be allowed on-site.		X		X	Visual inspection and ongoing	ECO and Contractors	Throughout construction and

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
							monitoring		decommissioning activities
		Sensitive habitat features will be avoided.	X	X			Visual inspection and ongoing monitoring	Project company and ECO	Prior to and during construction and operation activities
Direct Faunal Impact	Minimise direct impact to fauna during construction and decommissioning as a result of disturbance	All vehicles at the site will adhere to a low speed limit to avoid collisions with fauna such as tortoises.		X		X		ECO and Contractors	During construction and decommissioning
		Personnel will not be allowed to roam into the veld.		X		X	Visual inspection and ongoing monitoring	ECO and Contractors	During construction and decommissioning
		All personnel will undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.		X		X	Training materials and records	ECO and Contractors	During construction and decommissioning
		No activity will be allowed in the veld between sunset and sunrise.		X		X	Visual inspection and ongoing monitoring	ECO and Contractors	During construction and decommissioning
		Any dangerous fauna (snakes, scorpions etc) that are encountered during construction will not be handled or molested by the construction staff and the ECO or other suitably qualified persons will be contacted to remove the animals to safety.		X		X		ECO and Contractors	During construction and decommissioning
		No litter, food or other foreign material will be thrown or left around the site and should be placed in demarcated and fenced rubbish and litter areas.		X		X	Visual inspection and ongoing monitoring	ECO and Contractors	During construction and decommissioning

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Holes and trenches will not be left open for extended periods of time and should only be dug when needed for immediate construction. Trenches that may stand open for some days, will have places where the loose material has been returned to the trench to form an escape ramp present at regular intervals to allow any fauna that fall in to escape.		X		X	Visual inspection and ongoing monitoring	ECO and Contractors	During construction and decommissioning
		If there is any part of the site that needs to be lit at night for security reasons, then this will be with low-UV emitting types which do not attract insects.		X		X	Visual inspection	ECO and Contractors	During construction and decommissioning
Habitat degradation during construction and operation	Minimise degradation of faunal habitats during project activities	Personnel will not be allowed to roam into areas not demarcated for construction, operation and decommissioning activities.		X	X	X	Visual inspection and ongoing monitoring	ECO, Contractors and Project Company	All phases of the project
		No activity will be allowed in the veld between sunset and sunrise.		X	X	X	Visual inspection and ongoing monitoring	ECO, Contractors and Project Company	All phases of the project
		No litter, food or other foreign material should be thrown or left around the site and will be placed in demarcated and fenced rubbish and litter areas.		X	X	X	Visual inspection and ongoing monitoring	ECO, Contractors and Project Company	All phases of the project
		All hazardous materials will be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site will be cleaned up in the appropriate manner as related to the nature of the spill.		X	X	X	Method Statement for Storage of Hazardous Goods Visual Inspection	ECO, Contractors and Project Company	All phases of the project
Avifauna									
Loss of avifaunal habitat due to	Minimise impacts on birds during	The temporal and spatial footprint of the development will be kept to a		X	X		Visual Inspection	Project Company,	Boundaries to be established prior

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
clearing of vegetation during the construction phase	construction and operational activities as a result of habitat loss	minimum. The boundaries of the development area are to be clearly demarcated.						Contractors and ECO	to construction and maintained throughout construction phase
		Existing roads must be used as much as possible for access during construction.		X		X	Visual Inspection	Project Company, Contractors and ECO	Throughout construction and decommissioning phases
		Site personnel are to receive adequate training with regard to minimising areas of disturbance and avifaunal impacts and proposed management.		X	X	X	Training Records	Project Company, Contractors and ECO	Once off at the start then as new personnel are hired
		Any bird nests that are found during the construction phase must be reported to the ECO.		X		X	Records of birds' nests	Project Company, Contractors and ECO	Throughout construction and decommissioning phases
Disturbance of avifauna from construction activities and operational maintenance activities	Minimise impacts on birds during construction and operational activities as a result of destruction and displacement.	Ensure that all new lines are marked with bird flight diverters. Bird-diverters must be securely fitted and be readily and cost effectivity installed. Diverters should be fitted in consultation with an avifaunal specialist.		X	X	X	Visual Inspection; Final Design	Project Company, Contractors and ECO	Throughout construction
		All new power infrastructure must be adequately insulated and bird friendly in configuration (i.e. to allow for perching or roosting without electrocution).	X				Final Design	Project Company	Prior to construction
		If any priority species identified in this report are observed to be roosting and/or nesting and breeding in the vicinity, the ECO will be notified.		X	X	X	Records of birds' nests	Project Company, Contractors and ECO	Throughout construction and decommissioning phases
		The laydown areas and site offices etc. will be as close to the site as possible.	X	X		X	Final Design	Project Company	Prior to construction
		Driving must take place on existing		X	X	X	Visual Inspection	Project	Throughout

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		roads and a speed limit of 50 km/h must be implemented on all internal roads.						Company, Contractors	construction and decommissioning phases
		If birds are nesting on power infrastructure and cannot be tolerated due to operational risks of fire, electrical short or other problems, birds will be prevented from accessing nesting sites by using mesh or other means of excluding them. Birds will not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks will be allowed to fledge their chicks before nests are removed. If there are any persistent problems with avifauna, then an avifaunal specialist will be consulted for advice on further mitigation.			X		Visual Inspection	Project Company, appointed specialist	During operations phase
Marine Ecology									
Impact to Marine Ecology due to seawater abstraction	Avoid impingement and entrainment of marine organisms.	Water to be drawn into the intake heads at a velocity of 14 l/s, screened through appropriate coarse and fine screens before being pumped to site.	X		X		Monitoring and visual inspection	Project Company	During operation phase
Marine Water Quality									
Impact on marine water quality incidences	Limit construction footprint	Any soil removed to bury the pipeline at the beach-crossing must be deposited in the Reclamation Dam. The sand must be spread over the Reclamation Dam to prevent sand from protruding above the water.	X				Monitoring and visual inspection	Project Company	During construction
Noise									
Increased noise levels associated	Reduce the impact of increased noise levels	Proper stack and ducting design, verified by finite element analysis of the various exhaust path sections.	X				Final Design	Project Company	During planning and design phase

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
with construction and operation activities on site.	on the community and the workforce	Incorporate sound attenuation lining within the flue stacks to nullify the potential amplification of pulsating exhaust disturbances.	X				Final Design	Project Company	During planning and design phase
		Buildings that will house noise generating equipment should be designed to incorporate sound attenuation.	X				Final Design	Project Company	During planning and design phase
		Increased stack diameter and reduced exhaust stack temperature through better, more efficient heat recovery and design of the heat recovery steam generators.	X				Final Design	Project Company	During planning and design phase
		Regular, scheduled maintenance of equipment, including exhaust and intake mufflers will be undertaken.		X	X	X	Maintenance Schedule and Log Book	Project Company; Contractors	As per maintenance schedule
		Internally "steel-brush" the larger steam pipelines before being assembled to reduce total 'blow-out' time.		X			Final Design	Project Company; Contractors	During assembly of the steam pipelines
		Advise people close to the facility, of the times during which high noise levels would be generated during safety valve testing, and recommend ear safety procedures for workers if warranted.		X	X		Proof of notification	Project Company	A day in advance of safety valve testing
		Mechanical equipment with lower sound power levels must be selected to ensure that permissible occupation noise-rating limit of 85 dBA is not exceeded.		X		X	Equipment inventory	Project Company, Contractors and ECO	Equipment used during construction and decommissioning
		Site personnel (including construction workforce and operational personnel) must wear hearing protection where the 8-hour ambient noise levels exceed 75dBA.		X	X	X	Visual Inspection	Project Company, Contractors and ECO	Throughout life cycle of Project where ambient noise levels are exceeded

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Ensure that workers accessing the site conduct themselves in an acceptable manner as far as noise generation is concerned.		X	X	X	Records of environmental inductions	Project Company; Contractors	Throughout life cycle of Project
		On site construction activities are to be limited to daylight hours as far as possible. Should construction activities need to be undertaken outside of these times, landowners need to be consulted.		X		X	Construction Schedule; Working Hours	Contractors	During construction and decommissioning phases
		A grievance procedure will be established whereby complaints are recorded and responded to.		X	X	X	Grievance Register	Project Company, Contractors and ECO	Throughout life cycle of Project
Air Quality									
Decreased ambient air quality resulting from: • Land clearing activities • Road construction activities • Wind erosion from exposed areas • Activities associated with operation of the power plant	Appropriate design measures to minimise impacts on the ambient air quality Reduce PM_{10} concentrations and dustfall	Stack heights must be designed according to Good International Industry Practice (GIIP) to avoid excessive ground level concentrations and minimise impacts.	X				Final Design	Project Company	Detailed design phase
		Dust suppression techniques must be used before and during surface clearing, excavation and piling activities on all exposed surfaces. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.		X		X	Visual Inspection	Project Company, Contractors and ECO	Throughout construction and decommissioning phases
		Where necessary, stock piles of soil must be covered by suitable shade cloth or netting to prevent erosion, fugitive dust and to prevent the escape of dust during loading and transfer from site.		X			Visual Inspection	Project Company, Contractors and ECO	Throughout construction and decommissioning phases

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Loads of vehicles carrying dusty construction materials will be covered.		X		X	Visual Inspection	Project Company, Contractors	Throughout construction and decommissioning phases
		Loading and unloading bulk construction materials will be done in areas protected from the wind in calm conditions.		X		X	Visual Inspection	Contractors	Throughout construction and decommissioning phases
		Access to the construction site will be limited to construction vehicles only.		X		X	Visual Inspection	Contractors	Throughout construction and decommissioning phases
		Vehicle speed restrictions on the construction site will be imposed.		X		X	Visual Inspection	Contractors	Throughout construction and decommissioning phases
		A maintenance programme for construction vehicles will be implemented to ensure optimum performance and reduced emissions		X		X	Maintenance Schedule	Contractors	Throughout construction and decommissioning phases
		Vehicles carrying dusty materials will be cleaned before leaving the site		X		X	Visual Inspection	Contractors	Throughout construction and decommissioning phases
		Servicing programs for all operational components of the facility must be developed and implemented according to design specifications and requirements.			X		Servicing programmes	Project Company	Servicing according to design specifications and requirements
		Critical components must be in stock to ensure the availability of spares in the event of mechanical faults.			X		Stock inventory	Project Company	Throughout operation
		Commitment to use only LNG or CNG as the primary fuel.			X			Project Company	Throughout operation
		Any complaints received from neighbours or site users regarding air		X	X	X	Grievance	Project	Throughout life

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		quality must be reported to the Site Manager.					Register	Company, MC and ESO	cycle of Project
		Annual stack emission testing for SO_2, NO_x and PM to monitor efficiency of mitigation measures must be undertaken. The licence conditions of the atmospheric emissions license (AEL) shall describe the monitoring which needs to be done; therefore no specific monitoring requirements is prescribed until the AEL is obtained.			X		Stack emission testing results	Project Company	Annually during operations
		An atmospheric emissions license (AEL) will be obtained as required in terms of the legislation and conditions of approval adhered to.	X	X	X	X	Air Emissions Licence	Project Company	AEL must be obtained before construction. Conditions therein must be adhered to throughout project lifecycle.
Climate Change									
		The plant's thermal efficiency will be maximised throughout the life of the plant in order to reduce the gas consumption and therefore GHG emissions per unit of electricity (i.e. kWh or MWh) generated.			X		A combined thermal efficiency and GHG management plan	Project Company	During operation
		A plant specific assessment informed by the operations and maintenance (O&M) requirements for the equipment in question, and assessments will be carried out upon final selection of the equipment and, subsequent to the commencement of operations, periodically.	X				Plant specific assessment report	Project Company	Prior to the commencement of construction
		The Project documents note the potential for converting at least two of the 42 MW Trent60 OCGTs in Phase 1			X			Project Company	During operation following the commencement of

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		to combined cycle at a later stage for improved efficiency. The option to make such a change will be reviewed periodically and implemented when possible, and on as many of the six Trent60 turbines as is feasible.							Phase 2
		A combined thermal efficiency and GHG management plan will be developed to manage GHG emissions. Recommendations for aspects to be included in this plan are detailed in the Climate Change Specialist Study (see attached in *Annex D*).			X		A combined thermal efficiency and GHG management plan	Project Company	Prior to operation
		A detailed energy management plan including a baseline in accordance with SANS 50001will be prepared as required by the Department of Energy. The energy management plan will need to include a list of technically and financially viable measures that can be put in place to meet the savings potential.			X		Energy management plan	Project Company	Prior to operation
		The Project plans to make use of solar PV energy to meet some of the plant's auxiliary load requirements. Renewable energy can play a key role in the site's GHG emissions management plan and further opportunities to install more renewable capacity on-site will be investigated going forwards.			X			Project Company	During operation
Traffic									
Impact on traffic levels	Minimise traffic associated with the construction and operation of the	Implement the Traffic Management Plan (refer to *Section 11.14*); which includes the implementation of:		X	X	X	Traffic Management Plan	Project Company Contractors	Throughout the lifecycle of the Project

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
	Project								
		Conduct a road condition survey in order to gauge the damage to the road as a result of the intensive heavy traffic.	X				Road Condition Survey	Project Company; appointed specialist	Prior to construction
		The risk assessment of the proposed improvements to OP7644 should be the subject of a Road Safety Audit (RSA).	X				Road Safety Audit	Project Company; appointed specialist	Detailed design stage
		All employees must attend an environmental training programme which will include details of approved access roads and speed limits.		X		X	Training Records	Contractors; ECO	Prior to construction and during duration of contract
		Adjacent landowners must be notified of the construction and operation schedule.		X	X	X	Proof of Notification	Project Company	Prior to construction and operation phases
		Flagging must be provided at access points to the site and must be maintained until construction is completed.		X		X	Visual Inspection	Contractors	During construction and decommissioning phases
		All vehicles must be maintained in good condition to ensure that they are road worthy.		X	X	X	Maintenance Records Vehicle inspections	Project Company; Contractors	Throughout the lifecycle of the Project
		Speed restrictions must be established and enforced over all traffic.		X	X	X	Method Statements; Speeding Register	Project Company; Contractors	Throughout the lifecycle of the Project
		The movement of all vehicles within the site must be on designated roadways.		X	X	X	Visual Inspection	Project Company; Contractors	Throughout the lifecycle of the Project
		All necessary transportation permits to be applied for and obtained from the relevant authorities prior to	X				Transportation Permits	Project Company; Contractors	Prior to construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		construction, including access to the site from OP7644 which will include the addition of proposed turning lanes.							
		If abnormal loads are required, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.	X	X	X	X	Abnormal load permits	Project Company; Contractors	As and when required.
		A designated access point to the site must be created and clearly marked to ensure safe entry and exit.		X		X	Visual Inspection	Contractors	During construction and decommissioning phases
		Signs must be placed along construction roads and at the entrance to the site to identify speed limits, travel restrictions and other standard traffic control information and road markings.		X		X	Visual Inspection	Contractors	During construction and decommissioning phases
		Where possible, construction vehicles to avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.		X		X	Method Statement	Contractors	During construction and decommissioning phases
		All trucks transporting materials and water to and from the site must be appropriated covered during the construction phase.		X		X	Visual Inspection	Contractors	During construction and decommissioning phases
Impact on road safety	Manage vehicles and machinery to reduce the impact of traffic incidents.	A public transport embayment will be provided downstream of the entrance to the power plant and on both sides of the OP7644.			X		Final Design	Project Company	To be constructed during construction phase and implemented during operation
		All internal and access roads that will			X		Visual Inspection Maintenance Plan	Project Company	Throughout operational phase

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		be used during the operational phase of the Project must be maintained.							
Socio-Economic									
Employment, Skills Enhancement and Local Business Opportunities	Optimise opportunities for employment of local people, wherever possible, or alternatively that employment of South Africans, is prioritised over foreigners	Establish and implement a recruitment policy which prioritises the employment of South African and local residents (originating from the Local Municipality) over foreigners. Criteria will be set for prioritising local residents and then other South Africans as part of the recruitment process.	X	X	X	X	Recruitment Policy	Project Company	Throughout all phases of the Project
		All contractors will be required to recruit in terms of the Project's recruitment policy, where practical.	X	X	X	X	Recruitment Policy	Contractors	Throughout all phases of the Project
		The Project will meet with the Local Municipality and the IDZ to access any available skills/employment-seekers database for the area. This database is to be updated and made available to the appointed contractors.	X	X	X	X		Project Company	Throughout all phases of the Project
		Advertise job opportunities and criteria for skills and experience as needed through local media. This information should also be provided to all relevant authorities, community representatives and organisations on the interested and affected party database.	X	X	X	X		Project Company	Advertise at least three months ahead of recruitment
		Monitor on-the-job performance and training through performance reviews. Training needs will be identified and provided by the Project.	X	X	X	X	Performance Reviews Training Records	Project company, Contractors	Throughout all phases of the Project
Impacts on	Ensure effective	Compile and implement a grievance		X	X	X	Grievance	Project	To be

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
affected and surrounding landowners and land uses	communication mechanisms	procedure that is easily accessible to the local community, through which complaints related to contractor or employee behaviour can be lodged and responded to.					mechanism procedure	Company, Contractors	implemented during construction, operational, and if applicable, decommissioning phases
Community Health and Safety: Impacts associated with: • presence of the Project workforce; • influx of jobseekers; • air emissions	To protect members of the public / landowners / residents.	Develop an induction programme, including a Code of Conduct, for all workers directly related to the project and address the following aspects: • respect for local residents and customs; • zero tolerance of bribery or corruption; • zero tolerance of illegal activities; • no alcohol and drugs policy during working time or at times that will affect ability to work; • description of disciplinary measures.	X	X	X	X	Code of Conduct to be signed by each person.	Project Company	To be developed during planning and design phase and implemented during construction, operation, and if applicable, decommissioning phases
		Develop and implement an HIV/AIDS policy and information document for all workers directly related to the Project.		X	X	X	HIV/AIDS policy and information document	Project Company	To be implemented during construction, operational, and if applicable, decommissioning phases
		Secure the site, working areas and excavations in an appropriate manner.		X	X	X	Visual Inspection	Project Company, Contractors	During site establishment and maintenance for duration of contract.
		Implement access control procedures		X	X	X	Visual Inspection	Project	During site

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		which allows for the identification of all people on-site.						Company, Contractors	establishment and maintenance for duration of contract. Operational phase
Risk to Workers' Health and Safety due to Hazardous Construction and Operational Activities	To protect the construction workforce and operational personnel	The Project will comply with all applicable South African legislation in terms of health and safety, and worker rights, which will include access to workman's compensation for loss of income resulting from an onsite incident.		X	X	X	Workman's compensation policy as part of contract	Project Company, Contractors	Compliance throughout construction, operation, and if applicable, decommissioning phases
		As part of the contractor and supplier selection process the Project will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in South African law, international standards and the Project's policies.		X	X	X		Project Company, Contractors	Throughout all phases of the Project
		The Project will provide support to contractors and subcontractors to ensure that labour and working conditions are in line with South African law through capacity building.		X	X	X	Training records	Project Company, Contractors	Throughout all phases of the Project
		Workers will be provided with primary health care and basic first aid at construction camps / worksites.		X		X	Visual inspection	Contractors	Throughout construction and decommissioning phases
		In line with the worker code of conduct employees should not be under the influence of intoxicants which could adversely affect the ability of that employee to perform the work or adversely affect the health and safety of		X	X	X	Conduct breathalyser tests at random	Project Company, Contractors	Throughout all phases of the Project

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		other employees, other persons or the environment.							
		Provide Personal Protective Equipment (PPE), training and monitoring as well as ongoing safety checks and safety audits		X	X	X	Visual Inspection	Project Company, Contractors	Throughout all phases of the Project
		Ensure that all workers on site are aware of the proper procedure in case of a fire occurring on site.		X	X	X	Emergency Preparedness and Response Plan Training Records	Project Company, Contractors and ECO	Prior to construction and during duration of contract
		Establish the necessary ablution facilities with chemical toilets at appropriate locations on site (1 toilet per every 15 workers).		X		X	Visual Inspection	Contractors	During site establishment and maintenance for duration of contract
Visual									
Visual Impacts associated with the plant	To reduce the visual impact of the Project activities on the surrounding communities	Construction areas to be kept neat and tidy, with litter and dust management measures in place at all times.		X		X	Visual Inspection	Project Company, Contractors	Throughout construction phase
		If construction or operation is to occur during the night, all lights used for illumination will be designed and installed appropriately to avoid excessive light spill		X	X		Visual Inspection	Project Company, Contractors	During construction and operation phases
		Signage related to the Site must avoid commercial messages, be discrete, and be confined to entrance gates unless they serve to inform the public about the facility.			X		Visual Inspection	Project Company	Throughout operation
		All equipment and infrastructure on site will be removed and the impacted areas rehabilitated unless an alternative use for the infrastructure is identified in the closure plan.				X	Visual Inspection	Project Company	Following the decommissioning phase

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
Cultural Heritage									
Impacts to Pre-colonial & Colonial Archaeology, Graves and Cairns		Should any human burials, archaeological or palaeontological materials (fossils, bones, artefacts etc.) be uncovered or exposed during earthworks or excavations, they must immediately be reported to the Heritage Western Cape must be notified (Telephone: 021 483 9685), as well as Environmental and Heritage Section of the Saldanha Bay Municipality		X			Report sent to the Heritage Western Cape	Project Company and Contractor with assistance from heritage specialist	During construction
		After assessment and if appropriate a permit must be obtained from the SAHRA or HWC to remove such remains.		X			Heritage permit	Project Company and Contractor with assistance from heritage specialist	During construction
Impacts to buried Palaeontology		Sub-surface excavations should be monitored by a palaeontologist or archaeologist with appropriate palaeontological knowledge. The frequency of this to be worked out a priori with the contractor to minimise time spent on site.		X			Monitoring reports	Project Company and Contractor with assistance from a palaeontologist	During construction
		Any material recovered will be lodged in the Cenozoic collections of Iziko South African Museum.		X				Project Company and Contractor with assistance from a palaeontologist	During construction
		If any palaeontological material is uncovered, permit for the disturbance and removal of palaeontological material will be required from the Western Cape Provincial Heritage		X			Heritage permit	Project Company and Contractor with assistance from heritage specialist	During construction

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Agency.							
		Training in the nature and value of palaeontological and archaeological remains should be provided to project staff and equipment operators.		X			Training materials and attendance registers	Project Company, ECO, Contractor and Palaeontologist	During construction
		Should anything of a palaeontological nature be encountered on site by the Contractor (or any other party), e.g. bones or wetland deposits, work is to be stopped in that area immediately, and the OM / Principal Agent notified. Failure to do so will result in a penalty and this must be carefully explained to workers during the Environmental Education Programme undertaken by the OM.		X				Project Company, ECO, Contractor	During construction
		In the event of palaeontological material being encountered, the OM will demarcate the area and notify the appointed specialist (palaeontologist/ archaeologist with appropriate experience) who will view the material and ascertain whether further study of the area is required.		X			Visual inspection	Project Company, ECO, Contractor and Palaeontologist	During construction
		Should the specialist confirm a genuine fossil or sub-fossil and recommend further study of the area, work in the applicable area is to cease until further notice while arrangements are put in place. Heritage Western Cape (HWC) is to be informed immediately by the OM (Telephone: 021 483 9685).		x				Project Company, ECO, Contractor and Palaeontologist	During construction
Waste Management									

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
Pollution of the environment caused by waste	Limit the potential for site pollution and the accumulation of waste materials on site.	A suitable area for the storage of waste must be selected and included in the site layout plan.	X					Project Company	Prior to construction
		An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. The requirements of the Waste Management Plan (see *Section 11.17*) should be implemented.	X	X	X	X	Waste Management Plan	Project Company	Plan to be developed prior to construction and implemented throughout Project
		Where required, bunds will need to be constructed for fuel, oil, used oil and chemical storage areas. Bunds must be appropriately surfaced and have sufficient volume to accommodate any leaks as per the requirements of SABS 089:1999 Part 1.	X	X	X		Visual Inspection	Project Company, Contractors	Bund design to be confirmed prior to construction.
		All waste must be separated into clearly marked skips for recycling, reuse and disposal.		X	X	X	Visual Inspection	Project Company, Contractors	
		Vegetative material will be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation, provided that they are free of seed-bearing alien invasive plants.		X			Rehabilitation Plan	Project Company, Contractors	
		Any hazardous waste must be removed by a licensed waste disposal operator.		X	X	X	Waste Disposal Certificates	Project Company, Contractors	
		Hazardous substances must not be stored where there could be accidental leakage into surface or groundwater.		X	X	X	Visual Inspection	Project Company, Contractors	

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Waste must not be disposed of by burning, dumping or burying.		X	X	X	Visual Inspection	Project Company, Contractors	
		Littering on-site is forbidden and clean-up operations will be undertaken to address litter.		X	X	X	Visual Inspection	Project Company, Contractors	Daily clean-up operations to be undertaken.
		Temporary ablutions will be located in convenient locations around the Site, and must be cleaned regularly by a licenced sanitary contractor. All temporary ablutions must be removed from the site when the construction phase is completed		X			Waste Management Policy Visual Inspection	Contractors	
		Effluent from the cement batching plant must be contained within a settling sump and not be allowed to drain into water courses. Effluent will be recycled or removed.		X			Waste Disposal Certificates Visual Inspection	Project Company, Contractors	
		Excess or spilled concrete should be confined to the batching plant and work locations, and be disposed of as waste at a licensed landfill site.		X			Method Statement Waste Disposal Certificate Visual Inspection	Project Company, Contractors	
		The visible remains of the mixing of concrete, either solid or from washings, shall be physically removed and disposed of as waste at a licensed landfill site.		X			Waste Disposal Certificate Visual Inspection	Project Company, Contractors	
		All excess aggregate shall also be removed from site.		X			Visual Inspection	Project Company, Contractors	
		Spill containment and clean up kits will be available onsite and clean-up from any spill will be appropriately		X	X	X	Visual Inspection	Project Company, Contractors	

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		contained and disposed of to a licensed landfill by a licensed operator.							
		Used oil stored on site must be stored in an impervious container, within a bunded area.		X	X	X	Visual Inspection	Project Company, Contractors	
		All waste at the site must be handled appropriately and kept in closed bins not accessible to fauna.		X	X	X	Visual Inspection	Project Company, Contractors	
		General waste must be removed from site by a licensed contractor.		X	X	X	Waste manifest	Project Company, Contractors	
		Hazardous waste such as oils, oily rags, paint tins, bitumen etc. must be disposed of at a licenced hazardous waste facility.		X	X	X	Hazardous Waste Disposal Certificates	Project Company, Contractors	
		An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage.			X		Monitoring system	Project Company	
		Ensure that precautionary measures are in place to limit the possibility of oil and other toxic liquids from entering the soil or stormwater system.	X		X		Engineering Designs	Project Company	
Unplanned Events									
Risk of an incident (i.e. fire or explosion) from a loss of containment of Natural Gas or Propane from pipelines, facilities or ancillary	Ensure legal compliance of the facility.	Completing recognised processes of hazard analysis processes (HAZOP, FMEA, SIL, LOPA etc.) for the proposed CCGT power plant prior to construction	X				Completed processes of hazard analysis	Project Company	After Planning and Design Phase
		Ensuring a Major Hazard Installation (MHI) risk assessment is carried out for the facility in accordance with the	X				MHI Risk Assessment	Project Company	After detailed designs have been completed for the

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
equipment at the proposed Natural Gas pipelines or Propane electricity generator		Major Hazard Installation regulations							pipelines and CCGT power plant
Loss of containment of Natural Gas or Propane from pipelines	To avoid or minimise the risk of an incident (i.e. fire or explosion) through engineering design features	The pipelines to be designed to an international standard such as: • BS EN 14161: Petroleum and natural gas industries – Pipeline transportation systems; • ASME B31.8 Gas Transmission and Distribution Piping Systems; or • Other internationally recognised standards.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		The pipelines' wall thickness to be designed to accommodate the maximum operating pressure of 90 barg with a suitable safety factor.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Isolation valves to be located at least at either end of the pipelines but ideally at intervals such that in the event of a leak only small amounts of Natural Gas would be released.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Leak prevention systems such as cathodic protection and pipeline coatings suitable for the ground conditions to be implemented.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		The pipelines are to include an emergency shutdown system that will shut emergency isolation valves and depressurise the pipelines safely.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Areas of road crossing shall include specific protection measures to account for the weight from road traffic.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		A leak detection system is to be considered for the pipelines.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		The installation of non-return valves on the pipelines is to be considered.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Depth of burial of the pipelines along their length should be equal to, or greater than the minimum depth of burial specified.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Potential other risk reduction measures include concrete sheathing, tiles above pipelines, marker tape above pipelines, route marker posts etc.	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Emergency response plan for the pipeline must be compiled with the user of the pipelines and the Local Authority together.	X				Emergency Response Plan	Project Company	Planning and Design Phase
Loss of containment of Natural Gas or Propane from Propane generator installations on the CCGT power plant site	To avoid or minimise the risk of an incident (i.e. fire or explosion) through engineering design features	The installation must comply with all the requirements of SANS 10087-3:2015 The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500 L	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Multiple (at least two) safety systems will be implemented for Propane offloading.	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase. To be implemented in Construction and

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
									Operation.
		There will be effective inspection and pressure/leak tests to prevent transfer system leaks and bursts.		X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase. . To be implemented in Construction and Operation.
		The Propane storage vessel shall be fitted with pressure relief valves, which would only lift when the vessel has reached its maximum operating pressure or level	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		All piping shall be rated to accommodate the required operating pressure of the system and allow for pressure relief to a safe area	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		All pressure relief systems should vent away from the generator air intake system	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		The Propane vessel shall be filled with sparge pipes in the vapour space to limit reverse flow to the off-loading point as well as preventing vessel stresses due to uneven temperature	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		All instrumentation and electrical equipment shall be specified in accordance to the Hazardous Area classification as per SANS 10108	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Off-loading of Propane shall be done on a fully-automated system to prevent overfilling	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Pullaway prevention systems such as wheel chocks should be utilised during Propane offloading	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		Off-loading safety systems such as earthing of the road tanker are required	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Off-loading of Propane shall be done using hoses with breakaway couplings	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Emergency shutdown (ESD) shall be provided that would automatically shut down systems such as feed or off-loading pumps and emergency shut off valves in the event of an emergency	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Emergency shutdown should be initiated by local operators, CCGT control room operators as well as by gas detectors where appropriate.	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Active or passive fire protection on the Propane storage bullet in line with SANS 10087-3:2015	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Propane road tanker offloading deluge system to cool equipment in the event of a fire if required by SANS 10087-3:2015	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Gas detectors with appropriate logic which can initiate emergency shutdown	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		All of the automatic safety systems shall be designed so that they can also be manually activated	X				Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
		Procedures should ensure at least one person be present during Propane offloading	X	X	X		Final Detailed Design	Project Company and appointed Engineers	Planning and Design Phase
Emergency Incident	Reporting and management of emergency incidents	Any Emergency Incidents are to be reported immediately to the relevant		X	X	X	Emergency Response Plan	Project Company and designated responsible	As required

Aspect, Potential Impact / Issue	Objective	Mitigation and Enhancement Commitments	Applicable Phase				Monitoring and Indicators	Responsible Party	Implementation Time Frame and Frequency
			Planning and Design	Construction	Operation	Decommissioning			
		authority by the responsible person to the relevant authority as per the requirements of Section 30 of the National Environmental Management Act (Act No. 107 of 1998). All necessary documentation must be completed and submitted to the relevant authorities within the prescribed timeframes.						person	

11.6.1 Decommissioning Phase

A detailed decommissioning and rehabilitation plan must be developed prior to decommissioning the CCGT gas fired power plant and associated infrastructure. This plan should include, but not be limited to, management of socio-economic aspects such as employment loss, removal, re-use and recycling of materials and vegetative rehabilitation to prevent erosion.

The decommissioning activities will be similar to construction activities and therefore recommendations outlined to manage construction phase impacts should be adhered to during decommissioning. Management actions should focus on the rehabilitation of disturbed areas and the removal of infrastructure.

11.7 SPECIFIC MANAGEMENT PLANS

In accordance with the DEA's acceptance of the Scoping Report, a variety of management plans have been developed as part of the EMPr. These are aimed at ensuring that construction and operation occur in a responsible manner and include:

- Alien Invasive Management Plan;
- Plant Rescue and Protection Plan;
- Revegetation and Rehabilitation Plan;
- Open Space Management Plan;
- Traffic Management Plan;
- Stormwater Management Plan;
- Erosion Management Plan; and
- Emergency Preparedness and Response Plan.

The purpose, objectives and underlying principles of these plans are detailed in the sections that follow. All management and mitigation measures of the plans have been included in *Table 11.9*.

11.8 ALIEN INVASIVE MANAGEMENT PLAN

11.8.1 Objectives

The purpose of the Alien Invasive Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Project. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.

- Initiate and implement a monitoring and eradication programme for alien and invasive species.

- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

11.8.2 Principles

General Clearing and Guiding Principles

- The lighter infested areas should be cleared first to prevent the build-up of seed banks.

- Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently.

- Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses.

- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. However care should be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Construction Phase Alien Invasive Management Principles

- Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.

- Where cleared areas will be exposed for some time, these areas should be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.

- Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.

- Clearing of vegetation is not allowed within 32m of any wetland, 80m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas.

- Alien invasive species (such as ryegrass or oats) or straw containing any such species will not be used for temporary soil stabilisation of the pipeline corridor, as these will then rapidly dominate these areas, to the exclusion of indigenous species.

- Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.

Operation Phase Alien Invasive Management Principles

- Ongoing alien invasive plant management will be undertaken on an annual or biannual basis within any undeveloped portions of the power plant site and within the full pipeline servitude.

- No spraying of herbicide will be undertaken in the rehabilitated areas as this kills numerous non-target species.

- Focus will be on removing (using CapeNature approved methodology) all alien invasive shrubs and large herbs, although in some cases it may be possible and necessary to also remove invasive alien grasses.

11.8.3 Monitoring

Document and record alien invasive plant management throughout the life cycle of the project on a biannual basis including:

- alien plant distribution maps;
- alien plant control measures implemented; and
- evaluation of control success rate

11.9 PLANT RESCUE AND PROTECTION PLAN

11.9.1 Purpose

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Project on listed and protected plant species and their habitats during construction and operation.

11.9.2 Rescue and Protection Plan Principles

A plant rescue and translocation operation for protected plants will need to be undertaken prior to site clearing or construction taking place, according to the following principles:

- A suitably qualified botanist must be appointed prior to any construction / land clearing activities taking place, to undertake plant search and

rescue from the entire pipeline development corridor south of the Langebaan – Saldanha road. Search and Rescue will also be undertaken for selected species within the power plant footprint prior to development. Search and rescue operations should be undertaken during the appropriate season as determined by the appointed botanist.

- All translocatable plant species will be bagged up and stored in a nursery for later use, once construction has been completed and rehabilitation is required.

- A Training and Awareness Programme will be developed for employees and contractors to allow for training with regard to the areas of High and Medium – High sensitivity. This will be undertaken in conjunction with an experienced botanist.

- Replanting of the rescued specimens will be undertaken in the first autumn – winter (May – June) after construction has been completed, giving the plants maximum time to establish before the next summer dry period.

- The approved development footprint in this area will be surveyed and clearly demarcated with wire or coloured rope, and strung with warning signs, prior to any construction.

- Immediately after being transplanted, species should be adequately watered.

11.9.3 Monitoring

Plant mortality can be high when plants are transplanted and it is therefore recommended that relocated plants be monitored for a period of at least a month post-translocation to identify any additional plant requirements.

11.10 REVEGETATION AND REHABILITATION PLAN

11.10.1 Purpose

Disturbance of terrestrial vegetation outside the actual development footprint is likely to be inevitable and will likely require rehabilitation post-construction where the vegetation and / or soil surface has been damaged or disturbed. The purpose of this plan is to ensure that areas cleared or impacted during construction activities of the proposed Facility are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function. The purpose of the rehabilitation at the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential;

- Re-vegetate all disturbed areas with suitable local plant species;
- Minimise visual impact of disturbed areas;
- Ensure that disturbed areas are safe for future uses; and
- The movement of people and vehicles within rehabilitated areas must be restricted and controlled.

11.10.2 Principles

The following guidelines provide a clear and practical means of implementing such rehabilitation once construction activities have ceased.

General Recommendations

- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- Once revegetated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- Fencing should be removed once a sound vegetative cover has been achieved.
- Any runnels, erosion channels or wash-aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

Topsoil Management

Effective topsoil management is a critical element of rehabilitation, particularly in arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Where any excavation or topsoil clearing is required, the topsoil should be used immediately where possible or stockpiled and later used to cover cleared and disturbed areas once construction activity has ceased.

- Topsoil should be retained on site in order to be used for site rehabilitation. Topsoil must be excavated to the correct depth. It is recommended that no more than the top 10cm of topsoil are stored and used for rehabilitation.

- Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil.

- If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for extended periods and should be used as soon as possible.

- Ideally stored topsoil should be used within one month and should not be stored for longer than three months. In addition, it is recommended that topsoil stores should be a maximum depth of 1m to avoid compaction and the development of anaerobic conditions within the soil.

- If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile in order to intercept any sediment and runoff should be directed away from the stockpiles upslope.

Seeding

In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed should be collected from plants present at the site and should be used immediately or stored appropriately and used at the start of the following wet season. Seed can be broadcast onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch.

Transplants

Where succulent plants are available or other species which may survive translocation are present, individual plants can be dug out from areas about to be cleared and planted into areas which require revegetation. The primary purpose of using transplants is not to restore plant cover to its former levels, but rather to provide nodes of biological activity and a source of propagules that can spread and recover disturbed areas on their own. As such transplants should be planted in clumps rather than as isolated individuals.

- Plants for transplant should preferably be removed from areas that are going to be cleared.

- Transplants should be placed within a similar environment from where they came in terms of aspect, slope and soil depth.

- Transplants must remain within the site and may not be transported off the site.

As required, additional rehabilitation of the pipeline servitude south of MR559 will be undertaken using the relevant locally indigenous species that

are additional to those used in the Search and Rescue process. This work will be undertaken by an contractor with relevant horticultural experience who has access to suitable locally grown species.

Use of Soil Savers

In areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. The site is windy and wind erosion is likely to be a potentially significant issue at the site following construction and measures to protect the soil surface such as soil savers may to be necessary. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed. In areas where a soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface.

Soil saver may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination. Alternatively, fresh mulch containing seed can be applied to the soil saver.

11.10.3 Monitoring Requirements

As rehabilitation success is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection.

- Re-vegetated areas should be monitored every 6 months for the first 18 months following construction.

- Re-vegetated areas showing inadequate surface coverage (less than 10% within 12 months after re-vegetation) should be prepared and re-vegetated.

- Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

11.11 OPEN SPACE MANAGEMENT PLAN

11.11.1 Purpose

The purpose of the Open Space Management Plan (OSMP) is to provide a framework for the integrated management of the natural spaces within the Project Area. The footprint of the facility will occupy a small proportion of the site, but impacts resulting from the construction and operational activities of the facility may spread well beyond the required footprint and impact biodiversity within the site more generally. The goal of the OSMP is to reduce the ecological footprint of the power plant through ensuring that the facility operates in a biodiversity-compatible manner and does not have a long-term negative impact on the local environment.

11.11.2 Principles

The following mitigation and management measures are considered part of the Open Space Management Plan:

Access Control

- Access to the facility should be strictly controlled.
- All visitors and contractors should be required to sign-in.
- Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.
- The fencing around the facility should consist of a single fence with electrified strands only on the inside of the fence and not the outside.

Prohibited Activities

The following activities should not be permitted within the facility by anyone except as part of the other management programmes of EMPr for the development.

- No fires within the site.
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission.
- No dogs should be allowed on site.
- No driving off of demarcated roads.

Fire Risk Management

The National Veld and Forest Fires Act places responsibility on the landowner to ensure that the appropriate equipment as well as trained personnel are available to combat fires. Therefore, the management of the facility should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire. Fires must be managed in accordance with the plants Emergency Response Plan.

Alien Plant Control

Alien invasive plants should be controlled according to the Alien Invasive Management Plan.

Erosion Management

The facility should be inspected every 6 months for erosion problems or more frequently in the event of exceptional rainfall events. All erosion problems should be rectified according to the Erosion Management Plan.

11.12 TRAFFIC MANAGEMENT PLAN

11.12.1 Purpose

Implementation of the Traffic Management Plan (TMP) will ensure regulatory compliance and the reduction of the significance of impacts related to transport during the construction and operation of the Project. The objectives of this plan are therefore:

- Ensure compliance with all legislation regulating traffic and transportation within South Africa;
- Avoid incidents and accidents;
- Raise greater safety awareness in each drivers;
- Avoid the deterioration of roads; and
- Avoid pollution that can be created from noise and emissions related to transport.

11.12.2 Traffic and Transport Management Principles

The following principles (as included in *Table 11.9*) will be adhered to during the applicable phases of the Project:

- Conduct a road condition survey in order to gauge the damage to the road as a result of the intensive heavy traffic.

- The risk assessment of the proposed improvements to OP7644 should be the subject of a Road Safety Audit (RSA).

- All employees must attend an environmental training programme which will include details of approved access roads and speed limits.

- Adjacent landowners must be notified of the construction and operation schedule.

- Flagging must be provided at access points to the site and must be maintained until construction is completed.

- All vehicles must be maintained in good condition.

- Speed restrictions must be established prior to commencement of construction and enforced over all construction traffic.

- The movement of all vehicles within the site must be on designated roadways.

- All necessary transportation permits to be applied for and obtained from the relevant authorities prior to construction, including access to the site from OP7644 which will include the addition of proposed turning lanes.

- If abnormal loads are required, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.

- A designated access point to the site must be created and clearly marked to ensure safe entry and exit.

- Signs must be placed along construction roads and at the entrance to the site to identify speed limits, travel restrictions and other standard traffic control information and road markings.

- Where possible, construction vehicles to avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.

- Public transport embayments will be provided downstream of the entrance to the power plant and on both sides of the OP7644.

- All internal and access roads that will be used during the operational phase of the Project must be maintained.

11.12.3 Monitoring

Contractors and the Project Company must ensure that all vehicles adhere to the speed limits. A speeding register should be maintained which details the offending drivers and the offence.

11.13 STORMWATER MANAGEMENT PLAN

11.13.1 Purpose

The construction and operation of the Project can negatively impact drainage systems therefore stormwater management systems that take cognisance of natural hydrological patterns and processes will reduce the potentially negative impacts. The main risks associated with poor stormwater management practices are increased erosion risk and risks associated with flooding. Therefore the principles underlying the Erosion Management Plan should be read in conjunction with the Stormwater Management Plan (SWMP).

The objective of this SWMP is to provide measures to address runoff from disturbed portions of the site so that:

- Concentrated flows into natural watercourses are minimised;

- Concrete or other lining of watercourses to protect them from concentrated flows is not required; and

- Natural flow pathways are not diverted.

11.13.2 Stormwater Management Principles

The following sets out the general design principles that will enable effective stormwater management. It should be noted that a detailed SWMP with engineering specifications for proposed stormwater control measures will be prepared by the civil engineers during the detailed design phase. This will be based on the following underlying principles:

Sedimentation

Mitigation of possible sedimentation that may impact drainage systems can be achieved by implementing the following measures:

- Implement energy dissipation structures where concentrated flows occur.

- Implement appropriate measures to trap sediment at sources where areas are going to be disturbed (e.g. construction materials laydown area). Mitigation measures could include sediment fences and erosion control blankets.

- Design road networks to prevent the accumulation of high energy surface flows by specifying surface cross drains at regular intervals, by constructing roads to natural ground level or by including sufficient drainage in the form of culverts.

- Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil.

- Stabilise all earthen berm structures by specifying adequate compaction and revegetating.

- Exercise good excavation practises during the construction phase. Backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.

- Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into groundwater.

Flooding

Mitigation of the possible risk of flooding can be achieved by implementing the following measures:

- Only remove natural vegetation where necessary and maintain the natural flow resistance which will decrease flood peaks.

- Implement free draining platforms (if required) for the substations and transformers to prevent the risk of flooding of infrastructure.

- Establish earthen berms to protect infrastructure against flooding.

- Implement attenuation facilities of areas that are drained.

11.13.3 Monitoring

Although it is anticipated that the proposed Project (the pipeline development in particular) will have a limited impact on the drainage characteristics of the area, it is recommended that monitoring of the site be carried out both during and after construction to identify potential impacts on the natural systems as a result of potential altered flow patterns.

In addition, the discharge points from the laydown areas should be monitored for signs of concentrated flows and erosion.

The pipeline access road has the potential to impact negatively on the natural drainage pattern of the area if not designed and implemented correctly. The road network should be monitored regularly to determine areas where stormwater may be concentrated or diverted which may lead to erosion. In addition, the crossing points at the drainage features should be monitored for signs of erosion.

Should signs of erosion and alterations to the natural flow patterns be identified, appropriate interventions should be designed to address the issues as they arise.

11.14 EROSION MANAGEMENT PLAN

11.14.1 Purpose

The erosion management plan addresses the management and mitigation of potential impacts relating to soil erosion during the construction and operation of the Project. The objectives of the plan are to:

- Provide a general framework for soil erosion and sediment control; and

- Outline general methods to monitor, manage and rehabilitate erosion prone areas.

11.14.2 Erosion and Sediment Management Principles

The following management principles will reduce the impact of erosion and enable progressive revegetation and stabilisation of disturbed areas:

- Restrict removal of vegetation and soil cover to the development footprint.
- Soil stockpiles must be protected from wind or water erosion through placement, vegetation or appropriate covering.
- Excavations/trenches should be backfilled slightly higher than the natural ground level to accommodate some degree of settlement of the backfill material.
- Exercise good excavation practises - backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.
- Construction vehicles will remain on designated and prepared roads. Special care should be taken to avoid driving on any sand dunes in the vicinity of the site.
- Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil against erosion.
- Foundations and trenches must be backfilled with originally excavated materials as far as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
- Borrow materials must only be obtained from authorised and permitted sites.
- Although soil erosion is not considered significant, it might be necessary to implement control measures such as suitable location on flatter areas with low erosion potential and the rapid establishment of vegetation through seeding of the stockpiles, to promote and reserve indigenous seeds and (soil fertility) organic matter.
- Where space constraints are not limiting, topsoil stockpiles will be constructed as low and long facilities not higher than 2m, or where space constraints limit this, stockpiles will be constructed as terraced stockpiles.
- Compacted areas must have adequate drainage systems to avoid pooling and surface flow.
- Rehabilitation activities must commence at work faces as soon as construction activities have concluded. Phased construction and

progressive rehabilitation should be implemented where practicably possible.

11.14.3 Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site, the ECO must:

- Assess the significance of the situation and determine the cause of the impact including taking photographs as visual reference;
- Inform the Project Company / contractors that rehabilitation must take place and that a rehabilitation method statement is to be implemented;
- Monitor that the Project Company / contractors are taking action to stop the erosion;
- Report and monitor the progress of the rehabilitation on a weekly basis; and
- Report all actions in a monthly compliance audit report.

11.15 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

ArcelorMittal Saldanha Works have a Standard Operating Procedure (SHERQ-SPS-030, rev4) which provides a detailed emergency preparedness procedure for various unplanned events. The following types of emergencies, amongst other, are planned for:

- Medical emergency
- Threat of sabotage
- Bomb threat
- Gas clouds or chemical hazards
- Fire / explosions
- Structural and facilities failures and accidents
- Energy and / or utility incidents
- Confided space emergencies
- Working at height emergencies
- Vehicles and driving emergencies
- Emergencies involving contractors.

The procedure defines duties and responsibilities of designated persons and how emergencies should be reported (including contact numbers). Communication methods and training requirements are also documented. Maps are provided to indicate assembly points, equipment location, ambulance points and types of alarms, amongst other. The procedure defines how critical valves, pipes and pumps should be identified and shutoff. Re-entry procedures and recovery of equipment is also documented. Firefighting

equipment, spills equipment and other rescue equipment is described and documented. The plan also provides details of emergency drills, how headcounts should be conducted and evacuations procedures.

The document will be updated to include the proposed power plant and LNG import. It will document on-site emergency procedures that will be followed in the event of an incident or accident. All measures included in *Table 11.9* relevant to emergency procedures will be included in the plan. The document cannot be made public due to the sensitive nature of the information it contains, however ArcelorMittal is willing to make it available to the Competent Authority upon request provided that it remains confidential.

11.16 NOISE MANAGEMENT AND MONITORING

Noise monitoring measures are presented in this monitoring programme, but will only be required if there is development within 2000 m of the plant and/or noise complaints are received.

Should a reasonable and valid complaint about noise be registered, it is the responsibility of the developer to investigate this complaint as per the following sections. It is recommended that the noise investigation be done by an independent acoustic consultant.

While this section recommends a noise monitoring programme, it should be used as a guideline as site specific conditions may require that the monitoring locations, frequency or procedure be adapted.

11.16.1 Measurement Localities and Procedures

Measurement Localities

No routine noise measurements or locations are recommended. Noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading. A second instrument should ideally be deployed at a control point close to the potential noise source during the measurement period.

11.16.2 Measurement Frequencies

Once-off measurements if and when a reasonable and valid noise complaint is registered. Results and feedback must be provided to the complainant. If required and recommended by an acoustic consultant, there may be follow-up measurements or a noise monitoring programme can be implemented.

11.16.3 Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 24 hours, covering at least a full day- (06:00 – 22:00) and night-time (22:00 – 06:00) period. Measurements should be collected in 10-minute bins defining the 10-minute descriptors such as $L_{Aeq,I}$ (National Noise Control Regulation requirement), $L_{A90,f}$ (background noise level as used internationally) and $L_{Aeq,f}$ (Noise level used to compare with IFC noise limit). Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

11.16.4 Relevant Standard for Noise Measurements

Noise measurements must be conducted as required by the National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008. It should be noted that the SANS standard also refers to a number of other standards.

11.16.5 Data Capture Protocols

Measurement Technique

Noise measurements must be conducted as required by the National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008.

Variables to be analysed

Measurements should be collected in 10-minute bins defining the 10-minute descriptors such as $L_{Aeq,I}$ (National Noise Control Regulation requirement), $L_{A90,f}$ (background noise level as used internationally) and $L_{Aeq,f}$ (Noise level used to compare with IFC noise limit). Noise levels should be co-ordinated with the 10-m wind speed. Spectral frequencies should also be measured to define the potential origin of noise.

Database Entry and Backup

Data must be stored unmodified in the electronic file saved from the instrument. This file can be opened to extract the data to a spread sheet system to allow the processing of the data and to illustrate the data graphically. Data and information should be safeguarded from accidental deletion or corruption.

Feedback to Receptor

A measurement report must be compiled considering the requirements of the National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008. The facility must provide feedback to the potential noise-sensitive receptors

using the channels and forums established in the area to allow interaction with stakeholders, alternatively in a written report.

11.16.6 Standard Operating Procedures for Registering a Complaint

When a noise complaint is registered, the following information must be obtained:

- Full details (names, contact numbers, location) of the complainant;
- Date and approximate time when this non-compliance occurred;
- Description of the noise or event;
- Description of the conditions prevalent during the event (if possible).

11.17 WASTE MANAGEMENT PLAN

11.17.1 Purpose

To design, construct and operate waste management facilities in a manner that minimises adverse impacts to sensitive receptors.

Performance criteria applicable will be the relevant South African Law including the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). A Waste Management Licence (WML) is not expected to be applicable for this Project.

11.17.2 Principles

General Waste Management Strategy

General Waste Management Planning:

- Facilities that generate waste shall characterize their waste according to composition, source, types of wastes produced, generation rates, or according to local regulatory requirements.
- Effective planning and implementation of waste management strategies shall include:
- Identifying expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal infrastructure;
- Establishment of priorities based on potential EHS risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner;
- Definition of opportunities for source reduction, as well as reuse and recycling;
- Definition of procedures and operational controls for onsite storage; and
- Definition of procedures and operational controls for treatment and final disposal.

In accordance with the principles outlined in the IFC EHS Guidelines (2007) and international best practice, the waste management hierarchy objectives are:

- Prevent
- Minimise
- Reduce
- Re-use
- Recycle
- Disposal

Waste Prevention:

- Waste management processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes in accordance with the following strategy:
- Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off specification, contaminated, damaged, or excess to needs;
- Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials; and
- Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste.

Recycling and Reuse:

- In addition to the implementation of waste prevention strategies, the amount of waste generated may be significantly reduced through the implementation of recycling plans, which shall include the following:
- Identification of potentially recyclable materials;
- Investigation of recycling facilities or companies that may be operating in the vicinity of the proposed infrastructure;
- Establishing recycling objectives and formal tracking of waste generation and recycling rates;
- Providing training and incentives to employees to meet objectives; and
- Providing clearly marked (colour coded) bins in public areas for relevant recyclable materials including paper, plastic, glass and metals.

Treatment and Disposal:

- For waste materials that are generated after the implementation of feasible waste prevention and reduction measures and after all options for reuse, recovery and recycling have been exhausted, treatment and/or disposal will be required. Such waste materials should be treated and disposed of to avoid potential impacts to human health and the environment. Waste management approaches will need to be compliant with local regulations, and may include:
    - Biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal; and

    - Treatment or disposal at permitted facilities specially designed to receive the waste.
- Examples of treatment and disposal include:
    - composting operations for organic non-hazardous wastes;
    - appropriately designed, permitted and operated landfills or incinerators; and
    - other methods of treatment such as bioremediation of appropriate low toxicity organic materials.

Hazardous Waste Management Strategy:
Hazardous wastes should always be segregated from non-hazardous wastes. If generation of hazardous waste cannot be prevented through the implementation of the above general waste management practices, its management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential impacts and risks associated with the management of any generated hazardous waste during its complete life cycle;
- Ensuring that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and follow international best practice for the waste being handled; and
- Ensuring compliance with applicable local and international regulations.

Hazardous Waste Storage:

- Hazardous waste should be stored so as to prevent or control accidental releases to air, soil, and water resources as follows:
- Waste must be stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Secondary spill containment measures should also be implemented including physical barriers, bunds or containment curbs;
- Waste should be stored in closed containers away from direct sunlight, wind and rain;
- Secondary containment systems shall be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment. Secondary containment must be included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater); and
- Adequate ventilation should be provided where volatile wastes are stored.
- Hazardous waste storage activities should also be subject to special management actions, conducted by employees who have received specific training in handling and storage of the relevant wastes, as follows:
- Provision of readily available information on chemical compatibility to employees, including labelling each container to identify its contents;

- Limiting access to hazardous waste storage areas to employees who have received proper training;
- Clearly identifying (label) and demarcating the storage areas, including documentation of its location on a facility map or site plan;
- Conducting periodic inspections of waste storage areas and documenting the findings; and
- Preparing and implementing spill response and emergency plans to address accidental releases of wastes.

Transportation:

- Transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public. All waste containers designated for off-site shipment should be secured and labelled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards.

Treatment and Disposal:

- Hazardous waste should be disposed of at licensed facilities operated by qualified commercial or government-owned waste vendors. If such facilities are not available, facilities generating waste shall consider using contractors that:
    - Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment;
    - Have all required permits, certifications, and approvals, of applicable government authorities; and
    - Have been secured through the use of formal procurement agreements.

Small Quantities of Hazardous Waste:

- Hazardous waste materials are frequently generated in small quantities by many projects through a variety of activities such as equipment and building maintenance activities. Examples of these types of wastes include: spent solvents and oily rags, empty paint cans, chemical containers; used lubricating oil; used batteries (such as nickel-cadmium or lead acid); and lighting equipment, such as lamps or lamp ballasts. These wastes should be managed following the guidance provided in the previous sections.

11.17.3 Monitoring

Monitoring requirements shall include:

- Inspection of vessels for leaks, drips or other indications of loss;
- Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors;
- Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapour, or groundwater);
- Documenting any changes to the storage facilities, and any significant changes in the quantity of materials in storage;

- Regular audits of waste segregation and collection practices;
- Tracking of waste generation trends by type and amount of waste generated;
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes;
- Keeping manifests or other records that document the amount of waste generated and its destination;
- Periodic auditing of third party treatment and disposal services, including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal locations; and
- Monitoring records for hazardous waste collected, stored, or shipped should include:
    - Name and identification number of the components of the hazardous waste;
    - Physical state (i.e., solid, liquid, gaseous or a combination of these);
    - Quantity (e.g., kilograms or litres, number of containers);
    - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter;
    - Method and date of storing, repacking, treating, or disposing at an off-site facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste; and
    - Location of each hazardous waste within the facility, and the quantity at each location.