PHAKWE RICHARDS BAY GAS POWER 3 COMBINED CYCLE POWER PLANT, RICHARDS BAY, KWAZULU NATAL

ENVIRONMENTAL MANAGEMENT PROGRAMME

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PROJECT DETAILS

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Title	:	Environmental Impact Assessment Process Environmental Management Programme: Phakwe Richards Bay Gas Power 3 Combined Cycle Power Plant, Richards Bay, KwaZulu Natal
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DEFINITIONS AND TERMINOLOGY

The following definitions and terminology may be applicable to this project and may occur in the report below:

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: The impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Dust: Solid materials suspended in the atmosphere in the form of small irregular particles, many of which are microscopic in size

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that is made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental Assessment Practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental Control Officer (ECO): An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment (EIA): Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

Environmental Officer (EO): The Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. The EO must act as liaison and advisor on all environmental and related issues

and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Method Statement: a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red Data Species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Vulnerable species: A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the *Gazette*.

ABBREVIATIONS

The following abbreviations may be applicable to this project and may occur in the report below:

AEL	Atmospheric Emissions Licence
CBA	Critical Biodiversity Area
CCPP	Combined Cycle Power Plant
CV	Curriculum Vitae
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EAP	Environmental Impact Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMPr	Environmental Management Programme
ESA	Ecological Support Areas
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
H_2	Hydrogen
IDZ	Industrial Development Zone
IFC	International Finance Corporation
IRP	Integrated Resource Plan
kV	Kilo Volt
LNG	Liquified Natural Gas
MW	Mega Watt
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NFA	National Forests Act (Act 84 of 1998)
NO_2	Nitrogen dioxide
NWA	National Water Act (Act 36 of 1998)
PM	Particulate matter
$PM_{2.5}$	Inhalable particulate matter (aerodynamic diameter less than 2.5 µm)
PM_{10}	Thoracic particulate matter (aerodynamic diameter less than 10 µm)
QRA	Quantitative Risk Assessment
SABS	South African Bureau of Standards
SAHRA	South African National Heritage Resources Agency
SANS	South African National Standards
SHE	Safety, Health and Environment
SO_2	Sulfur dioxide
TOPS	NEMBA Threatened or Protected Species
µg	Microgram(s)

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APPENDICES

1. PROJECT DETAILS

Phakwe Richards Bay Gas Power 3 (Pty) Ltd (PRBGP3), an Independent Power Producer (IPP), proposes the development of a combined cycle (CC) gas to power plant, with a capacity of up to 2 000MW, on various erven within the Richards Bay IDZ Phase 1F, Richards Bay. The proposed project is to be known as the Phakwe Richards Bay Gas Power 3 (PRBGP3) CCPP. The project site is located approximately 5km north-east of Richards Bay and 1km north of the suburb of Alton, within the jurisdiction of the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province (refer to **Figure 1.1**).

The Combined Cycle Power Plant and associated infrastructure is proposed in response to the provision for gas-to-power technology as part of the energy mix within the Integrated Resource Plan (IRP), 2019, and is planned to be bid into future procurement processes to be initiated by the Department of Mineral Resources and Energy (DMRE).

The project will provide mid-merit or baseload power supply, estimated at 16 to 24 hours daily operation. The power station will have an installed capacity of up to 2000MW, to be operated on natural gas or a mixture of natural gas and hydrogen. A dedicated pipeline to connect into an on-site gas receiving and conditioning station will provide the natural gas or the mixture of natural gas and Hydrogen. The pipeline, which will be subject to a separate environmental authorisation process, will be connected to the proposed Transnet supply pipeline network of Richards Bay (the location of this network has not yet been confirmed), or it will extend directly to the Regasification facilities in the Richards Bay Harbour.

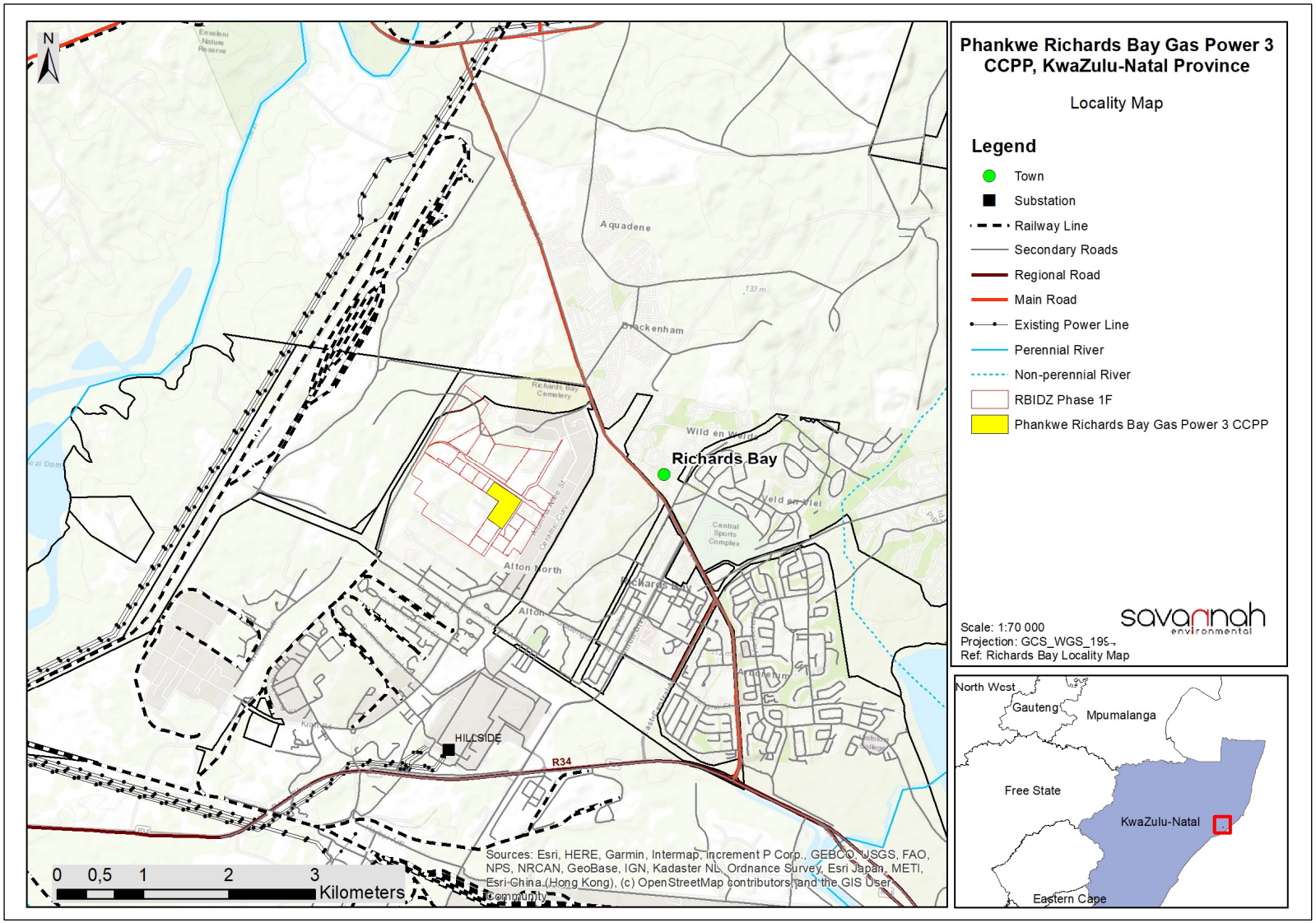


Figure 1.1: Locality map showing the area proposed for the establishment of the 2000MW PRBGP3 CCPP within the Richards Bay IDZ 1F, in the Richards Bay area

1.1. Project Location

Table 1.1 provides a summary of proposed properties associated with proposed project.

Table 1.1: Summary of the preferred project site identified for the development of the Phakwe Richards Bay Gas Power 3 CCPP

Province	KwaZulu-Natal
District Municipality	King Cetshwayo District Municipality
Local Municipality	City of uMhlathuze Local Municipality
Ward number(s)	26
Nearest town(s)	Alton, Richards Bay, Arboretum, Empangeni, Ichubo
Farm name(s) and number(s)	» Erf 16820 » Erf 16819 » Erf 1/16674 Subdivision of Erf 17442
SG 21 Digit Code (s)	N0GV04210001682000000 N0GV04210001681900000 N0GV04210001667400000 N0GV04210001744200000
Coordinate points for the proposed development site	28°44'31.5306"S, 32°1'39.4420"E 28°44'26.9614"S, 32°1'42.3432"E 28°44'31.6831"S; 32°1'51.9240"E 28°44'45.6445"S; 32°1'42.9759"E 28°44'43.0901"S; 32°1'38.0691"E 28°44'33.7688"S: 32°1'43.9819"E
Current zoning	Industrial
Current land use	Vacant / Industrial

1.2. Project Components

The power plant will operate at mid-merit or baseload duty and will include the following main infrastructure:

- Up to 4 gas turbines for the generation of electricity through the use of natural gas (liquid or gas forms), or a mixture of Natural gas and Hydrogen (in a proportion scaling up from 20% H2) as fuel source, operating all turbines at mid-merit or baseload (estimated 16 to 24 hours daily operation).
- Exhaust stacks associated with each gas turbine.
- Up to 4 Recovery Steam Generator (HRSG to generate steam by capturing the heat from the turbine exhaust.
- Up to 4 steam turbines to generate additional electricity by means of the steam generated by the HRSG.
- The water treatment plant will demineralise incoming water from municipal or similar supply, to the gas turbine and steam cycle requirements. The water treatment plant will produce two parts demineralised water and reject one-part brine, which will be discharged to the RB IDZ stormwater system.
- Steam turbine water system will be a closed cycle with air cooled condensers. Make-up water will be required to replace blow down.
- Air cooled condensers to condensate used steam from the steam turbine.
- Compressed air station to supply service and process air.

- Water pipelines and water tanks for storage and distributing of process water. (Potential sourcing of alternative water outside RB IDZ supply (Municipality))
- Water retention pond
- Closed Fin-fan coolers to cool lubrication oil for the gas turbines
- Gas generator Lubrication Oil System.
- Gas pipeline supply conditioning process facility. Please note, gas supply will be via dedicated pipeline from the proposed Transnet supply pipeline network of Richards Bay (the location of this network has not yet been confirmed) or, alternatively directly from the Regasification facilities at RB Harbour. The gas pipeline will be separately authorized.
- Site water facilities including potable water, storm water, waste water
- Fire water (FW) storage and FW system
- Diesel emergency generator for start-up operation.
- Onsite fuel conditioning including heating system.
- All underground services: This includes stormwater and wastewater.
- Ancillary infrastructure including:
  - Roads (access and internal);
  - Warehousing and buildings;
  - Workshop building;
  - Fire water pump building;
  - Administration and Control Building;
  - Ablution facilities;
  - Storage facilities;
  - Guard House;
  - Fencing;
  - Maintenance and cleaning area;
  - Operational and maintenance control centre;
- Electrical facilities including:
  - Power evacuation including GCBs, GSU transformers, MV busbar, HV cabling and 1x275kV or 400kV GIS Power Plant substation.
  - Generators and auxiliaries;
- Service infrastructure including:
  - Stormwater channels;
  - Water pipelines
  - Temporary work areas during the construction phase (laydown areas)

Table 1.2 provides details of the proposed Phakwe Richards Bay Gas Power 3 CCPP, including the main infrastructure and services. An overview of the indicative areas for the proposed infrastructure is provided in **Figure 1.2**. A preliminary detailed design is included in **Appendix A.**

Table 1.2: Details of the Phakwe Richards Bay Gas Power 3 CCPP located near Richards Bay

Component	Description/ Dimensions
Location of the site	Erven 16820, 16819 1/16674 and a subdivision of Erf 17442 within the Richards Bay IDZ Phase 1F, KwaZulu-Natal
Landowner	Richards Bay Industrial Development Zone (IDZ), Phase 1F
Municipal Jurisdiction	King Cetshwayo District Municipality and the City of uMhlathuze Local Municipality

Component	Description/ Dimensions
Electricity Generating capacity	2000MW (installed)
Proposed technology	Combined Cycle Gas Turbine Technology with associated Balance of Plant
Extent of preferred project sites	11.8ha
Extent of the 2000MW PRBGP3 CCPP	Up to 11ha
Stack dimensions (Site elevation: 43 - 47 m above mean sea)	» Exhaust and bypass stack height will be a minimum of 45m up to 90m (1 stack per Heat Recovery Steam Generator (HRSG) and one additional bypass for each gas turbine. » Diameter of each stack is expected to be approximately 9m
Fuel Sources	» Natural gas (LNG or similar) – 2 218 407 840 (i.e. 2 218 million) normal m^3. » Mixture of Natural gas and Hydrogen
Site access	The site will be accessed via existing roads within the IDZ Phase 1F (already approved through an EIA undertaken for the Phase 1F infrastructure) and internal access roads (width of up to 6m) which will be constructed.
Grid connection	» Onsite substation (275kV or 400kV) » The Phakwe Richards Bay Gas Power 3 CCPP will be connected to the national grid via a 275kV or 400kV Eskom Switching Station and underground transmission cables that will connect to the selected Eskom grid connection point. A separate EIA process will be undertaken for the switching station and transmission line.
Water requirements	» The construction phase of the PRBGP3 plant will require ~25 000m^3 of water for a period of 36-48 months. The average consumption will be approximately 550-700 m^3/month. Potable water is to be sourced from RB IDZ as part of the lease agreement conditions. » Water volumes of approximately 1 130 000 m^3 per annum are expected to be required for the operation of the plant. This amount to between 2790 and 3100 m^3/day which will be provided by the RB IDZ. Water provided by RB IDZ will be sourced from the uMhlathuze Municipality Water Works. If the potential construction of a Umhlathuze Water treatment plant makes industrial water available in the future, this water could be considered as an alternative source of water during the operation of the plant.
Associated infrastructure	» Temporary laydown areas; » Warehousing and buildings; » Workshop building; » Fire water pump building; » Administration and Control Building; » Ablution facilities; » Storage facilities; » Guard House; » Fencing; » Maintenance and cleaning area; » Operational and maintenance control centre
Services required	The proposed project will be located within the Richards Bay IDZ 1F under a long-term lease. The Zone Operator / Landlord (RBIDZ) is

Component	Description/ Dimensions
	responsible for all services required by Phakwe Richards Bay Gas Power 3 (Pty) Ltd (the tenant) under the long-term lease agreement. The RBIDZ lease agreement states: "*Undeveloped land which is to be serviced by the Landlord to include bulk water, sewer, and electrical connections and a road external to the leased premises but within the RBIDZ. The Landlord will be responsible for the development of the Property as vacant developed land with services in place to the supply points installed by the Landlord near the boundary of the Property*." In this regard, the following engineering services will be provided by the Landlord: » Water; » Sewage; » Roads; » Storm water; » Electricity; and » General waste removal on a weekly basis by the uMhlathuze Municipality. These services are already existing within the IDZ and sufficient water supply for the project from the IDZ has been confirmed by the applicant. Construction waste and hazardous waste during construction and operation will be removed from site by a suitably qualified contractor for disposal at an appropriately licensed waste disposal site or to be recycled (where possible).
Raw/Process-Water Storage Reservoir	Water storage facilities will be located on site. This will include a raw water and fire water tank, demineralisation water tank and a tank for partially treated water.

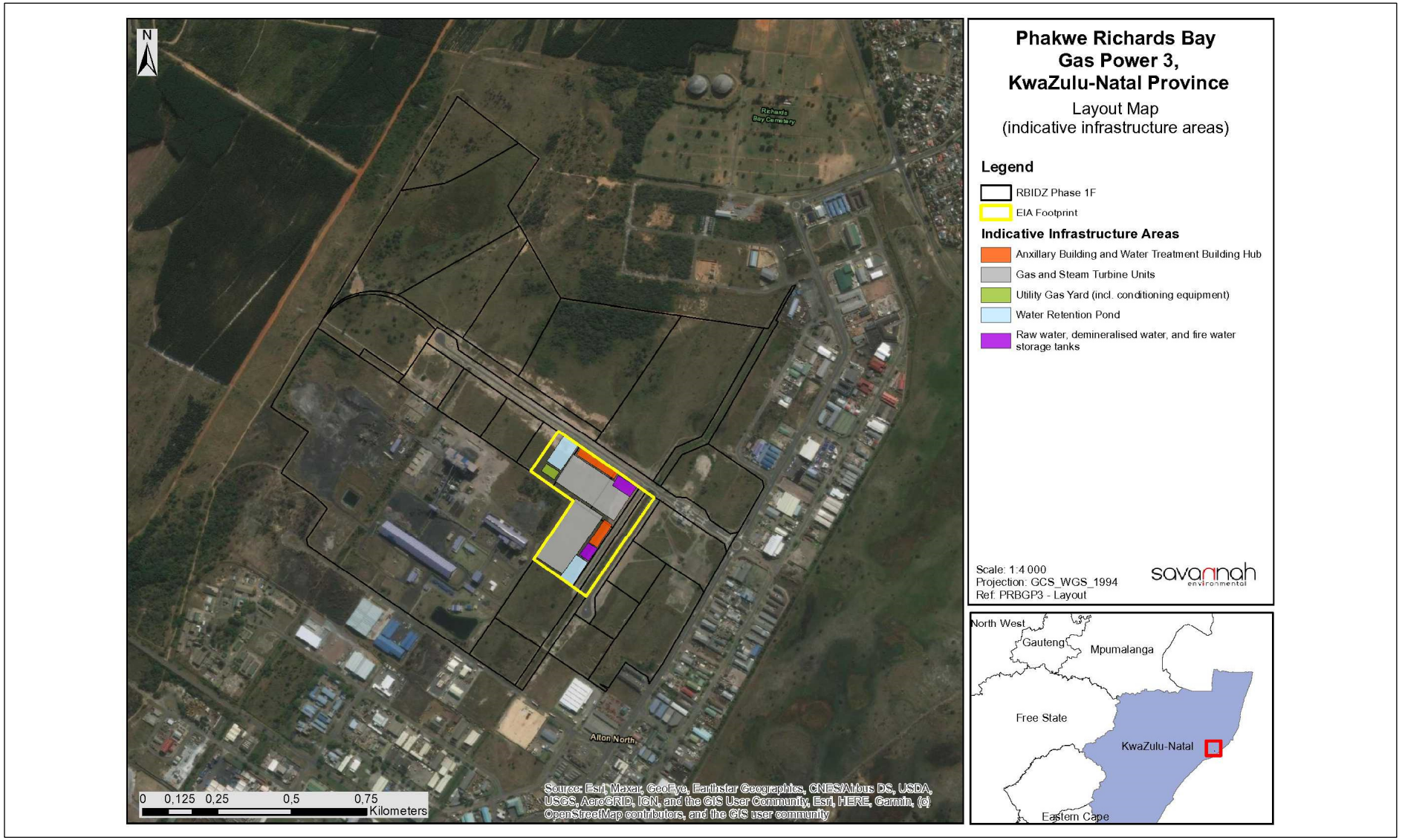


Figure 1.2: Map of indicative areas for infrastructure associated within the Phakwe Richards Bay Gas Power 3 CCPP. A preliminary detailed design is included in **Appendix A**

1.3. Life-cycle Phases of the 2000MW PRBGP3 CCPP

4.3.1. Construction Phase

Construction of the Phakwe Richards Bay Gas Power 3 CCPP is expected to take up to 36 to 48 months to construct depending on the choice of technology and the lead time for equipment. The construction activities involve the following:

- Prior to initiating construction, a number of surveys will be required including, but not limited to, geotechnical survey, site survey and confirmation of the power station footprint and location of exhaust stacks key components.
- Site preparation activities will include clearance of vegetation and excavations for foundations and internal roads. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.
- Thereafter civil works will take place which involves concrete works for structures such as foundation, the production unit (which houses the engines/turbines, generator, engines and so forth), stacks, cooling towers (if applicable), substation and associated infrastructure.
- Civil works for water storage areas, water demineralisation processing plant and mechanical and electrical work will then follow.
- Ancillary infrastructure such as fuel storage facilities (if required), guard house, admin building, workshops and a warehouse will be established.
- As construction is completed in an area, and as all construction equipment is removed from the site, the site will be rehabilitated where practical and reasonable.

Employment opportunities to local community members will be available during the construction phase of the project. It is estimated that during the construction period the construction staff complement will be ~600 people, with peaks of staff higher, with employment opportunities being provided for the local community as far as possible. The labour required includes 90% low skilled and semi-skilled and a 10% of skilled and highly skilled workforce. Employees will not reside on the project site and will be accommodated in the Richards Bay area.

4.3.2. Operation Phase

Prior to the operation of the power station, testing and trials will need to be undertaken. The proposed facility will create approximately 60 permanent employment positions that will be retained for the 20-year life of the project. The permanent employment positions will include highly skilled, skilled and semi-skilled positions.

The Phakwe Richards Bay Gas Power 3 CCPP is proposed to operate at mid-merit or baseload (estimated 16 to 24 hours daily operation). To operate a power plant of this nature, resources are required (input), and processes and outputs occur from the electricity generation process.

The amount of fuel to be consumed will depend on the degree to which the plant is used (i.e. base load or mid-merit – comparison). The maximum fuel consumption of the power plant will be approximately 116 million GJ per annum at base load and 77 million GJ per annum at mid-merit. The estimated volumes required are: 3 021 000 000m^3 at base load and 2 014 000 000 m^3 at mid-merit. The source of fuel (LNG) is expected to be the Transnet dedicated LNG pipeline, from the Richards Bay harbour. Alternatively, fuel can

be purchased from international suppliers. Where fuel is purchased from a party other than Transnet, it will be supplied to the power plant via a dedicated gas pipeline, also from the Richards Bay harbour.

The gas to power plant may consume water at volumes up to 1 130 000m^3 per annum at base load and 755 000m^3 per annum at mid-merit (note that the volume of water required will be dependent on the final design of the facility as well as on the technology supplier). Every effort is being made to reduce these volumes further, including the potential for recycling condensation from air cooled condensers if such equipment will form part of the final plant design. The volume of water required will be supplied via the Richards Bay IDZ water supply network that has an allotment from the local water authority. The Richards Bay IDZ has undertaken to provide the water to the site under its long-term lease agreement with Phakwe Richards Bay Gas Power 3 (Pty) Ltd. The Richards Bay IDZ has provided Phakwe Richards Bay Gas Power 3 (Pty) Ltd with a letter of confirmation that the volumes required would be supplied (refer to Appendix C).

Other small consumables include oils for plant lubrication and electrical insulation and selected other chemicals that are typically associated with such plants.

The plant will produce wastewater as an output of the demineralisation plant on site and the washing of turbines, blow down, as well as oily water. The wastewater will be contaminated with heavy metals and must be disposed of by a specialist contractor. The wastewater will be stored in a sump at each unit. Oily water will be collected from drains. The oily water will be sent to an oily water separator (one for the site). Oil that is separated from the water will be removed from the sump periodically by a specialist contractor. The grey water from the separator will be discharged into the RB IDZ's wastewater system which is a dedicated effluent discharge pipeline used by existing industrial users. It must however be noted that prior to any discharge of grey water, the developer must obtain an oil contamination requirement from the RB IDZ to ensure that the oily water separator filter purchased is of the correct specifications. This will ensure that grey water discharged into the RB IDZ's system will not further contaminate the RB IDZ's wastewater system.

It is anticipated that there will be full time security, maintenance and control room staff required at the site.

4.9.3. Decommissioning Phase

The lifespan of the proposed Phakwe Richards Bay Gas Power 3 CCPP will be at least 20 years from date of commissioning. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or if it is no longer required. Upgrade of the RMPP technology could be possible after the initial 20 year operational life should an extension of operational life be required as the gas engines and turbines are common to have longer operational lives than 20 years. Should the project be decommissioned, the fuel supply infrastructure would similarly need to be decommissioned (natural gas or mixture of natural gas and hydrogen).

It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA process would comprise the disassembly and disposal of the infrastructure. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, fuel storage tanks and pipelines, removal of waste from the site and rehabilitation to the desired end-use.

Future use of the site after decommissioning of the Phakwe Richards Bay Gas Power 3 CCPP could possibly form part of another energy generating project of an alternative industry that would be able to utilise some

of the existing infrastructure associated with the plant. This would however be dependent on the development plans of the area at the time.

2. FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

2.1. Impacts Identified and Assessed through the EIA Process

The potential environmental impacts associated with Phakwe Richards Bay Gas Power 3 CCPP identified and assessed through the EIA process include:

- Impacts on Terrestrial Biodiversity
- Impacts on Aquatic Ecology
- Impacts on Soils and Agricultural Potential
- Impacts on Air Quality
- Health Impacts
- Impacts on Climate Change
- Visual impacts
- Impacts on ambient Noise Levels
- Socio-Economic impacts
- Traffic impacts
- Impact due to unplanned events

2.1.1. Impacts on Terrestrial Biodiversity

The project under consideration is located within areas recognised as of national, provincial, district or municipal conservation significance (Valued Ecosystem Components (VECs)[1]) considered important in terms of habitats, species, ecosystems, and ecosystem services conservation that are required to meet national, provincial, district and municipal conservation targets. Despite the presence of VECs within Phase 1F, this area was incorporated into the Industrial Development Zone and received authorisation for industrial development in 2016.

Phase 1F of the IDZ is still largely undeveloped but has a longstanding history of anthropogenic disturbance which included the historic planting of *Pinus* and *Eucalyptus* plantations, vegetation clearance to accommodate the installation of various services infrastructure (i.e., water, sewer, stormwater, electricity, roads, artificial drainage canals), and the more recent infilling of the wetlands as authorised for the development of the IDZ. Currently Phase 1F is occupied by Tata Steel and the Nyanza TiO_2 Pilot plant which covers approximately a third of Phase 1F. Phase 1F is located amidst mixed-use industrial developments, residential areas, exotic plantations, and a few open spaces degraded by invasive plant species/weeds.

The project site on Phase 1F has experienced past environmental disturbances that were judged to have had a negative influence on its biodiversity and ecology and included the following:

- Land clearance on the project site resulted in the direct loss of indigenous vegetation.
- The wetlands on the proposed development site were fragmented by the construction of a drainage line and roads.
- The wetlands on the project site were infilled to prepare the area for future development.

[1] VECs are defined as elements of the environment that have scientific, ecological, economic, social, or cultural significance.

The site has been determined to have a moderate Ecological Importance. In this context, development activities of medium impact are considered acceptable followed by appropriate restoration activities. Many of the anticipated project-specific impacts during the construction and operational phases can be successfully mitigated to moderate, low, and minor levels of significance, and are thus considered acceptable.

2.1.2. Impacts on Aquatic Ecology

Three hydrogeomorphic (HGM) units were identified within the 500 m regulated area, of which two have been classified as unchanneled valley bottom wetlands and one classified as a hillslope seep. The HGM units consist of one dominant soil form was identified within the identified wetland, namely the Manguzi soil form.

The Richards Bay Industrial Development Zone received environmental authorisation, which includes the development of two of the wetland areas. The remaining third wetland is not in a position in the landscape to be affected by the development. Therefore, no additional authorisation or WUL is required for the proposed PRBGP3 project.

It is recommended that the conceptual wetland plan developed for the industrial zone (Royal Haskoning DHV, 2015) be implemented for the project.

2.1.3. Impacts on Soils and Agricultural Potential

Various soil forms have been identified which have been divided into four main land capability classes according to depth, texture, hydromorphic properties etc. (namely land capability class II, III, IV and V). From these four classes as well as the ideal climatic capability of "C1", three land potential levels were calculated, namely land potential 1, 2 and "vlei". Therefore, the overall land potential ranges from "Low" (for the wetland areas characterised by non-arable conditions) to "Very High".

The 50 m regulated area comprises of land potential resources characterised by "Very High" arable potential under natural conditions, owing to the ideal climatic conditions of the region as well as the physical properties of the classified soil forms. The high sensitivity of these soils emphasises the potential loss of highly valued land. It is worth noting that the agricultural land use in the surrounding area needs to be considered holistically.

High potential arable land is only useful to agricultural land use, with limited significance outside of such a land use. It is worth considering the locality of the proposed project area being on the outskirts of the Richards Bay CBD. Therefore, regardless of whether or not the proposed activities proceed, the soil will not be used for agriculture due to the zoning of the area. Therefore, it is the specialist's opinion that even though significant impacts towards soil resources are expected, no impacts towards agricultural land use are foreseen. The soil resources will ultimately never be of value to farming practices reliant on high potential arable land. Therefore, the proposed activities should proceed as have been planned.

2.1.4. Impacts on Air Quality

The CALPUFF/CALMET model suite was selected for use in the Air Quality Impact Assessment investigation to predict maximum short-term (1 and 24-hour) and annual average ground-level concentrations at various

receptor locations within the computational domain. The main findings of the simulated incremental assessment were:

1. The construction phase of the project could result in off-site exceedances of inhalable particulate matter of less than 10 µm in diameter - PM_{10} daily and annual National Ambient Air Quality Standards (NAAQS) over the 36-month construction phase.
    a. It is likely that the construction (and decommissioning) phase(s) may have a "low" impact on the ambient air quality before and after effective mitigation measures are implemented.
2. Compliance with hourly, daily and annual NAAQS under normal operations for hourly, daily and annual average pollutant concentrations as applicable to sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$ – inhalable and respirable particulate matter of less than 10 µm and 2.5 µm in diameter, respectively), carbon monoxide (CO) and total volatile organic compounds (TVOCs). Exceedances of the nitrogen dioxide (NO_2) NAAQ Limit Concentration could result from the normal operation of the facility using natural gas, but the frequency of exceedance is likely to be within that allowed by the NAAQS.
    a. The operational phase of the project will have a low impact significance (based on design mitigation measures) on ambient SO_2, PM, CO, and VOC concentrations, with no additional mitigation required.
    b. The operational phase is likely to have a "medium" impact significance for NO_2; however, if additional mitigation measures are implemented, the significance could be reduced to "low".
3. Due to the inherently low sulfur content of natural gas, SO_2 emissions from the turbines will not reach the emission standard and therefore the facility's impact on SO_2 was also assessed using mass balance calculations for combined cycle turbines using the default sulfur content of the emission factor (4600 g/lE+06 Nm^3).
    a. Compliance the NAAQS was simulated for hourly, daily, and annual average SO2 for the operational scenario based on emission factor calculations.
4. The impact of start-up on ambient nitrogen dioxide (NO_2) concentrations was estimated, and exceedances of the NAAQS could result at residential receptors, schools and medical facilities. The impacts can be reduced if the turbines reach Minimum Emission Standards in less than 30 minutes, and if the frequency of start-up events is reduced.
5. Annual SO_2 and NO_2 concentrations are unlikely to affect vegetation productivity or animal health off-site.
6. The impact of the facility was simulated to be below the National Dust Control Regulations (NDCR) acceptable dustfall rates for all project phases.
7. While hydrogen (or natural gas – hydrogen mixture) could significantly reduce emissions of SO2, CO, PM and VOCs from the facility, emissions of oxides of nitrogen (NOX) could potentially be similar to those from natural gas combustion.

From an air quality perspective, it is the opinion of the specialist that the Phakwe Richards Bay Gas Power 3 Combined Cycle Gas to Power Plant be authorised, on condition that:

» Emissions be monitored as per standard practice for the appropriate listed activity.
» Emissions are maintained at or lower than the Minimum Emission Standards appropriate for the listed activity.
» Conformance with the other environmental management programme requirements for air quality are met.

2.1.5. Health Impacts

A rapid appraisal health impact assessment (RAHIA) was undertaken for the proposed project, supported by a Baseline Health Assessment Report and a Human Health Risk Assessment. This assessment was informed by the outcomes of the Air Quality Impact Assessment. According to the Good Practice guidance of the IFC, a RAHIA is suitable for the project, because an influx of people settling in the area, due to the construction and operation of the facility, is not foreseen.

It was concluded that:

» The assessment has been conducted with consideration of the health vulnerabilities of certain age groups in the receptor population, as indicated in the community baseline health report.
» Impacts on health associated with PM2.5, SO2, NO2, CO and VOC emissions from the proposed Phakwe power plant project during the construction, operational and decommissioning phases are assessed as of low significance, with a neutral status.
» Implementation of the proposed power plant is associated with low impact on health, even in sensitive receptor communities.

2.1.6. Impacts on Climate Change

The assessment of the climate change impact of this project considered the impact of the project on climate change, the resilience of the project to climate change, as well as the options for mitigation of the impacts.

The impact of the project on climate change was assessed in the context of both GHG emissions from the project, as well as the potential positive impact the project can have through the avoidance of emissions. This was assuming natural gas is the only fuel used. The results are compared to South Africa's carbon budget for the NDC Low Emission Scenario, which was calculated as 7 760 million tons CO_2e.

The project will emit 82 $ktCO_2e$ during the construction phase, 7 870 $ktCO_2e$/year during the operational phase and 236 000 $ktCO_2e$ over its lifetime. The portion of these emissions emitted inside the borders of South Africa represents 1.9% of the low emission NDC carbon budget calculated, for the lifetime of the project.

When considering the potential positive impact of the proposed project, the expected GHG emissions from the project will avoid emissions through the displacement of coal. In addition to this, the project will enable an increased level of intermittent renewable energy capacity to be placed onto the South African grid. In the long-term, hydrogen can be a potential fuel source used to offset the projects carbon emissions. The total avoided emissions is 236 million tCO_2e over the lifetime of the project through the displacement of the coal baseline. This represents 3% of the South African carbon budget associated with NDC low emission pathway. In addition to this there is a possibility that the project could avoid 556 million tons through increasing the ability of the Eskom grid to accept intermittent renewable energy over the lifetime of the project. This represents 7.2% of the carbon budget

The positive impact of the project on climate change with respect the avoided emissions from the coal baseline, and the potential avoided emissions through the increase of the grid to accept intermittent renewable energy far outweighs the contribution of the project to national inventory.
With respect to the resilience of the project to climate change, we found that there are no significant risk factors that should be considered in the environmental authorisation.

There are limited mitigation measures available to this proposed project, and as a result this project will be exposed to a low residual risk of lock in emissions, due to the combustion of natural gas.

In accordance with the findings of this CCIA, the specialist has concluded that the proposed Phakwe Richards Bay Gas Power 3 CCPP should not be refused environmental authorisation on climate change related issues.

2.1.7. Visual Impacts

The development and operation of the proposed Phakwe Richards Bay Gas Power 3 CCPP and its associated infrastructure is not expected to have a significant visual impact within the larger study area. The location of the proposed power plant within an established industrial area is in line with the principle of consolidating industrial infrastructure within allocated areas. It is also not expected to significantly increase the potential cumulative visual impacts of industrial developments within the region, given the existing industrial nature of the port of Richards Bay, the Alton industrial area and the RB IDZ Phase 1F developments, and the planned port expansion endeavours.

Overall, the significance of the visual impacts (should any occur) is expected to range from moderate to low as there are no known potential sensitive visual receptors within close proximity of the proposed development. There are no residences located within a 1km radius of the proposed development and no tourist attractions or tourist routes that would be significantly impacted.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the proposed power plant.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the development of the Phakwe Richards Bay Gas Power 3 CCPP would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

2.1.8. Noise Impacts

Potential scenarios were conceptualized for the future proposed construction and operational phases, with the output of the modelling exercise indicating a potential noise impact of low significance for both the day- and night-time periods for all the project phases. No mitigation or management measures are required or recommended to reduce noise levels (when considering Environmental Noise). The power generation facility still has to comply with the relevant Health and Safety Regulations and Guidelines that my stipulate periodic noise monitoring (Noise-Induced Hearing Loss Regulations [GNR 307 of 2020] as well as the Occupational Health and Safety Act, 1993 [Act 85 of 1993]).

Similarly, no additional acoustic studies are recommended for this development, and it will not be required to develop or implement an environmental noise monitoring programme considering:

- the developmental character of the area;
- the results from the night-time ambient sound level measurements;
- the projected low significance of the noise impacts

It is therefore recommended that the proposed 2 000MW Phakwe Gas to Power Project be authorized from an acoustic perspective.

2.1.9. Socio-economic Impacts

the proposed development will result in both negative and positive impacts. All identified economic impacts will be positive and some social identified impacts are negative in nature. The following main conclusions are reached from the specialist study undertaken:

- South Africa is experiencing high energy demand and as a result of the gap between the high demand and low supply there has been continued load-shedding and therefore a need for additional electricity supply.
- High dependence on coal as an energy source has attracted growing national and international criticism due to greenhouse gas emissions the contribute significantly to climate change and air pollution. Due to the impact of coals as energy source there is a need for South Africa to diversify the sources of electricity generation.
- The proposed Phakwe Richards Bay Gas Power 3 CCPP and its associated infrastructure which is to be located at the Richards Bay IDZ Phase 1F, aims to supply natural gas-based electricity which is less harmful to the environment when compared to coal produced energy.
- The socio-economic impact assessment in this report focuses on the social impacts which are likely to arise from the development of the proposed plant as well as the various economic impacts which might arise from the proposed development. Under the social impacts, several the impacts have been identified as being negative and these include air pollution, expected increase in noise levels, expected increase in traffic level and possible increases on the crime levels of the area.
- The mitigation measures are specific to a particular impact and these can be summarized as follows:
  - Community Impact
    - The negative visual effect and the pollution levels can be mitigated by planting trees around the plant establishment.
  - Population Levels Impact
    - To reduce the magnitude of the population levels, mitigation measures such as prioritising local workers for employment should be applied.

- Crime Levels Impact
  - The magnitude of potential crime levels can be reduced by ensuring that there is good security measure on the premises of the plant.
- Standard of Living Impact
  - To mitigate the magnitude of the impact occurring, proper employment procedures have to be followed with workers being part of a labour union to ensure that their concerns noted

» All identified economic impacts from the proposed development are expected to be of a positive nature and these include the following:
- Employment creation
  - A total of 2 484 jobs are expected to be created during the construction phase of the proposed PRBGP3 and a further 157 jobs are expected to be created during the operational phase of the project. This includes direct, indirect and induced job opportunities.
- Increase Gross Value Add
  - During the construction of and operational phases of the project, the total contribution to GVA from the plant is expected to be more than R25 Billion rands.
- Property Values
  - The operation of the highly technical power plant which uses an advanced method of energy generation will have a positive impact on the property values of surrounding establishments.

» The Phakwe Richards Bay Gas Power 3 CCPP development also has a larger positive economic contribution in terms of contributing energy towards the national electric grid which will ease load shedding and allow reduced power costs for the reopening of industry.

» The overall status of the proposed development is considered to be positive given the high demand for energy generation in South Africa as well as other factors such as the needed jobs which will be created by this project.

» All these findings support the proposal of proceeding with the development of the Phakwe Richards Bay Gas Power 3 CCPP at the identified site in Phase 1F of the Richards Bay IDZ.

2.1.10. Traffic Impacts

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Phakwe Richards Bay Gas Power 3 (PRBGP3) 2000 MW Combined Cycle Gas to Power Plant were identified and assessed.

» The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal load vehicles was estimated and found to be able to be accommodated by the road network.

» During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 60 full-time employees will be stationed on site (subject to change). Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

» The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation.

» The traffic generated during the decommissioning phase will be less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of medium significance before and of low significance after mitigation.

» The proposed access point, located on the access road located off Alumina Alley, will need to be upgraded to cater for the construction vehicles and abnormal load vehicles.

- As traffic delays are experienced along the R619, the access roads located off the R619 should be avoided or if necessary, used during off peak hours.
- The preferred access roads to the site are the roads located off the R34 viz. Western Arterial, Alumina Alley and Bullion Road.

The construction and decommissioning phases are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is short term i.e., the impact on the surrounding road network is temporary and the facility, when operational, will not add any significant traffic to the road network.

The development is supported from a traffic and transport engineering perspective provided that the recommendations and mitigations contained in this report are adhered to.

The potential impacts associated with the facility and associated infrastructure are acceptable from a traffic and transport engineering perspective and it is therefore recommended that the proposed facility be authorised

2.1.11. Impact of Unplanned Events

As a result of the risk assessment study conducted for the proposed PRBGP3 facility in Richards Bay, a number of events were found to have risks beyond the site boundary. These risks could be mitigated to acceptable levels, as shown in the report.

No fatal flaws that would prevent the project proceeding to the detailed engineering phase of the project were identified, and the specialist would support the project under the following conditions most of which will be detailed in the MHI study:

- Compliance with all statutory requirements, i.e., pressure vessel designs.
- Compliance with applicable SANS codes, i.e., SANS 10087, SANS 10089, SANS 10108, etc.
- Incorporation of applicable guidelines or equivalent international recognised codes of good design and practice into the designs.
- Completion of a recognised process hazard analysis (such as a HAZOP study, FMEA, etc.) on the proposed facility prior to construction to ensure design and operational hazards have been identified and adequate mitigation put in place.
- Full compliance with IEC 61508 and IEC 61511 (Safety Instrument Systems) standards or equivalent to ensure that adequate protective instrumentation is included in the design and would remain valid for the full life cycle of the tank farm:
  - Including demonstration from the designer that sufficient and reliable instrumentation would be specified and installed at the facility.
- Preparation and issue of a safety document detailing safety and design features reducing the impacts from fires, explosions and flammable atmospheres to the MHI assessment body at the time of the MHI assessment:
  - Including compliance to statutory laws, applicable codes and standards and world's best practice;
  - Including the listing of statutory and non-statutory inspections, giving frequency of inspections;
  - Including the auditing of the built facility against the safety document;
  - Noting that codes such as IEC 61511 can be used to achieve these requirements;
- Demonstration by the PRBGP3 owner or their contractor that the final designs would reduce the risks posed by the installation to the South African requirements as prescribed in SANS 1461 (2018).

- Signature of all terminal designs by a professional engineer registered in South Africa in accordance with the Professional Engineers Act, who takes responsibility for suitable designs.
- Completion of an emergency preparedness and response document for on-site and off-site scenarios prior to initiating the MHI risk assessment (with input from local authorities).
- Any increases to the product list or product inventories must be with the approval of the authorities under NEMA.
- Final acceptance of the facility risks with an MHI risk assessment that must be completed in accordance with the MHI regulations;
  - Basing such a risk assessment on the final design and including engineering mitigation.

2.1.12. Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Phakwe Richards Bay Gas Power 3 CCPP throughout all phases of the project life cycle. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The assessment of the cumulative impacts was undertaken through the consideration of impacts in isolation and compared to the cumulative impacts of the Phakwe Richards Bay Gas Power 3 CCPP and other industrial developments at a scale specifically identified by each specialist.

Based on the specialist cumulative assessment and findings, the development of the Phakwe Richards Bay Gas Power 3 CCPP, other industrial activities, and gas to power developments within a 10km radius, it can be concluded that cumulative impacts will be of a low to medium significance, depending on the impact being considered. Impacts associated with climate change are potentially high but can be mitigated through avoided emissions as the addition of the Phakwe Richards Bay Gas Power 3 CCPP to the national grid has the potential to enable the expansion of South Africa's renewables generation capacity in execution of South Africa's energy transition strategy. There are no impacts or risks identified as unacceptable with the development of Phakwe Richards Bay Gas Power 3 CCPP when considered together with other developments within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

The limited potential for cumulative impacts and risks makes the location of this project within the identified site of the Richards Bay IDZ Zone 1F a desirable location for the proposed project, provided that environmental impacts are mitigated to suitable standards as recommended within this EIA Report.

2.1.13. Assessment of the Do Nothing Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing the Phakwe Richards Bay Gas Power 3 CCPP. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of a CCPP facility.

In terms of the cost-benefit analysis of the project it was concluded that, apart from impacts associated with GHG emissions, the costs associated with the project are anticipated to occur at a site-specific level, the significance of which can be largely reduced through the application of appropriate mitigation measures, and through the appropriate placement of infrastructure within areas of lower sensitivity. The inclusion of the Phakwe Richards Bay Gas Power 3 CCPP onto the grid could contribute to a potential net reduction in

GHG emissions. The total avoided emissions are 236 million tCO_2e over the lifetime of the project through the displacement of the coal baseline. This represents 3% of the South African carbon budget associated with NDC low emission pathway. In addition to this, there is a possibility that the project could avoid 556 million tons through increasing the ability of the Eskom grid to accept intermittent renewable energy over the lifetime of the project. This represents 7.2% of the carbon budget.

Impacts of not implementing the project on the identified site largely relate to lost opportunities from a socio-economic perspective relating to employment, skills development, contribution to local and provincial development goals and the addition of 2000MW to the electricity grid and support for the introduction of more renewable energy into the technology mix.

Although a number of impacts of potential high significance have been identified, no environmental fatal flaws were identified to be associated with the Phakwe Richards Bay Gas Power 3 CCPP through the specialist studies undertaken. Where impacts cannot be avoided, appropriate mitigation has been identified to minimise impacts to acceptable levels. A number of negative impacts have been identified to be associated with the implementation of the do nothing alternative.

The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of Phakwe Richards Bay Gas Power 3 CCPP.

2.1.14. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the project site, specific environmental features and areas were identified which will be impacted by the placement of the Phakwe Richards Bay Gas Power 3 CCPP (refer to **Figure 2.1**). These include wetland features and medium sensitivity vegetation (Maputaland Wooded Grassland) within the project site, as well as potentially sensitive noise and air quality receptors further afield (>2km).

Regarding the wetland features, Richards Bay Industrial Development Zone SoC Ltd received Environmental Authorisation (EA) for the IDZ Phase 1F in September 2016 (DFFE Ref No.: 14/12/16/3/3/3/665). This EA included the infilling of some of the wetlands on site to release the land for development. Other wetland features identified within the 500m regulated zone will not be impacted by the proposed development.

Impacts on sensitive noise and air quality receptors were determined to be of low significance.

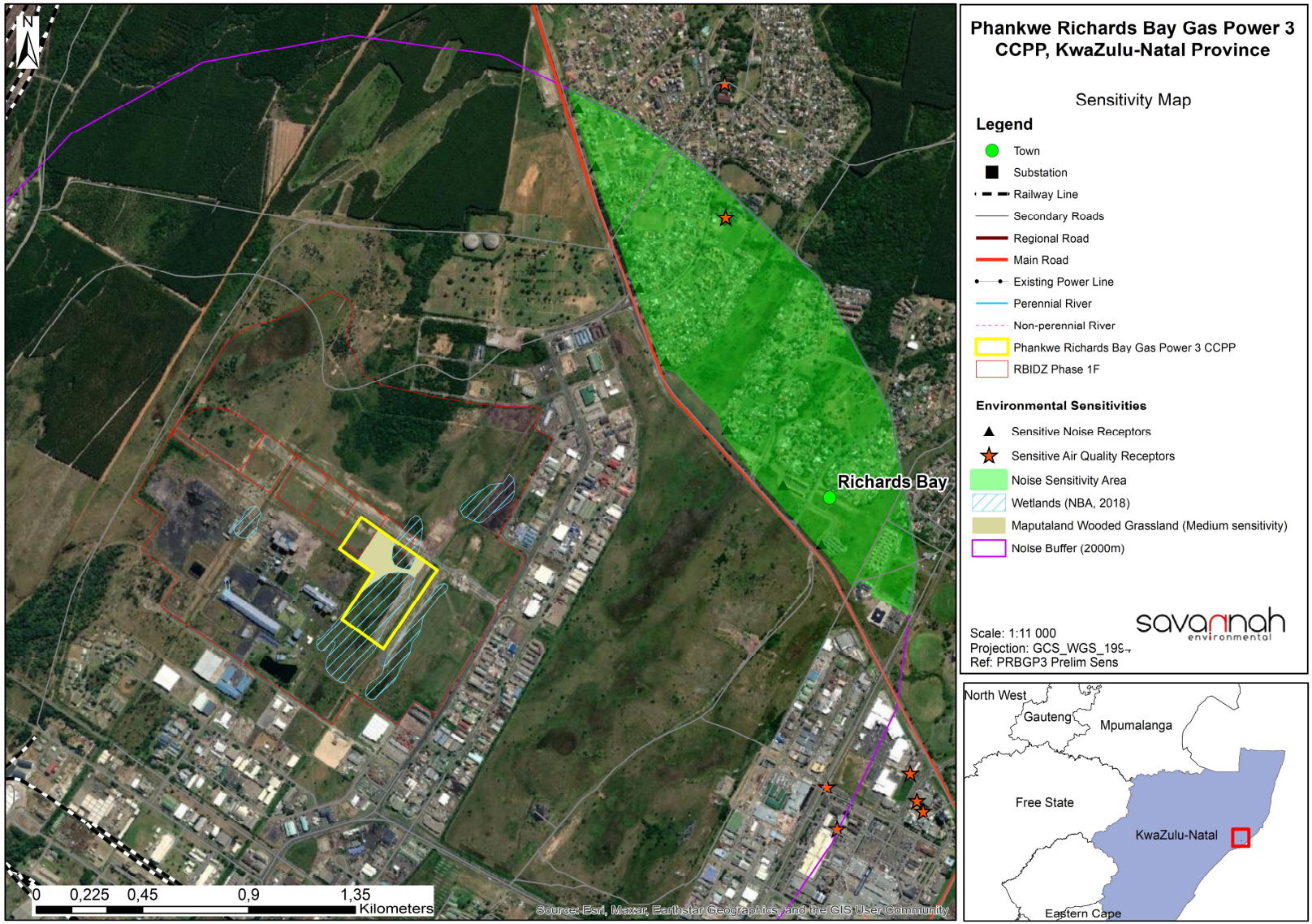


Figure 2.1: Environmental sensitivity map of the project site overlain by the layout assessed for Phakwe Richards Bay Gas Power 3 CCPP

2.1.15. Overall Conclusion (Impact Statement)

The construction and operation of the Phakwe Richards Bay Gas Power 3 CCPP on the project site located within the Richards Bay IDZ Phase 1F, Richards Bay in the City of uMhlathuze Local Municipality and the King Cetshwayo District Municipality has been proposed by Phakwe Richards Bay Gas Power 3 (Pty) Ltd. The preferred activity was determined by the developer to be the development of a gas to power combined cycle power plant. A technically viable project site and development footprint was proposed by the developer and assessed as part of the EIA process. The environmental assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA Report.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level.

From a biodiversity perspective, features in the study area include wetlands and medium sensitivity vegetation (Maputaland Wooded Grassland) within the project site. The site has been determined to have a moderate Ecological Importance. In this context, development activities of medium impact are considered acceptable followed by appropriate restoration activities. Many of the anticipated project-specific impacts during the construction and operational phases can be successfully mitigated to moderate, low, and minor levels of significance, and are thus considered acceptable.

The Richards Bay Industrial Development Zone received environmental authorisation, which includes the development of two of the wetland areas. The remaining third wetland is not in a position in the landscape to be affected by the development. Therefore, no additional authorisation or WUL is required for the proposed PRBGP3 project.

From a land use perspective, the site is located within the Richards Bay Industrial Development Zone, Phase 1F. The site is designated for noxious industry such as the proposed gas to power plant. The land potential resources of some areas within the site are characterised by "Very High" arable potential under natural conditions, owing to the ideal climatic conditions of the region as well as the physical properties of the classified soil forms. High potential arable land is however only useful to agricultural land use, with limited significance outside of such a land use. It is worth considering the locality of the proposed project area being on the outskirts of the Richards Bay CBD. Therefore, regardless of whether or not the proposed activities proceed, the soil will not be used for agriculture due to the zoning of the area. Therefore, even though significant impacts towards soil resources are expected, no impacts towards agricultural land use are foreseen. The soil resources will ultimately never be of value to farming practices reliant on high potential arable land.

From a social perspective, the project has the potential to impact negatively on ambient air quality, human health, ambient noise levels and sense of place. As a result of the nature of the proposed project and the location of the proposed development site in relation to sensitive receptors, impacts in this regard are expected to be limited. Positive socio-economic impacts of the project, including employment and skills development opportunities as well as the supply of reliable electricity to the grid, are expected at a regional and national level.

The project is expected to have a high impact on climate change. The inclusion of the Phakwe Richards Bay Gas Power 3 CCPP onto the grid could, however, contribute to a potential net reduction in GHG emissions.

The total avoided emissions are 236 million tCO_2e over the lifetime of the project through the displacement of the coal baseline. This represents 3% of the South African carbon budget associated with NDC low emission pathway. In addition to this, there is a possibility that the project could avoid 556 million tons through increasing the ability of the Eskom grid to accept intermittent renewable energy over the lifetime of the project. This represents 7.2% of the carbon budget.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of Phakwe Richards Bay Gas Power 3 CCPP. All impacts associated with the project can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

Through the assessment of the development of the Phakwe Richards Bay Gas Power 3 CCPP within the project site it can be concluded that the development of the facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

2.1.16. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the Phakwe Richards Bay Gas Power 3 CCPP is acceptable within the landscape and can reasonably be authorised. The recommended validity period for the environmental authorisation is **10 years**.

The authorisation would include the following key infrastructure and components:

- Up to 4 gas turbines for the generation of electricity through the use of natural gas (liquid or gas forms), or a mixture of Natural gas and Hydrogen (in a proportion scaling up from 20% H2) as fuel source, operating all turbines at mid-merit or baseload (estimated 16 to 24 hours daily operation).
- Exhaust stacks associated with each gas turbine.
- Up to 4 Recovery Steam Generator (HRSG to generate steam by capturing the heat from the turbine exhaust.
- Up to 4 steam turbines to generate additional electricity by means of the steam generated by the HRSG.
- The water treatment plant will demineralise incoming water from municipal or similar supply, to the gas turbine and steam cycle requirements. The water treatment plant will produce two parts demineralised water and reject one-part brine, which will be discharged to the RB IDZ stormwater system.
- Steam turbine water system will be a closed cycle with air cooled condensers. Make-up water will be required to replace blow down.
- Air cooled condensers to condensate used steam from the steam turbine.
- Compressed air station to supply service and process air.
- Water pipelines and water tanks for storage and distributing of process water. (Potential sourcing of alternative water outside RB IDZ supply (Municipality))
- Water retention pond
- Closed Fin-fan coolers to cool lubrication oil for the gas turbines
- Gas generator Lubrication Oil System.
- Gas pipeline supply conditioning process facility. Please note, gas supply will be via dedicated pipeline from the proposed Transnet supply pipeline network of Richards Bay (the location of this network has not

yet been confirmed) or, alternatively directly from the Regasification facilities at RB Harbour. The gas pipeline will be separately authorized.

- Site water facilities including potable water, storm water, waste water
- Fire water (FW) storage and FW system
- Diesel emergency generator for start-up operation.
- Onsite fuel conditioning including heating system.
- All underground services: This includes stormwater and wastewater.
- Ancillary infrastructure including:
  - Roads (access and internal);
  - Warehousing and buildings;
  - Workshop building;
  - Fire water pump building;
  - Administration and Control Building;
  - Ablution facilities;
  - Storage facilities;
  - Guard House;
  - Fencing;
  - Maintenance and cleaning area;
  - Operational and maintenance control centre;
- Electrical facilities including:
  - Power evacuation including GCBs, GSU transformers, MV busbar, HV cabling and 1x275kV or 400kV GIS Power Plant substation.
  - Generators and auxiliaries;
- Service infrastructure including:
  - Stormwater channels;
  - Water pipelines
  - Temporary work areas during the construction phase (laydown areas)

The following key conditions would be required to be included within an authorisation issued for the Phakwe Richards Bay Gas Power 3 CCPP:

- The Phakwe Richards Bay Gas Power 3 CCPP must be located within the Richards Bay IDZ Phase 1F on the following erven:
  - Erf 16820
  - Erf 16819
  - Erf 1/16674
  - Subdivision of Erf 17442
- All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices D to N**, are to be implemented.
- The EMPr as contained within **Appendix Q** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the Phakwe Richards Bay Gas Power 3 CCPP in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered key in achieving the appropriate environmental management standards as detailed for this project.
- A pre-construction walk-through of the final development footprint for species of conservation concern that may be affected and that can be translocated as well as comply with the KZN Nature Conservation

Ordinance and DEDT&EA permit conditions, must be undertaken prior to the commencement of the construction phase.

- Before construction commences individuals of listed species within the development footprint that would be affected, must be counted, and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey, if required. Permits from the relevant provincial authorities, i.e. the KZN DEDT&EA, must be obtained before the individuals are disturbed.
- The project footprint must be kept as small as possible.
- An alien vegetation management plan should be compiled during the planning phase and implemented concurrently with the commencement of construction. Regular inspection for alien and invasive vegetation, to limit their spread into the wetland.
- Obtain all other mandatory and environmental permits for the project, as required.

3. PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced". The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through to those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Phakwe Richards Bay Gas Power 3 CCPP. The document must be adhered to and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended) (refer to **Table 4.1**). The specifications have been developed on the basis of the findings of the Environmental Impact Assessment (EIA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts.

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and operation phases of the project to minimise the extent of environmental impacts, and to manage environmental impacts associated with the project.
- Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the EIA process.

The mitigation measures identified within the EIA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Phakwe Richards Bay Gas Power 3 (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. This EMPr is applicable to the Project Proponent and contractors working on the pre-construction, construction, and operation and maintenance phases of project. In terms of the Duty of Care provision in S28(1) of National Environmental Management Act (NEMA), the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. The document must therefore be adhered to and updated as relevant throughout the project life cycle.

This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the EIA Report for the project. As such, it is important that this document be read in conjunction with the EIA Report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation, the stipulations in the Environmental Authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the planning, construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the project and/or as the project develops. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

4. STRUCTURE OF THIS EMPR

The preceding chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

- Planning and design activities;
- Construction activities;
- Operation activities; and
- Decommissioning activities.

These chapters set out the procedures necessary for the project owner to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation for the project, an overarching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed accompanied by management **actions** that are aimed at achieving these objectives. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, responsibilities, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies

Project Component/s	List of project components affecting the objective, i.e.: » Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/Risk Source	Description of activities which could affect achieving the objective.
Mitigation: Target/Objective	Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management programme.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

» Planned activities change (i.e. in terms of the components and/or layout of the facility);
» Modification to or addition to environmental objectives and targets;
» Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment.
» Relevant legal or other requirements are changed or introduced; and
» Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

Any amendments to the EMPr must be undertaken in accordance with the requirements of the legislation relevant at the time, as well as in accordance with any specific requirements of the EA (once issued).

4.1. Contents of this Environmental Management Programme (EMPr)

This Environmental Management Programme (EMPr) has been prepared as part of the EIA process being conducted in support of the application for Environmental Authorisation (EA) for the Phakwe Richards Bay Gas Power 3 CCPP. This EMPr has been prepared in accordance with DFFE's requirements as contained in Appendix 4 of the 2014 EIA Regulations (GNR 326), and within the Acceptance of Scoping dated 18 February 2021. It provides recommended management and mitigation measures with which to minimise impacts and enhance benefits associated with the project.

An overview of the contents of this EMPr, as prescribed by Appendix 4 of the 2014 EIA Regulations (GNR 326), and where the corresponding information can be found within this EMPr is provided in Table 4.1.

Table 4.1: Summary of where the requirements of Appendix 4 of the 2014 NEMA EIA Regulations (GNR 326) are provided in this EMPr.

Requirement	Location in this EMPr
(1) An EMPr must comply with section 24N of the Act and include – (a) Details of – (i) The EAP who prepared the EMPr. (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 4.2.1 Appendix A
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Chapter 1
(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Figure 2.1 Appendix B
(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –	
(i) Planning and design.	Chapter 6
(ii) Pre-construction activities.	Chapter 6
(iii) Construction activities.	Chapter 7
(iv) Rehabilitation of the environment after construction and where applicable post closure.	Chapter 7

Requirement	Location in this EMPr
(v) Where relevant, operation activities.	Chapter 8
(f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to – (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation. (ii) Comply with any prescribed environmental management standards or practices. (iii) Comply with any applicable provisions of the Act regarding closure, where applicable. (iv) Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable.	Chapter 6-8
(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapter 6-8
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapter 6-8
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Chapter 6-8
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Chapter 6-8
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Chapter 6-8
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Chapter 6-8
(m) An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work. (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Chapter 7
(n) Any specific information that may be required by the competent authority.	Table 4.2
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

4.2. Project Team

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326) the applicant appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for managing the application for EA and the supporting EIA process. The application for EA and the EIA process, is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

4.2.1 Details and Expertise of the Environmental Assessment Practitioner (EAP)

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned), and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 15 years, for a wide variety of

projects throughout South Africa, including those associated with electricity generation and infrastructure development.

This EIA process is being managed by Jo-Anne Thomas. She is supported by Nicolene Venter.

» **Jo-Anne Thomas.** She holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with SACNASP and a registered Environmental Assessment Practitioner (EAP) with EAPASA (2019/726). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. She has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

» **Nicolene Venter.** She is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 16 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development, and therefore have extensive knowledge and experience in EIAs and environmental management, having managed and drafted EMPrs for numerous other power generation projects throughout South Africa. Curricula Vitae (CVs) detailing the Savannah Environmental team's expertise and relevant experience are provided in **Appendix B** of this EMPr.

4.2.2 Details of the Specialist Consultants

A number of independent specialist consultants have been appointed as part of the EIA project team in order to adequately identify and assess potential impacts associated with the project.

Table 4.3: Specialist Consultants which form part of the EIA project team

Issue	Specialist
Terrestrial Ecology	Anita Rautenbach of Rautenbach Biodiversity Consulting
Soils and Wetlands	Dale Kindler and Andrew Husted of The Biodiversity Company
Air Quality	Terri Bird of Airshed
Climate Change	Promethium Carbon
Noise	Morne de Jager of EARES
Visual	Lourens du Plessis of LOGIS

Socio-economic	Eugene de Beer of Urban-Econ Development Economists
Traffic	Iris Wink of JG Afrika
Health Impact Assessment	Infotox
Major Hazard Installation Risk Assessment	Mike Oberholzer of Riscom

5. ROLES AND RESPONSIBILITIES

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- Project Developer;
- Project Manager/Site Manager;
- Environmental Control Officer;
- Lead Contractor;
- Contractor's Safety, Health and Environment Representative/Environmental Officer;
- Plant Manager; and
- Environmental Officer during operation.

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities during construction in relation to the overall implementation of the EMPr

i) The Developer

The Phakwe Richards Bay Gas Power 3 CCPP are responsible for the implementation of the requirements of the EA (once issued), the requirements of all other relevant environmental permits and the specifications of the EMPr during all phases of the project. Decommissioning will entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases.

ii) Project Manager/Site Manager

The Project Manager/Site Manager is responsible for overall management of project and EMPr implementation. The following tasks will fall within his/her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the Environmental Authorisation (once issued).
- Be familiar with the recommendations and mitigation measures of this EMP, and implement these measures.
- Monitor site activities on a daily basis for compliance.
- Conduct internal audits of the construction site against the EMP.
- Confine the construction site to the demarcated area.
- Rectify transgressions through the implementation of corrective action.

iii) Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO) must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- Be fully knowledgeable of the contents of the EIA.
- Be fully knowledgeable of the contents of the conditions of the EA (once issued).
- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation, and ensure compliance therewith.
- Be fully knowledgeable with the contents of all relevant licences and permits issued for the project.
- Ensure that the contents of the EMPr are communicated to the Contractors site staff and that the Site Manager and Contractors are constantly made aware of the contents through ongoing discussion.
- Ensure that compliance with the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements or site-specific plans.
- Ensure that activities on site comply with all relevant environmental legislation.
- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Independently report to the DEFF in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued).
- Keep records of all reports submitted to DEFF.

iv) Lead Contractor

The Lead Contractor is responsible for the following:

- Ensure compliance with the EA, environmental permits and the EMPr at all times during construction.
- Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities
- Provide all necessary supervision during the execution of the project. He/ She should be available on site all the time.
- Comply with special conditions as stipulated by landowners during the negotiation process.
- Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which should be avoided during the construction process in order to minimise significant impacts to the environment.
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints
  - Health and safety incidents
  - Hazardous materials stored on site

- Non-compliance incidents

» Where construction activities are undertaken is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants.
» The Contractor shall under no circumstances interfere with the property of landowners, Grid staff or nearby communities.
» Should the Contractor require clarity on any aspect of the EMPr the Contractor must contact the Environmental Consultant/Officer for advice.

v) Contractor's Safety, Health and Environment Representative/Environmental Officer

The Contractor's Safety, Health and Environment (SHE) Representative/Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE/EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's SHE/EO should:
» Be well versed in environmental matters.
» Understand the relevant environmental legislation and processes.
» Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
» Know the background of the project and understand the implementation programme.
» Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
» Keep accurate and detailed records of all EMPr-related activities on site.

OBJECTIVE 2: Establish clear reporting, communication, and responsibilities during operation in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed during operation. Several professionals will form part of the operation team. For the purposes of the EMPr, the generic roles that need to be defined are those of the:

» Plant Manager; and
» Environmental Manager

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) Plant Manager

The Plant Manager will:
» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.

- Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
- Take appropriate action as a result of findings and recommendations in management reviews and audits.
- Provide forums to communicate matters regarding environmental management.

ii) Environmental Officer

The Environmental Officer will:

- Develop and Implement an Environmental Management System (EMS) for the power station and associated infrastructure.
- Manage and report on the facility's environmental performance.
- Maintain a register of all known environmental impacts and manage the monitoring thereof.
- Conduct internal environmental audits and co-ordinate external environmental audits.
- Liaise with statutory bodies (such as the National and Provincial Department of Environmental Affairs, Air Emissions Licensing Authority, and conservation authorities) on environmental performance and other issues.
- Conduct environmental training and awareness for the employees who operate and maintain the facility.
- Compile environmental policies and procedures.
- Liaise with interested and affected parties on environmental issues of common concern.
- Track and control the lodging of any complaints regarding environmental matters.

6. PLANNING AND DESIGN MANAGEMENT PROGRAMME

Overall Goal: undertake the pre-construction activities (planning and design phase) in a way that:

- Ensures that the design of the power plant and associated infrastructure responds to the identified environmental constraints and opportunities.
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements and avoids sensitive environmental areas as far as practically possible.
- Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- Ensures that the best environmental options are selected for the power plant and associated infrastructure.
- Enables the power plant construction activities to be undertaken without significant disruption to other land uses in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

6.1. Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Pre-construction activities, e.g. geotechnical investigations, site surveys of substation footprint and internal access roads, and environmental walk-through surveys. » Positioning of temporary laydown areas.
Mitigation: Target/Objective	» To ensure that the design of the power plant and associated infrastructure responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Project developer Contractor	Pre-construction
Undertake a detailed geotechnical pre-construction survey.	Project developer Geotechnical specialist	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
The EMPr must form part of the contract with the Contractors appointed to construct the power plant, and must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.	Project developer Contractor	Tender Design and Design Review Stage
Plan the placement of laydown areas and temporary construction equipment camps outside of identified sensitive areas (as detailed in Section 2.1.14 of this EMPr) and in such a way as to minimise vegetation clearing wherever possible and to avoid habitat loss and disturbance to adjoining areas.	Project developer	Pre-construction
Access roads and entrances to the site must be carefully planned to limit any intrusion on the neighbouring property owners and road users.	Project developer	Planning and design
Plan to make use of existing roads and tracks where feasible, rather than creating new routes. Ensure that adequate vehicle turning areas are allowed for	Project developer	Planning and design
Final project design must include measures for adequate surface water runoff, spill control and leakage control system.	Project developer Design engineer	Design and planning
Water saving techniques/strategies which could decrease the water demand of the proposed power plant, during its operation must be investigated and implemented. Alternative water sources for use during operation should be investigated.	Project developer Design engineer	Design and planning Operation phase
Relevant mitigation technologies must be built into the design of the facility to comply with emission and ambient air quality standards.	Project developer Design engineer	Design and planning
Plan for the introduction of Hydrogen as a fuel source as soon as possible.	Project developer Design engineer	Design and planning
Avoid the use of highly reflective material through painting or galvanising of exposed metals.	Project developer Design engineer	Design and planning
Visually obtrusive structures must be painted in natural soft colours that would blend in with the environment.	Project developer Design engineer	Design and planning
Plan lighting as follows: » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters, or shielded fixtures. » Make use of Low Pressure Sodium lighting or other types of low impact lighting. » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. » Lighting should be kept to a minimum wherever possible. » Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of	Project developer Design engineer Contractor Operator	Design and planning Implement during construction Maintain during operation

Mitigation: Action/Control	Responsibility	Timeframe
the activity – this is especially relevant where the edge of the activity is exposed to residential properties. » Wherever possible, lights should be directed downwards to avoid illuminating the sky. » Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement.		
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Project developer Contractor	Pre-construction
Undertake MHI Risk assessment in accordance with relevant regulations once final design is available. Ensure the following: » Compliance with all statutory requirements, i.e., pressure vessel designs. » Compliance with applicable SANS codes, i.e., SANS 10087, SANS 10089, SANS 10108, etc. » Incorporation of applicable guidelines or equivalent international recognised codes of good design and practice into the designs. » Completion of a recognised process hazard analysis (such as a HAZOP study, FMEA, etc.) on the proposed facility prior to construction to ensure design and operational hazards have been identified and adequate mitigation put in place. » Full compliance with IEC 61508 and IEC 61511 (Safety Instrument Systems) standards or equivalent to ensure that adequate protective instrumentation is included in the design and would remain valid for the full life cycle of the tank farm: ∗ Including demonstration from the designer that sufficient and reliable instrumentation would be specified and installed at the facility. » Preparation and issue of a safety document detailing safety and design features reducing the impacts from fires, explosions and flammable atmospheres to the MHI assessment body at the time of the MHI assessment: ∗ Including compliance to statutory laws, applicable codes and standards and world's best practice; ∗ Including the listing of statutory and non-statutory inspections, giving frequency of inspections; ∗ Including the auditing of the built facility against the safety document; ∗ Noting that codes such as IEC 61511 can be used to achieve these requirements; » Demonstration by the PRBGP3 owner or their contractor that the final designs would reduce the risks posed by the installation to the South African requirements as prescribed in SANS 1461 (2018). » Signature of all terminal designs by a professional engineer registered in South Africa in accordance with the Professional Engineers Act, who takes responsibility for suitable designs.	Project developer	Design Phase

Mitigation: Action/Control	Responsibility	Timeframe
» Completion of an emergency preparedness and response document for on-site and off-site scenarios prior to initiating the MHI risk assessment (with input from local authorities). » Any increases to the product list or product inventories must be with the approval of the authorities under NEMA. » Final acceptance of the facility risks with an MHI risk assessment that must be completed in accordance with the MHI regulations; ∗ Basing such a risk assessment on the final design and including engineering mitigation		

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Demarcated sensitive areas as detailed in Section 2.1.14 of this EMPr are avoided at all times. » Design and layouts respond to the mitigation measures and recommendations in the EIA Report.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 2: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components » Pre-construction activities, e.g. geotechnical investigations, site surveys of substation footprint, power line servitude and internal access roads and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	» To ensure that the design of the power plant responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner. » To ensure that the design of the power plant responds to the identified constraints identified through pre-construction surveys.

Mitigation: Action/Control	Responsibility	Timeframe
Obtain any additional environmental permits required prior to the commencement of construction.	Project Proponent	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Obtain abnormal load permits for transportation of project components to site (if required).	Contractor(s)	Prior to construction
Prior to vegetation clearance, the development footprint and the 200 m of adjoining areas must be scanned for the presence of any protected flora species by a suitably qualified Botanist/Ecologist. Any protected plants close to the site that will remain in place must be clearly marked and may not be defaced, disturbed, destroyed, or removed. The plants must be cordoned off with construction tape or similar barriers and marked as no-go areas. This scan should be conducted at a favourable time of the year when the probability of recognising these species is high (Aug – Oct).	Project developer Specialist	Pre-construction
Prior to construction and vegetation clearance a suitably qualified Zoologist should closely examine the project site for the presence of local fauna species and relocate any affected non-Red Listed/Protected animals to appropriate habitat away from the project site.	Project developer Specialist	Pre-construction
The necessary biodiversity permits must be obtained from Ezemvelo KZN Wildlife and/or DFFE prior to removal of any species of concern.	Project developer	Pre-construction
Any Red Listed or protected species that falls within the development footprint must be removed and translocated prior to vegetation clearance. Basic principles for the translocation of the affected species into suitable habitats and the plant rescue plan as detailed in the specialist ecology report (Appendix D of the EIA Report) must be followed.	Project developer	Pre-construction
A chance find procedure must be developed and implemented in the event that archaeological or palaeontological resources are found.	Project developer Contractor	Pre-construction
Prepare a detailed Fire Management Plan in collaboration with surrounding landowners.	Project developer	Pre-construction
Develop and implement a stormwater management plan for the site. All potentially contaminated runoff from the site must be treated by oil water separator prior to discharge.	Project developer Design engineer	Pre-construction
Develop and implement an alien, invasive and weeds eradication/control plan.	Project developer Specialist	Pre-construction
The conceptual wetland plan developed for the industrial zone (Royal Haskoning DHV, 2015) be implemented for the project	Project developer	Pre-construction, construction and operation
Develop appropriate emergency response plans for implementation during the operation phase of the project. Collaborate with the potentially affected communities and local government agencies in the preparation to respond effectively to emergency situations.	Project developer	Prior to operation

Performance Indicator	» Layout does not destroy/degrade no-go areas. » No disturbance of no-go areas. » Permits are obtained and relevant conditions complied with. » Relevant management plans and Method Statements prepared and implemented.

Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: Ensure appropriate planning is undertaken

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impact on identified sensitive areas. » Design and planning fail to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components » Pre-construction activities. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	» To ensure that the design of the power plant responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Project developer Contractor	Pre-construction
Pre-construction environmental induction for all construction staff on site must be provided to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.	EO	Pre-construction
A comprehensive social enhancement study be conducted for this project.	Project developer	Pre-construction
A local procurement policy must be adopted to maximise the benefit to the local economy.	Project developer Contractor	Pre-construction
Recruitment of temporary workers onsite is not to be permitted. A recruitment office with a Community Liaison Officer must be established to deal with jobseekers.	Project developer Contractor	Pre-Construction
Set up a labour desk in a secure and suitable area to discourage the gathering of people at the construction site.	Project developer Contractor	Pre-Construction
Local community organisations and policing forums must be informed of construction times and the duration of the construction phase. Procedures for the control and removal of loiters at the construction site must be established.	Project developer Contractor	Pre-Construction
Security company must be appointed and appropriate security procedures implemented.	Project developer Contractor	Pre-Construction

Mitigation: Action/Control	Responsibility	Timeframe
A comprehensive employee induction programme must be developed and utilised to cover land access protocols, fire management and road safety.	Contractor	Pre-construction
Perform a skills audit to determine the potential skills that could be sourced in the area.	Project developer Contractor	Pre-construction

Performance Indicator	» Conditions of the EMPr form part of all contracts. » Local employment and procurement is encouraged.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: Ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operation phases of the development. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners, and communities. » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operation phases of the facility. This procedure must include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.	Project developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operation and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure must be in line with the South African Labour Law.	Project developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Consult adjacent landowners (if present) to inform them of the development and to identify any (valid) visual impact concerns.	Project developer	Pre-construction
Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.	Contractor	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» A Public Complaints register must be maintained, by the Contractor to record all complaints and queries relating to the project and the action taken to resolve the issue. » All correspondence must be in writing.

7. MANAGEMENT PROGRAMME: CONSTRUCTION

Overall Goal: Undertake the construction phase in a way that:

» Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning traffic and road use, and effects on local residents.
» Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
» Minimises impacts on fauna in the study area.
» Minimises the impact on heritage sites should they be uncovered.
» Establish an environmental baseline during construction activities on the site, where possible.
» Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

7.1. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 1: Minimise impacts related to inappropriate site establishment

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Hazards to landowners and the public. » Damage to indigenous natural vegetation. » Loss of threatened plant species. » Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and resulting erosion.
Activities/Risk Sources	» Any unintended or intended open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site. » Transport to and from the temporary construction area/s.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint. » Minimal visual intrusion by construction activities and intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/Control	Responsibility	Timeframe
The construction site must be appropriately fenced and security provided.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner.	Contractor	Site establishment, and duration of construction
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes.	Contractor	Construction
Ensure that no activities infringe on identified sensitive areas.	Contractor	Duration of construction
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified in the EIA Report.	Contractor	Duration of construction
Ensure that vegetation is not unnecessarily cleared or removed during the construction phase.	Contractor	Site establishment, and duration of construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and access roads.	Contractor	Construction
Make use of existing roads and tracks where feasible, rather than creating new routes	Contractor	Construction
Any individuals of protected species affected by and observed within the development footprint during construction must be translocated under the supervision of the Contractor's Environmental Officer (EO) and in line with relevant permits.	EO Specialist	Construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Construction
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Restrict construction activities to daylight hours as far as possible in order to negate or reduce the visual impacts associated with lighting. Where night time working is required, lighting must be kept to a minimum and directed away from any sensitive receptors.	Contractor	Construction
All unattended open excavations must be adequately demarcated and/or fenced.	Contractor	Construction
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor	Site establishment, and duration of construction
Visual impacts must be reduced during construction through minimising areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soil as closely as possible to their original contour and vegetation.	Contractor	Site establishment, and duration of construction
Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but must be temporarily stored in a demarcated area.	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers so that the surrounding environment is not polluted (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1)(b)) at appropriate locations on site). The facilities must be placed within the construction area and along the road.	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Ablution or sanitation facilities must not be located within 100m from a watercourse or within the 1:100 year flood.	Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at the site where construction is being undertaken. Separate bins must be provided for general and hazardous waste. Provision must be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction
Foundations and trenches must be backfilled to originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas, or, if suitable, stockpiled for use in reclamation activities.	Contractor	Site establishment, and duration of construction and rehabilitation

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site. » Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion.
Monitoring	» An incident reporting system is used to record non-conformances to the EMPr. » EO and ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager. » Monitoring of vegetation clearing during construction (by contractor as part of construction contract).

OBJECTIVE 2: Appropriate management of the construction site and construction workers

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
To minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.	Contractors	Construction
All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping"	Contractors	Construction
All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	Contractor	Construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Duration of construction
Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Emphasis must be placed on the vulnerable sector of the population such as children and the elderly.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Open fires on the site for heating, smoking or cooking are not allowed, except in designated areas.	Contractor	Construction
Take adequate precautions to ensure that fires are not started because of works on the site.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Take immediate steps to extinguish any fire which may break out on the construction site.	Contractor	Construction
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Contractor	Duration of construction
Rehabilitation of the working areas must be concurrent with the construction of the project.	Contractor	Duration of Contract

Mitigation: Action/Control	Responsibility	Timeframe
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Duration of Contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	Contractor	Duration of construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor	Duration of construction
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	During construction.
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
Do not permit any smoking within 3 m of any fuel or chemical storage area, or refuelling area.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Contractor	Construction
Fire-fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Construction
To reduce low intensity noise levels, work areas need to be effectively screened to reduce or deflect noise. Engineering controls such as modifications to equipment or work areas to make it quieter, the acquisition of equipment designed to emit low noise and vibration, creation of noise barriers, proper maintenance of tools and equipment must be considered.	Contractor	Construction
Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Equipment should be regularly serviced.	Contractor	Construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.	Contractor and sub-contractor/s	Pre-construction
Maintain the general appearance of the site as a whole.	Contractor	Construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction

Performance Indicator	» The construction camps and laydown areas have avoided sensitive areas. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not undertaken. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of the construction phase.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Maximise local employment, skills development and business opportunities associated with the construction phase

Project Component/s	» Construction activities associated with the establishment of the power station. » Procurement of equipment and services. » Availability of required skills in the local communities for the undertaking of the construction activities.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area. » Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area. » Higher skilled positions might be sourced internationally, where required.
Enhancement: Target/Objective	» The contractor must aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This must also be made a requirement for all contractors.

	» Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
The project developer must use locally sourced inputs where feasible to maximize the benefit to the local economy.	Contractor	Construction
Sub-contracting of local construction companies to occur as far as possible for the construction of facilities, given that gas turbines will be imported.	Contractor	Construction
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.	Contractor	Construction
Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.	Contractor	Construction
To maximise the positive impact, it is suggested that the contractor provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Contractor	Construction
Create youth internship opportunities to train and transfer skills to unemployed youth. This would improve the chances of these youth to be absorbed in the mainstream economy as they would have been trained in a particular skill.	Contractor	Construction
Perform a skills audit to determine the potential skills that could be sourced in the area.	Contractor	Construction
Adopt policies that address gender in labour recruitment.	Contractor	Construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Employment and business policy document that sets out local employment and targets is completed before the construction phase commences. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	» Project proponent and contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.

OBJECTIVE 4: Protection of sensitive areas, flora and fauna

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impacts on natural vegetation, habitats and fauna. » Loss of indigenous natural vegetation due to construction activities. » Impacts on sensitive areas
Activity/Risk Source	» Vegetation clearing. » Site preparation and earthworks. » Excavation of foundations. » Construction of infrastructure. » Site preparation (e.g. compaction). » Excavation of foundations.
Mitigation: Target/Objective	» To minimise the development area as far as possible. » To minimise impacts on surrounding sensitive areas.

Mitigation: Action/Control	Responsibility	Timeframe
A minimum impact approach must be adopted. Only vegetation in the project footprint, outside the buffer, must be removed, leaving adjacent buffer vegetation intact.	Contractor	Duration of contract
All contractors and subcontractor personnel working on the project must participate in an environmental awareness program. The program must include appropriate wildlife avoidance methodologies, such as impact minimisation procedures and methods for protecting nesting birds. Information about the importance and purpose of protecting wildlife must be described in the program.	Contractor	Construction
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing. No vegetation removal must be allowed outside the designated project development footprint. Restrict construction activity to demarcated areas.	Contractor	Construction
Vegetation clearance should, ideally, start during the non-breeding season of fauna populations (i.e., winter).	Contractor	Construction
During vegetation clearance, methods should be employed to minimise potential harm to faunal species. Clearing must take place in a phased and slow manner, commencing from the interior of the project area progressing outwards towards the boundary.	Contractor	Construction
Undeveloped areas beyond the development footprint should be regarded as no-go areas and be expressly off limits to construction personnel and construction vehicles and this should be communicated to them and monitored.	Contractor	Construction
Where construction occurs close to any plants of high conservation value that have a probability of occurring on-site,	Contractor EO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
they must be suitably and visibly demarcated and cordoned off by the Environmental Officer (EO) prior to, and during the construction phase.		
Should a specimen of the frog species *Hemisus guttatus* be unearthed, all construction work on the area should be immediately stopped and the unearthed specimen should be carefully captured and relocated outside of the project area by an Ecologist/Zoologist in a suitable habitat.	Contractor	Construction
Where clearing is required outside of permanent infrastructure areas, vegetation must be brush-cut rather than cleared to speed re-establishment following site closure.	Contractor	Construction
Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.	Contractor	Construction
Excavated soils must be placed on the upslope side of the proposed development site, minimizing the risk of erosion and excess sediment entering the wetland buffer.	Contractor	Construction
No harvesting of plants for firewood, medicinal or any other purposes are to be permitted.	Contractor	Construction
Retain and maintain natural vegetation immediately adjacent to the development footprint.	Contractor	Construction
Prior and during vegetation clearance any larger fauna species noted must be given the opportunity to move away from the construction machinery.	Contractor	Construction
Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by an Ecologist/Zoologist trained in the handling and relocation of animals.	Suitably qualified person	Construction
No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted in the project site or surrounding areas.	Contractor	Construction
It is recommended that, while trenches are open during the construction phase, an appropriately sloping section of the side-wall is made available for the escape of any trapped animals.	Contractor	Construction
All stormwater structures should be designed to block amphibian and reptile access to the road surface	Contractor	Construction
Should the facility be fenced with electrified fencing, then no electrified strands should be placed within 30 cm of the ground.	Project proponent	Operation
All construction activities must be limited to daylight hours, except where the ECO has agreed that the work may proceed after hours.	Contractor	Construction
Areas beyond the development footprint must be expressly off limits to construction personnel and construction vehicles and this must be communicated to them.	Contractor	Construction
Vehicles may not leave the designated roads and tracks and turnaround points must be limited to specific sites	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
All outside lighting should be directed into the proposed development as opposed to away from the development, and also not in the direction of sensitive areas, including sensitive areas on neighbouring properties. Fluorescent and mercury vapour lighting should be avoided, and sodium vapour (yellow) lights should be used wherever possible.	Contractor	Construction
All areas affected during the construction phase must be rehabilitated as soon as possible after construction is completed.	Contractor	Construction

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing vegetation. » Topsoil appropriately stored, managed and rehabilitated. » Limited soil erosion around site. » No activity in restricted areas. » Minimal level of soil degradation.
Monitoring	» Observation of vegetation clearing activities by EO throughout construction phase. » Supervision of all clearing and earthworks. » Ongoing monitoring of erosion management measures within the site. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 5: Minimise the establishment and spread of alien invasive plants

Major factors contributing to invasion by alien invasive species include high disturbance activities and negative grazing practices. Consequences of this may include:

» Loss of indigenous vegetation;
» Change in vegetation structure leading to change in various habitat characteristics;
» Change in plant species composition;
» Change in soil chemical properties;
» Loss of sensitive habitats;
» Loss or disturbance to individuals of rare, endangered, endemic, and/or protected species;
» Fragmentation of sensitive habitats;
» Change in flammability of vegetation, depending on alien species; and
» Hydrological impacts due to increased transpiration and runoff.

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats.

	» Degradation and loss of agricultural potential.
Activities/Risk Sources	» Transport of construction materials to site. » Movement of construction machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of site access roads. » Stockpiling of topsoil, subsoil and spoil material. » Routine maintenance work – especially vehicle movement.
Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species. » To avoid the introduction of additional alien invasive plants to the site. » To avoid distribution and thickening of existing alien plants in the site. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the site.

Mitigation: Action/Control	Responsibility	Timeframe
Any existing or new exotic vegetation within the proposed development site must be eradicated.	Contractor	Construction
A prevention strategy should be considered and established, that must include regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural habitats. Prevention could also include measures such as washing the working parts and wheels of earth - moving equipment prior to it being brought onto site, visual walk - through surveys every three months.	Contractor	Construction
Monitoring plans should be developed which are designed to contain Invasive Alien Plant Species shortly after they arrive on the project site. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are spotted an immediate response of locating the site for future monitoring and either hand - pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.	Contractor	Construction
If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long - term. This will also ensure that natural systems are impacted to the smallest degree possible.	Contractor	Construction
The use of herbicides and pesticides and other related horticultural chemicals must be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.		

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within the site and immediate surroundings.
Monitoring	» On-going monitoring of area by EO during construction. » Annual audit of development footprint and immediate surroundings by qualified botanist. » If any alien invasive species are detected then the distribution of these must be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. » The results must be interpreted in terms of the risk posed to sensitive habitats within and surrounding the site. » The environmental manager/site agent must be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 6: Minimise impacts on soils

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Impacts on soil. » Loss of topsoil. » Erosion.
Activity/Risk Source	» Vegetation clearing. » Site preparation and earthworks. » Excavation of foundations. » Construction of infrastructure. » Site preparation (e.g. compaction). » Excavation of foundations. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To minimise the development area as far as possible. » To minimise impacts on soils. » Minimise spoil material. » Minimise erosion potential.

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil must be stripped and stockpiled separately from overburden (subsoil and rocky material).	Contractor	Construction
Co-ordinate works to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil must be reapplied where appropriate as soon as possible to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Construction
Any fill material must be sourced from a commercial off-site suitable/permitted and authorised source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	Contractor	Duration of contract
Store stripped topsoil in an approved location and in an approved manner for later reuse in the rehabilitation process. Ensure that all topsoil is stored in such a way and in such a place that it will not cause erosion gullies or wash away	Contractor	Construction
Topsoil stockpiles must not exceed 2m up to a maximum of 2m in height.	Contractor	Construction
Remove exotic / invasive plants and broad leaf weeds that emerge on topsoil stockpiles.	Contractor	Construction
If topsoil is to be stockpiled for extended periods, especially during the wet season, one of the following measures need to be implemented: » The re-vegetation of the stockpiles with indigenous grasses. » The covering of the stockpiles with a protective material such as hessian mats.	Contractor	Construction
Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery. This will render the topsoil unsuitable for use during rehabilitation.	Contractor	Construction
Protect all areas from erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.	Contractor	Construction
Erosion control structures must be put in place where soil may be prone to erosion. These must be regularly maintained and cleaned to ensure effective drainage and must only be removed once construction has been completed and there is no further risk of sedimentation.	Contractor	Construction
Sediment barriers or sediment traps such as silt fences, sandbags, and hay bales for example must be established to curb erosion and sedimentation where necessary. These temporary barriers may only be removed once construction has been completed and there is no further risk of sedimentation.	Contractor	Construction
Maintain all access routes and roads to minimise erosion and undue surface damage. Repair rutting and potholing immediately and maintain stormwater control mechanisms.	Contractor	Construction
Runoff from roads must be managed to avoid erosion and pollution problems.	Contractor	Construction
During rehabilitation, prompt and progressive reinstatement of bare areas is required. During reinstatement, the topsoil layer is to be replaced last, to simulate the pre-construction soil conditions.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Any erosion problems within the development area as a result of the construction activities observed must be rectified immediately and monitored thereafter to ensure that they do not re-occur.	Contractor	Construction
Only the designated access routes are to be used to reduce any unnecessary compaction.	Contractor	Construction
All construction vehicles must adhere to a low speed limit (40km/h).	Contractor	Construction
All areas affected during the construction phase must be rehabilitated as soon as possible once construction is completed.	Contractor	Construction

Performance Indicator	» Limited soil erosion around site. » Minimal level of soil degradation.
Monitoring	» Ongoing monitoring of erosion management measures within the site. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 7: Appropriate Stormwater Management

The stormwater management is covered under the Pre-construction and Construction Phase management, but aspects thereof will also continue into the Operation Phase. It is important that the engineers and contractors responsible for the detailed design of the stormwater systems take into account the requirements of this EMPr, as well as the recommendations by the participating specialists. This section of the EMPr provides general principles for stormwater management. The SWMP compiled and submitted as part of the Water Use License application process must be implemented.

Project Component/s	» Alteration of natural areas into hard surfaces impacting on the local hydrological regime of the area.
Potential Impact	» Poor stormwater management and alteration of the hydrological regime.
Activities/Risk Sources	» Placement of hard engineered surfaces.
Mitigation: Target/Objective	» Reduce the potential increase in surface flow velocities and the impact on localised drainage systems.

Mitigation: Action/Control	Responsibility	Timeframe
Temporary stormwater management structures must be used during construction. Any areas damaged as a result of stormwater runoff from the construction site must be rehabilitated immediately.	Contractor	Construction
All roads and other hardened surfaces must have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Stormwater control systems must be implemented to reduce erosion on the project site. Stockpiles are not to be used as stormwater control features.	Contractor	Construction
Drainage measures must promote the dissipation of stormwater run-off.	Contractor	Construction

Performance Indicator	» No impacts due to runoff. » Minimise erosion as far as possible. » Appropriate stormwater management system in place.
Monitoring	» Ongoing monitoring of erosion management measures within the site. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 8: Protection of heritage resources

No heritage resources of significance were recorded within the study site. It is however possible that artefacts could be unearthed during construction activities. Due to the low sensitivity of resources likely to occur in the area, no impacts of high significance are expected.

Project Component/s	» Gas turbines. » Access roads. » Associated infrastructure.
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed.
Activity/Risk Source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
If human remains are located then all work in that area must cease and KZNARI (0333946543) and the SAPS need to be informed. The area needs to be cordoned off.	Contractor	Construction
If any archaeological or palaeontological remains are located at the site then they can be initially assessed via photographs and emails. Isolated artefacts occur throughout the general area and would not require a field assessment if found.	Contractor	Construction
Contractors must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow if they find sites. All staff must also be familiarised with procedures for dealing with heritage objects/sites.	Contractor, ESA and heritage specialist	Duration of contract, particularly during excavations

Performance Indicator	» No disturbance outside of designated work areas. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring	» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 9: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during construction phase

Project component/s	» All project components including associated infrastructure.
Potential Impact	» Heavy vehicles and construction equipment can generate dust and fine particulate matter and release air pollutants (NO_2, CO, particulates, SO_2) due to movement on-site and movement of materials on-site. » Construction activities such as vegetation clearing, temporary stockpiles, foundation excavation, and road construction can result in dust and particulate release potentially affecting human health on nearby communities; or result in nuisance dustfall and reduced visibility during active construction.
Activity/risk source	» The use of heavy vehicle and construction equipment » Clearing of vegetation and topsoil » Excavation, grading, and scraping » Transport and movement of materials, equipment, and materials to site and around site (as required) » Wind erosion from cleared areas, temporary stockpiles, and unsealed roads » Combustion of fuel in construction equipment (e.g., generators) and heavy vehicles.
Mitigation: Target/Objective	» Minimise potential particulate matter impacts associated with vehicles and construction equipment use » Minimise potential health and nuisance impacts to communities and adjacent landowners from particulate emissions » Minimise emissions from combustion engines (stationary or mobile) during the construction phase

Mitigation: Action/control	Responsibility	Timeframe
Establish a complaints' register and/or incident reporting system where personnel, communities and adjacent landowners can lodge complaints regarding construction activities. Ideal location would be security post at point of site access.	EO	Prior to construction
Appropriate dust suppression measures on cleared areas, temporary stockpiles, and unsealed roads such as water suppression (using non-potable water if possible), chemical stabilisation, or revegetation (as soon as practically feasible), especially during high wind speed events.	Contractor(s) and EO	During construction
Use minimum safe drop heights when transferring material on-site	Contractor(s) and EO	During construction
Cover material stockpiles with tarpaulins or story in protected temporary bunkers	Contractor(s) and EO	During construction
Limit cleared area for bulk earthworks to minimum as practically feasible	Contractor(s) and EO	During construction

Mitigation: Action/control	Responsibility	Timeframe
Heavy vehicles and construction equipment to be road worthy and regularly maintained.	Contractor(s), transportation contractor(s) and EO	During construction
All vehicles leaving site with loose material must have load-bins covered with tarpaulins.	Contractor(s) and EO	During construction
All vehicles associated with the construction phase must adhere to the designated speed limits on- and off-site.	Contractor(s), transportation contractor(s) and EO	Duration of contract
Revegetation (as soon as practically feasible)	Contractor(s) and EO	At completion of construction phase (or before if practically feasible)
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators	Contractor(s) and EO	During construction

Performance Indicator	» Appropriate dust suppression measures are implemented during construction phrase. No visible dust plumes from cleared areas and temporary stockpiles during high wind speed events. No visible plumes from unsealed roads when in use or during high wind speed events. » Drivers are aware of potential safety issues and strict enforcement of on-site speed limits when employed and when entering site. » Vehicle roadworthy certificates and maintenance records for all heavy vehicles are made available prior to construction and updated regularly. No or minimal visible exhaust fumes during normal operation.
Monitoring	» The performance indicators listed above must be met during the construction phase by the responsible parties. » Any potential or actual issues that could results in non-conformance with the performance indicator must be reported by on-site personnel to the Site Manager immediately. » An incident reporting system must be used to record non-conformances to the EMPr » A complaints register must be used to record complaints from the public.

OBJECTIVE 10: Minimise impacts related to traffic management and transportation of equipment and materials to site

During the construction phase the road network surrounding the power station site will be affected. There will be an increase in traffic impacting on traffic volumes, congestion and road safety (light vehicles, buses, mini-vans (taxis) and as well as heavy construction vehicles), however the extent of the impact will be small and of a local nature.

Project Component/s	» Delivery of any component required for the construction phase of the facility.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads. » Dust and noise pollution due to construction traffic.
Activities/Risk Sources	» Construction vehicle movement.

	» Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of project components, equipment and materials to the site. » Mobile construction equipment movement on-site.
Mitigation: Target/Objective	» Minimize impacts on road network and surrounding area » Minimise impact of traffic associated with the construction of the facility on local traffic volumes, existing infrastructure, property owners, animals, and road users. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
Compile and implement a construction period traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	Contractor	Pre-construction
Should abnormal loads have to be transported by road to the site, a permit must be obtained from the relevant Provincial Government.	Contractor (or appointed transportation contractor)	Pre-construction
Stagger component delivery to site as far possible.	Contractor	Construction
Use mobile batch plants and/or quarries near the site to decrease the impact on the surrounding road network.	Contractor	Construction
Implement appropriate dust suppression on gravel roads.	Contractor	Construction
Staff and general trips must occur outside of peak traffic periods as far as possible.	Contractor	Construction
Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.	Contractor	Construction
Any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved temporarily to accommodate the abnormal load vehicles, if required.	Contractor	Construction
The contractors must ensure that there is a dedicated access and an access control point to the site.	Contractor	Construction phase
Utilise only designated access routes & entrance/exits from the site.	Contractor	Construction
Implement appropriate signage & road safety measures at entrance/exit to the site and on site.	Contractor	Construction
Road signage and road markings in the vicinity of the site must be well maintained to enhance road safety.	Contractor	Construction
Provide flagmen at the access when accommodating abnormal load vehicles.	Contractor	Construction
All construction vehicles must be road worthy.	Contractor	Construction
All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.	Contractor	Construction

Performance Indicator	» Vehicles are in good working order and safety standards are implemented. » Local road conditions and road surfaces are up to standard.
Monitoring	» Regular monitoring of road surface quality. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 11: Appropriate handling and management of waste

The construction of the power station and associated infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction activities include:

» general solid waste
» hazardous waste
» inert waste (rock and soil)
» liquid waste (including grey water and sewage)

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifests must be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at an appropriately licensed landfill.	Contractor	Construction
Construction method and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Construction
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of at dumping site as approved by the Council.	Contractor	Construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Construction
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Construction
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Construction
Uncontaminated waste must be removed at least weekly for disposal, if feasible; other wastes must be removed for recycling/ disposal at an appropriate frequency.	Contractor	Construction
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled. This must be regularly removed and recycled (where possible) or disposed of at an appropriately licensed landfill site.	Contractor	Construction
Waste must be stored in accordance with the relevant legislative requirements.	Contractor	Construction
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Construction
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works.	Contractor	Construction
All liquid wastes must be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility.	Contractor	Construction
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage.	Contractor	Construction
Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Construction
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	Contractor	Construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Upon the completion of construction, the area must be cleared of potentially polluting materials (including chemical toilets). Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » Proof of disposal of sewage at an appropriate wastewater treatment works. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 12: Appropriate handling and storage of chemicals, hazardous substances

The construction phase may involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Laydown areas. » Contractors camps. » Temporary hydrocarbon and chemical storage areas.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Soil pollution.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon spills by vehicles and machinery during levelling, vegetation clearance and transport of workers, materials and equipment and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops. » Pollution from concrete mixing.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan during the construction phase.	EPC Contractor	Duration of Contract
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. These must be maintained regularly.	Contractor	Duration of contract
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
Establish an appropriate Hazardous Stores and fuel storage area which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This must include but not be limited to: » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund as per the requirements of the relevant standards and any relevant by-laws; » Protected from the elements, » Lockable; » Ventilated; and » Has adequate capacity to contain 110% of the largest container contents.	Contractor	Duration of Contract
The storage of flammable and combustible liquids such as oils must be stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Do not store gas and liquid fuel in the same storage area.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
All machinery and equipment must be inspected regularly for faults and possible leaks,	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	Contractor	Construction
As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site.	Contractor	Construction
Have appropriate action plans on site, and training for contactors and employees in the event of spills, leaks and other potential impacts to the aquatic systems. All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
Drip trays must be used during all fuel/chemical dispensing and beneath standing machinery/plant.	Contractor	Construction
In the case of petrochemical spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction
Mitigation includes a regional (industrial area-wide) emergency response plan with involvement by the local authorities as well as alarms and communication systems which allow for fast and effective communication to neighbouring facilities such as the Mondi facility to the north. The area around the site is sparsely populated, so any impact would not be experienced by a large number of people.	Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » Safe storage of hazardous chemicals. » Proper waste management.

Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system must be used to record non-conformances to the EMPr. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures. » Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record volume and nature of spill, location and clean-up actions. » Monitor maintenance of drains and intercept drains weekly. » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident when it occurs. » Records of accidental spills and clean-up procedures and the results thereof must be audited on an annual basis by the ECO. » Records of all incidents that caused chemical pollution must be kept and a summary of the results must be reported to management annually.

OBJECTIVE 13: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» Construction camps. » Laydown areas. » Access roads. » Ancillary buildings.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
Develop a rehabilitation plan for implementation once construction is completed. This should include details of ongoing activities required during construction to ensure appropriate rehabilitation	Contractor in consultation with rehabilitation specialist	Pre-construction
Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures, and any other temporary works as soon as construction is completed.	Contractor	Rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Rehabilitation
Laydown areas and construction camps are to be checked for spills of substances such as oil, paint, etc. Any spills recorded must be cleaned up and the contaminated soil appropriately disposed of.	Contractor	Rehabilitation
All voids must be backfilled. Any gullies must also be backfilled.	Contractor	Rehabilitation
All waste must be removed from site and appropriately disposed of.	Contractor	Rehabilitation
Remove from site all temporary fuel stores, hazardous substance stores, hazardous waste stores and pollution control sumps. Dispose of hazardous waste in the appropriate manner	Contractor	Rehabilitation
Remove from site all temporary sanitary infrastructure and wastewater disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the appropriate manner.	Contractor	Rehabilitation
Where disturbed areas are not to be used during the operation of the power station, these areas must be rehabilitated/re-vegetated with appropriate natural indigenous vegetation and/or local seed mix. A seed mix must be applied to rehabilitated and bare areas. Where possible, indigenous trees endemic to the area be incorporated into rehabilitation plan to promote green industry. No exotic plants must be used for rehabilitation purposes. No grazing must be permitted to allow for the recovery of the area.	Contractor in consultation with rehabilitation specialist	Rehabilitation
Ensure that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state and / or a state no worse than prior to construction	Contractor	Rehabilitation
Shape all disturbed areas to blend in with the surrounding landscape.	Contractor	Rehabilitation
No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	Contractor	Rehabilitation
Ripping and scarifying » Rip and / or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers if necessary. » Rip and / or scarify all disturbed areas on the construction site, including temporary access routes and roads, compacted during the execution of the works. » Rip and / or scarify along the contour to prevent the creation of down-slope channels. » Rip and / or scarify all areas at 300 mm intervals (but not more than 400 mm intervals), ensuring that the lines overlap. » Do not rip and / or scarify areas under wet conditions, as the soil will not break up.	Contractor	Rehabilitation
Temporary roads must be closed and access across these blocked. The temporary access roads must be rehabilitated.	Contractor	Rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Rehabilitation
Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation. Soils must be replaced in the correct sequence / profile.	Contractor	Rehabilitation
Topsoil replacement and soil amelioration » The principle of Progressive Reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded. » Execute top soiling activity prior to the rainy season or any expected wet weather conditions. » Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased. » Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas on the construction site, including temporary access routes and roads. Replace topsoil to the original depth (i.e., as much as was removed prior to construction). » Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. » The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage. » Do not use topsoil suspected to be contaminated with the seed of alien vegetation. » Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner to blend in with the local surrounding area. » After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.	Contractor	Rehabilitation
Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfilling is smoothed over to blend in with the surrounding landscape	Contractor	Rehabilitation
Re-vegetated areas must be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Proponent in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures must be used in sensitive areas such as steep slopes, hills, and drainage systems if necessary.	Proponent in consultation with EO and rehabilitation specialist (if required)	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Proponent	Post-rehabilitation

Performance Indicator	» All portions of the site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	» Rehabilitated areas must be monitored (responsibility of EO) on a weekly basis throughout the construction phase and on a monthly basis thereafter and to the point where the area has rehabilitated to a satisfactory level. » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal must be undertaken on an annual basis.

7.2. Detailing Method Statements and/or Site-specific Plans

OBJECTIVE 14: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements and/or site-specific plans, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements and/or site-specific plans to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

» Responsible person/s;
» Construction procedures;
» Materials and equipment to be used;
» Getting the equipment to and from site;
» How the equipment/material will be moved while on-site;
» How and where material will be stored;
» The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
» Timing and location of activities;
» Compliance/non-compliance with the Specifications; and

» Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and must be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

» Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.
» Excavations and backfilling procedure.
» Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
» Stormwater method statement.
» Ablution facilities (placement, maintenance, management and servicing).
» Solid Waste Management:
  * Description of the waste storage facilities (on site and accumulative).
  * Placement of waste stored (on site and accumulative).
  * Management and collection of waste process.
  * Recycle, re-use and removal process and procedure.
» Liquid waste management.
» Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment. Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facility where possible. Where no facilities are available, grey water runoff must be controlled to ensure no seepage into the surrounding environment occurs.
» Dust and noise pollution:
  * Describe the necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  * Procedure to control dust at all times on the site, access roads and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
» Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  * Lists of all potentially hazardous substances to be used.
  * Appropriate handling, storage and disposal procedures.
  * Prevention protocol of accidental contamination of soil at storage and handling areas.
  * All storage areas, (i.e. for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
» Fire prevention and management measures on site.
» Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).

- Rehabilitation, re-vegetation process and bush clearing.
- Incident and accident reporting protocol.
- General administration.
- Designate access road and the protocols while roads are in use.
- Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager (with input from the ECO), except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract. Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

7.3. Awareness and Competence: Construction Phase

OBJECTIVE 15: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that all personnel involved in the project are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The ECO is responsible for monitoring compliance pre, during and post construction. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Contractors obligations in this regard include the following:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity are to have copies of the relevant Method Statements and be aware of the contents thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff are aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training must be done either in a written or verbal format but must be appropriate for the receiving audience.
  - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

- All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors must have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

7.3.1 Environmental Awareness and Induction Training

The EO, in consultation with the contractor, shall ensure that all construction workers receive an induction presentation, as well as on-going environmental education and awareness, on the importance and implications of the EMPr and the environmental requirements it prescribes. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The contractor must provide a translator from their staff for the purpose of translating should this be necessary.

As a minimum, induction training must include:

- Explanation of the importance of complying with the EMPr;
- Explanation of the importance of complying with the Environmental Authorisation;
- Discussion of the potential environmental impacts of construction activities;
- Awareness regarding sensitivities on the site, including sensitive plant species (including the use of visual aids and on-site identification);
- The benefits of improved personal performance;
- Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractor's Health and Safety Representative);
- Explanation of the mitigation measures that must be implemented when carrying out their activities; and
- Explanation of the specifics of this EMPr and its specification (no-go areas, etc.).

Environmental Awareness Training must take the form of an on-site talk and demonstration by the EO/ECO before the commencement of site establishment and construction on site. The education/awareness programme must be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the EO/ECO on site. Proof of awareness training must be kept on record. Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training must be undertaken by the Contractor's Environmental Officer and must include discussing the Contractor's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight

overall do's and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the EO/ECO on site.

7.3.2 Toolbox Talks

Toolbox talks must be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks must also include discussions on possible common incidents occurring on site and ones recommended by the on site EO and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.4. Monitoring Programme: Construction Phase

OBJECTIVE 16: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). The Technical Director/ Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- Ensure adequate and appropriate interventions to address non-compliance
- Ensure adequate and appropriate interventions to address environmental degradation
- Provide a mechanism for the lodging and resolution of public complaints
- Ensure appropriate and adequate record keeping related to environmental compliance
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- Aid in communication and feedback to authorities and stakeholders

All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the DEFF in terms of the Environmental Authorisation, must be submitted to the Director: Compliance Monitoring of the Department.

Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

7.4.1. Non-Conformance Reports

All supervisory staff including Foremen, Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

7.4.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to the Director: Compliance Monitoring at DEFF for their records. This report must include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DEFF regarding waste related activities.

7.4.3. Audit Reports

The holder of the Environmental Authorisation must, for the period during which the Environmental Authorisation and EMPr remain valid, ensure that project compliance with the conditions of the Environmental Authorisation and the EMPr are audited, and that the audit reports are submitted to the Director: Compliance Monitoring of the DEFF.

An environmental internal audit must be conducted and submitted biannually and an external audit must be conducted on construction completion and the report is to be submitted to DEFF. This report must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014, as amended, and indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

7.4.4. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DEFF upon completion of the construction and rehabilitation activities. The report must be submitted within 30 days of completion of rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

8. MANAGEMENT PROGRAMME: OPERATION AND MAINTENANCE

Overall Goal: To ensure that the operation of the power station and associated infrastructure does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the facility in a way that:

» Ensures that operation and maintenance activities are properly managed in respect of environmental aspects and impacts.
» Enables the operation and maintenance activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.

8.1. Objectives

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 1: Appropriate management of the site and workers

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Impacts on the surrounding environment. » Pollution/contamination of the environment.
Activities/Risk Sources	» Access to and from the site. » Employees not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
To minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct. Employees, contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.	Project proponent Contractors Sub-contractors	Operation
All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping"	Project proponent Contractors	Operation

Mitigation: Action/Control	Responsibility	Timeframe
All operation and maintenance vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Project proponent Contractors	Operation
Ensure all equipment and vehicles are properly maintained at all times.	Project proponent Contractors	Operation
Restrict the activities and movement of operation and maintenance workers and vehicles to existing access roads.	Project proponent Contractors	Operation
Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Emphasis must be placed on the vulnerable sector of the population such as children and the elderly.	Project proponent Contractors	Operation
Contact details of emergency services must be prominently displayed on site.	Project proponent	Operation
Adequate firefighting equipment must be available on site and firefighting training to must be provided selected staff.	Project proponent	Operation
Take immediate steps to extinguish any fire which may break out on the site.	Project proponent	Operation
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Project proponent	Operation
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Project proponent	Operation
Ensure waste storage facilities are maintained and emptied on a regular basis.	Project proponent	Operation
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	Project proponent	Operation
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Project proponent	Operation
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Project proponent	Operation
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site.	Project proponent	Operation
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Project proponent	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Do not permit any smoking within 3 m of any fuel or chemical storage area, or refuelling area.	Project proponent	Operation
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Project proponent	Operation
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Project proponent	Operation
A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Project proponent	Operation
Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer.	Project proponent	Operation
Equipment should be regularly serviced.	Project proponent	Operation
Ensure proper health and safety plans in place during the operation and maintenance period to ensure safety on and around site, including fencing of the property and site access restriction.	Project proponent Contractors	Operation
Maintain the general appearance of the site as a whole.	Project proponent	Operation

Performance Indicator	» No complaints regarding worker behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the site. » Code of Conduct drafted before commencement of the operation phase.
Monitoring	» Regular audits of the site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works (if not into municipal sewer). » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 2: Protection of sensitive area, flora, fauna and soils

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project Component/s	» Rehabilitated areas.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat in surrounding areas. » Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activities/Risk Sources	» Movement of employee vehicles within and around the site.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site.

	» Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbed areas should the previous attempt be unsuccessful.	Project proponent	Operation
Retain and maintain natural vegetation immediately adjacent to the development footprint.	Project proponent	Operation
All vehicles accessing the site must adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and frogs.	Project proponent	Operation
The use of herbicides and pesticides and other related horticultural chemicals must be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	Project proponent	Operation
Soil surfaces where no revegetation seems possible will have to be covered with gravel or small rock fragments to increase porosity of the soil surface, slow down runoff and prevent wind and water erosion.	Project proponent	Operation
Any vegetation clearing that needs to take place as part of the maintenance activities must be done in an environmentally friendly manner, including avoiding the use of herbicides and using manual clearing methods wherever possible.	Project proponent	Operation
Vehicle movements must be restricted to designated access roads.	O&M Contractor	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	Project proponent	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (bags, logs), silt fences, stormwater catch-pits, and shade nets).	Project proponent	Operation
Develop and implement an appropriate stormwater management plan for the operation phase of the power station.	Project proponent	Operation
Site access must be controlled and only authorised staff and contractors must be allowed on-site.	Project proponent	Operation
No harvesting of plants for firewood, medicinal or any other purposes are to be permitted	Project proponent	Operation
No killing and poaching of any wild animal to be allowed. This must be clearly communicated to all employees, including subcontractors.	Project proponent	Operation
Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location.	Project proponent	Operation
Should the facility be fenced with electrified fencing, then no electrified strands should be placed within 30 cm of the ground.	Project proponent	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Regular monitoring for erosion post-construction to ensure that no erosion problems have developed as a result of the past disturbance.	Project proponent	Operation
All outside lighting should be directed into the proposed development as opposed to away from the development, and also not in the direction of sensitive areas, including sensitive areas on neighbouring properties. Fluorescent and mercury vapour lighting should be avoided, and sodium vapour (yellow) lights should be used wherever possible.	Project proponent	Operation

Performance Indicator	» Limited soil erosion around site. » No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.

OBJECTIVE 3: Minimise the establishment and spread of alien invasive plants

Major factors contributing to invasion by alien invasive species include high disturbance activities and negative grazing practices. Consequences of this may include:

» Loss of indigenous vegetation;
» Change in vegetation structure leading to change in various habitat characteristics;
» Change in plant species composition;
» Change in soil chemical properties;
» Loss of sensitive habitats;
» Loss or disturbance to individuals of rare, endangered, endemic, and/or protected species;
» Fragmentation of sensitive habitats;
» Change in flammability of vegetation, depending on alien species; and
» Hydrological impacts due to increased transpiration and runoff.

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats. » Degradation and loss of agricultural potential.
Activities/Risk Sources	» Movement of operation and maintenance machinery and personnel.

Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species. » To avoid the introduction of additional alien invasive plants to the site. » To avoid distribution and thickening of existing alien plants in the site. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the site.

Mitigation: Action/Control	Responsibility	Timeframe
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	Project proponent	Operation
Any existing or new exotic vegetation within the proposed development site must be eradicated.	Project Proponent	Operation
A prevention strategy should be considered and established, that must include regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural habitats.	Project Proponent	Operation
Monitoring plans should be developed which are designed to contain Invasive Alien Plant Species shortly after they arrive on the project site. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are spotted an immediate response of locating the site for future monitoring and either hand - pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.	Project Proponent	Operation
If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long - term. This will also ensure that natural systems are impacted to the smallest degree possible.	Project Proponent	Operation
The use of herbicides and pesticides and other related horticultural chemicals must be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	Project Proponent	Operation

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within the site and immediate surroundings.
Monitoring	» On-going monitoring of area by the Environmental Officer. » Annual audit of development footprint and immediate surroundings by qualified botanist.

	» If any alien invasive species are detected then the distribution of these must be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. » The results must be interpreted in terms of the risk posed to sensitive habitats within and surrounding the site. » The environmental manager/site agent must be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 4: Minimise impact on ambient air quality through effective management, mitigation, and monitoring during the operational phase

Project Component/s	» All project components including associated infrastructure
Potential Impact	» The normal operation of the proposed combined cycle power station will result in emission of gaseous and particulate pollutants including: SO_2, NO_2, particulates, CO, and VOCs. Increased ambient concentrations of these pollutants may result in negative human health impacts, and nuisance dustfall.
Activities/Risk Sources	» Combustion of natural gas in turbines
Mitigation: Target/Objective	» Ensure compliance with minimum emission limits as applicable to the natural gas turbines » Ensure compliance with ambient air quality standards at the property boundary.

Mitigation: Action/Control	Responsibility	Timeframe
Establish a complaints register and/or incident reporting system where personnel, communities and adjacent landowners can lodge complaints regarding construction activities. Ideal location would be security post at point of site access.	EO and Plant Manager	Prior to commissioning
Regular maintenance and inspection of turbines as per original equipment manufacturer requirements	EO and Plant Manager	During operations
Annual emissions monitoring campaign (as per conditions of the AEL), by independent contractor, on all turbine stacks.	EO, Contractor and Plant Manager	During operations
Annual emissions reporting (as per conditions of the AEL)	EO, Contractor and Plant Manager	During operations
Once per year a 7-day ambient monitoring campaign at (minimum) 4 fence line locations using passive sampling techniques. Monitoring of SO_2, NO_2, CO, and VOCs	EO, Contractor and Plant Manager	During operations
Appropriate dust suppression measures on access road, including regularly sweeping and or wet suppression, to minimise particulate matter build-up.	EO and Plant Manager	During operations
Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators	EPC Contractor(s) and EO	During operations

Performance Indicator	» Compliance with emission limits applicable to turbines during normal operation. » Compliance with national ambient air quality standards based on passive sampling campaign. » The performance indicators listed above should be met during the operational phase by the responsible parties.

	» Any potential or actual issues that could results in non-conformance with the performance indicator must be reported by on-site personnel to the Site Manager immediately.
Monitoring	» An incident reporting system must be used to record non-conformances to the EMPr » A complaints register must be used to record complaints from the public » Annual emissions monitoring campaign (as per conditions of the AEL), by independent contractor, on all turbine stacks. » Annual emissions reporting (as per conditions of the AEL) » Once per year a 7-day ambient monitoring campaign at (minimum) 4 fence line locations using passive sampling techniques. Monitoring of SO_2, NO_2, CO, and VOCs

OBJECTIVE 5: Ensure the implementation of appropriate emergency response plans

Project Component/s	» Operation and maintenance of the power station and associated infrastructure. » Storage of dangerous substances (such as Diesel and Ammonia).
Potential Impact	» Loss of containment of hazardous components at the proposed facility resulting in exposure to: • Thermal radiation from fires; • Overpressure from explosions.
Activities/Risk Sources	» Ammonia storage.
Mitigation: Target/Objective	» To avoid or minimise the risk of impacts to workers, surrounding landowners and communities.

Mitigation: Action/Control	Responsibility	Timeframe
Implement emergency response arrangements and systems, such as alarms and shutdown systems to allow for personnel to muster in case of emergency, as well as fire-fighting systems and cooperation with emergency responders.	Project proponent	Operation
Implement preventive measures including include maintenance procedures to prevent the occurrence of a catastrophic loss of containment from corrosion, fire and gas detection and firewater systems to prevent escalation as well as strict control of ignition sources and other measures, which may be required according to standards such as those prescribed by the South African National Standards system.	Project proponent	Operation
Ensure that appropriate communication channels are established to be implemented in the event of an emergency.	Project proponent	Operation
Provide adequate firefighting equipment on site and establish a fire-fighting management plan during operation.	Project proponent	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Project proponent	Operation
Fire breaks must be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Project proponent	Operation
Contact details of emergency services must be prominently displayed on site.	Project proponent	Operation

Performance Indicator	» Firefighting equipment and training provided before the operation phase commences. » Appropriate fire breaks in place. » Appropriate emergency response arrangements and systems in place. » Appropriate preventive measures implemented for all installations.
Monitoring	» The Plant Manager must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 6: Maximise local employment, skills development and business opportunities associated with the construction phase

Project Component/s	» Operation and maintenance activities associated with the power station and associated infrastructure. » Availability of required skills in the local communities for the undertaking of the construction activities.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» Limited use of local labour, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area. » Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area. » Higher skilled positions might be sourced internationally, where required.
Enhancement: Target/Objective	» The project Proponent must aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This must also be made a requirement for all contractors. » Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
The project developer must make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.	Project proponent	Operation
Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.	Project proponent	Operation
In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Project proponent	Operation
Facilitate the transfer of knowledge between experienced employees and the local staff.	Project proponent	Operation
Create youth internship opportunities to train and transfer skills to unemployed youth. This would improve the chances of these youth to be absorbed in the mainstream economy as they would have been trained in a particular skill.	Project proponent	Operation
Perform a skills audit to determine the potential skills that could be sourced in the area.	Project proponent	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Where possible train and empower local communities for employment in the operations of the power plant.	Project proponent	Operation

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Employment and business policy document that sets out local employment and targets is completed before the construction phase commences. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	» The project proponent must keep a record of local recruitments and local labour.

OBJECTIVE 7: Minimise impacts related to traffic management

Project Component/s	» Operation and maintenance vehicles.
Potential Impact	» Impact of vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.
Activities/Risk Sources	» Operation and maintenance vehicle movement. » Degradation of local road conditions.
Mitigation: Target/Objective	» Minimise impacts on road network and surrounding area. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.	Project proponent	Operation
Vehicles used for operation and maintenance purposes must be inspected regularly to ensure their road-worthiness.	Project proponent	Operation
Road signage and road markings in the vicinity of the site must be well maintained to enhance road safety.	Project proponent	Operation
Ensure that there is a dedicated access and an access control point to the site.	Project proponent	Operation
Utilise only designated access routes & entrance/exits from the site.	Project proponent	Operation

Performance Indicator	» Vehicles keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» Regular monitoring of road surface quality. » An incidents/complaints register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon.

OBJECTIVE 8: Appropriate handling and management of hazardous substances, waste and dangerous goods

The operation of the power station and associated infrastructure will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and sewage waste.

Project Component/s	» Gas turbines. » Stacks. » Access roads. » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	» Substation, transformers, switchgear and supporting equipment. » Workshop / control room.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances (such as used/new transformer oils, etc.) must be stored in sealed containers within a clearly demarcated designated area.	Project proponent	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	Project proponent	Operation
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Project proponent	Operation and maintenance
Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill.	Project proponent	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately	Project proponent	Operation

Mitigation: Action/Control	Responsibility	Timeframe
licensed waste disposal site or sold to a recycling merchant for recycling.		
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials must take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	Project proponent	Operation and maintenance
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at an appropriately licensed landfill.	Project proponent	Operation
Waste handling, collection, and disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Project proponent	Operation
All food waste and litter at the site must be placed in bins with lids and removed from the site on a regular basis.	Project proponent	Operation
All sewage disposal to take place at a registered and operational wastewater treatment works.	Project proponent	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Project proponent	Operation
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Project proponent	Operation
All servicing and re-fuelling of machines and equipment must either take place off-site, or in controlled and bunded working areas.	Project proponent	Operation
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Project proponent	Operation
Emergency response arrangements and systems such as foam pourers, fire-fighting systems and cooperation with emergency responders. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment, as well as strict control of ignition sources and other measures which may be required according to standards such as those prescribed by the South African National Standards system.	Project proponent	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection.

	» An incidents/complaints register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the O&M operator. » All appropriate waste disposal certificates accompany the monthly reports.

9. MANAGEMENT PROGRAMME: DECOMMISSIONING

The lifespan of the proposed power station will be a minimum of 20 year and potentially longer. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or if it is no longer required. The lifespan of the power station could be extended depending on the condition of the gas turbines. An assessment will be undertaken prior to the end of the lifecycle of the plant to determine whether the plant should be decommissioned or whether the operation of the plant should continue.

It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA process would comprise the disassembly, removal and disposal of the infrastructure. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of waste from the site and rehabilitation to the desired end-use. Future use of the site after decommissioning of the power station could possibly form part of an alternative industry that would be able to utilise some of the existing infrastructure associated with the project. This would however be dependent on the development plans of the area at the time.

It is expected that temporary employment opportunities will be made available during the decommissioning phase.

As part of the decommissioning phase the Project Proponent will undertake the required permitting processes applicable at the time of decommissioning.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore are not repeated in this section.

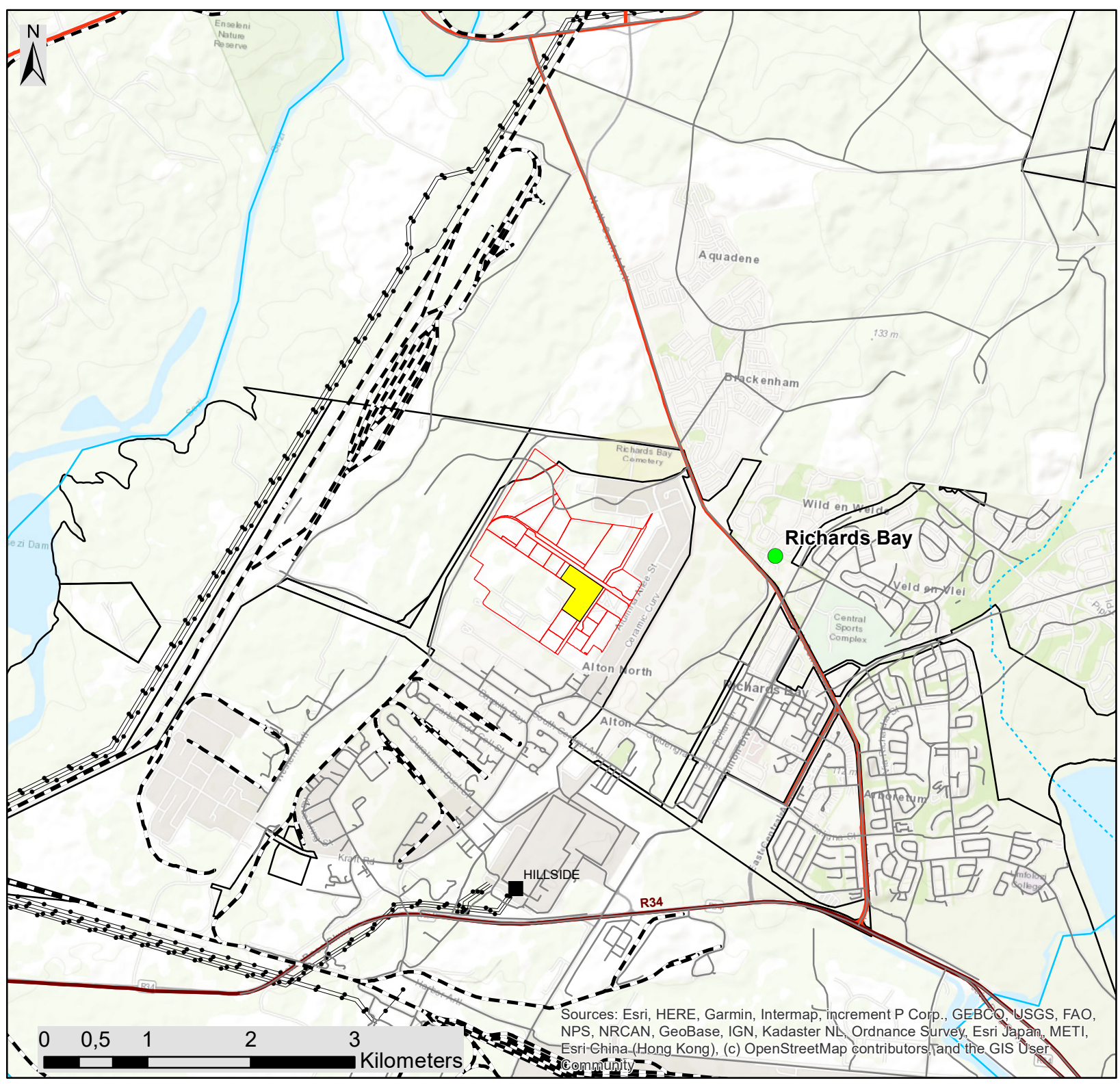
9.1. Objectives

Within a period of at least 12 months prior to the decommissioning of the site, a Decommissioning Method Statement must be prepared and submitted to the Local Planning Authority, as well as the Provincial and National Environmental Authority. This method statement must cover site restoration, soil replacement, landscaping, conservation, and a timeframe for implementation. Furthermore, this decommissioning must comply with all relevant legal requirements administered by any relevant and competent authority at that time.

The objectives of the decommissioning phase of the proposed project are to:

- Follow a process of decommissioning that is progressive and integrated into the short- and long-term project plans that will assess the closure impacts proactively at regular intervals throughout project life.
- Implement progressive rehabilitation measures, beginning during the construction phase.
- Leave a safe and stable environment for both humans and animals and make their condition sustainable.
- Return rehabilitated land-use to a standard that can be useful to the post-project land user.
- Where applicable, prevent any further soil and surface water contamination by maintaining suitable stormwater management systems.
- Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

APPENDIX A:
LAYOUT AND SENSITIVITY MAPS



Phankwe Richards Bay Gas Power 3 CCPP, KwaZulu-Natal Province

Locality Map

Legend

- Town
- Substation
- Railway Line
- Secondary Roads
- Regional Road
- Main Road
- Existing Power Line
- Perennial River
- Non-perennial River
- RBIDZ Phase 1F
- Phankwe Richards Bay Gas Power 3 CCPP

Scale: 1:70 000
Projection: GCS_WGS_19[illegible]
Ref: Richards Bay Locality Map

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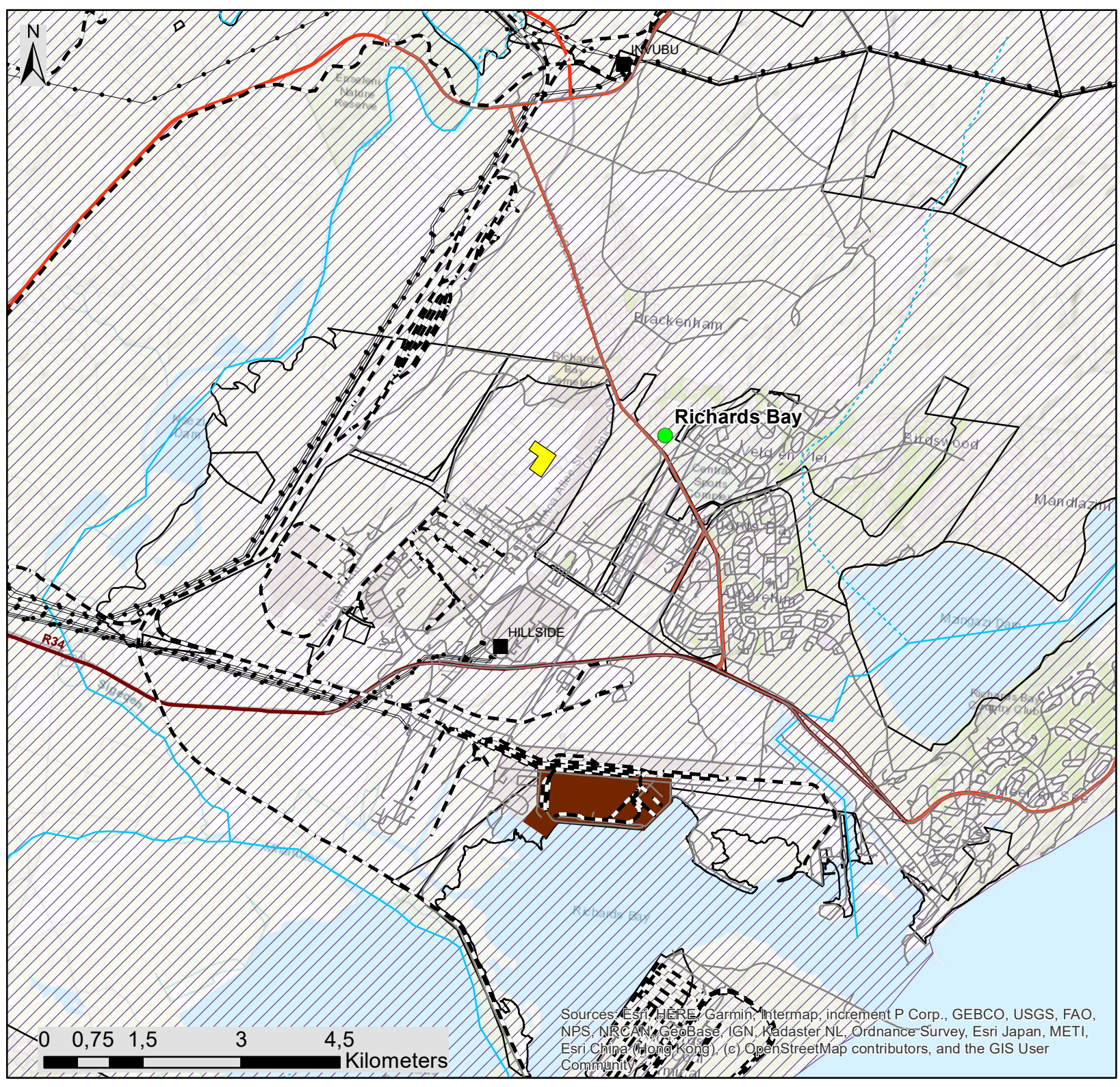

Phankwe Richards Bay Gas Power 3 CCPP, KwaZulu-Natal Province

Transmission and Strategic Infrastructure Map

Legend

- Town
- Existing Substation
- Railway Line
- Secondary Roads
- Regional Road
- Main Road
- Existing Power Line
- Perennial River
- Non-perennial River
- Strategic Gas Pipeline Corridors
- Port of Richards Bay
- Phankwe Richards Bay Gas Power 3 CCPP

savannah environmental

Scale: 1:70 000
Projection: GCS_WGS_19[illegible]
Ref: Richards Bay Regional Map

Phakwe Richards Bay Gas Power 3, KwaZulu-Natal Province

Layout Map
(indicative infrastructure areas)

Legend

- RBIDZ Phase 1F
- EIA Footprint

Indicative Infrastructure Areas

- Anxillary Building and Water Treatment Building Hub
- Gas and Steam Turbine Units
- Utility Gas Yard (incl. conditioning equipment)
- Water Retention Pond
- Raw water, demineralised water, and fire water storage tanks

Scale: 1:4 000
Projection: GCS_WGS_1994
Ref: PRBGP3 - Layout

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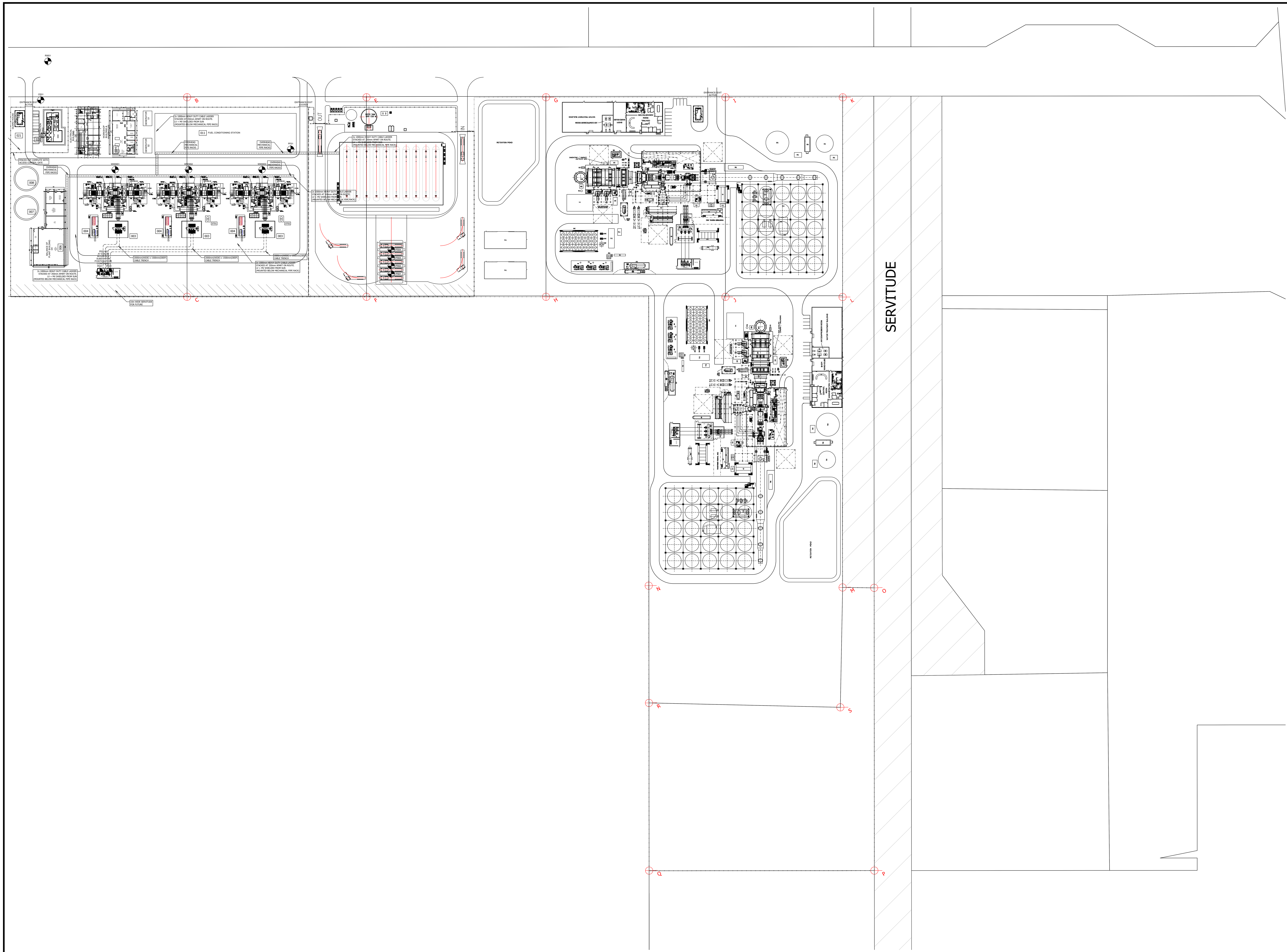

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Jacques Robbetze

GENERAL NOTES:

All levels, heights and dimensions to be verified on site where applicable and to be checked against drawings.

Any errors, discrepancies, queries or omissions to be brought to the attention of SDE immediately prior to the commencement of any work.

All work to be carried out in strict accordance with local authority requirements, National Building Regulations and relevant standards.

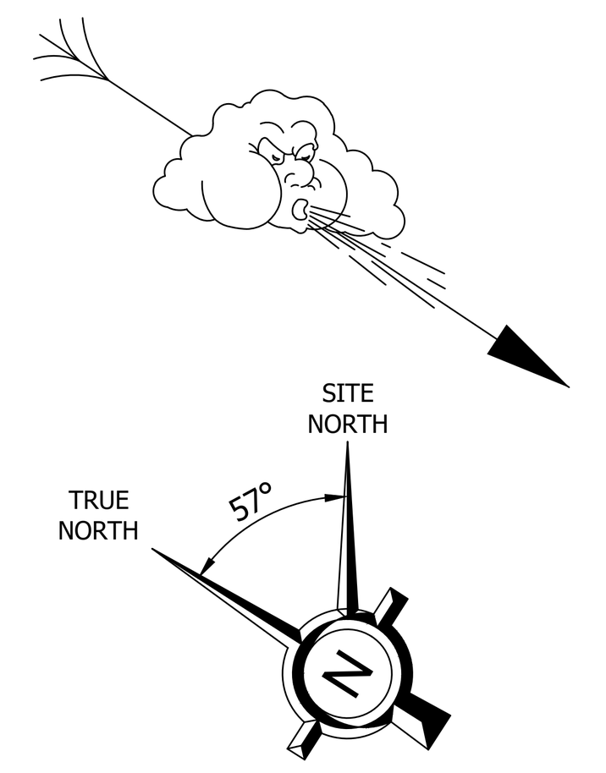
Where applicable, contractors to locate and identify existing services on site and protect these from damage throughout the duration of the works.

This drawing must not to be scaled. Only figured dimensions shall be followed.

Only drawings referenced as "For Construction" shall be used for construction purposes.

LEGEND:

1	GAS TURBINE
3	LUBE OIL RESERVOIR
5	LUBE OIL COOLER (A)
6	LUBE OIL COOLER (B)
9	LUBE OIL ACCUMULATOR
13	CONTROL OIL UNIT
17	GT COOLING AIR COOLER
19-1	GT FUEL GAS HEATER (A)
19-2	GT FUEL GAS HEATER (B)
36	GT FUEL GAS INLET FILTER
42	CO2 FIRE-FIGHTING SYSTEMS FOR GT
43	TURBINE CONTROL PACKAGE
46	GT EXHAUST DUCT
48	PLANT AIR COMPRESSOR (A)
49	PLANT AIR COMPRESSOR (B)
50	INS AIR RECEIVER
51	SER AIR RECEIVER
52	INS. AIR DRYER (A)
53	INS. AIR DRYER (B)
57	GT INLET AIR SILENCER
59	GT INLET AIR FILTER
69	TRANSFORMER AREA OIL SEPARATOR
70	GT FUEL GAS FLOW METER
92	JACKING OIL PUMP UNIT FOR GENERATOR
101	STEAM TURBINE GENERATOR
103	GEN SHAFT SEAL OIL EQUIPMENT (NOT SHOWN UNDER STG)
107	GEN HYDROGEN GAS DRYER (NOT SHOWN UNDER STG)
109	GEN HYDROGEN GAS SUPERVISORY ANALYZER RACK (NOT SHOWN UNDER STG)
111	GEN HYDROGEN GAS SUPERVISORY MONITORING RACK (NOT SHOWN UNDER STG)
113	MAIN TRANSFORMER
115	GEN. EXC. TRANSFORMER
117	GEN. EXC CUB. PACKAGE
121	UNIT AUX TRANSFORMER
123	SFC TRANSFORMER
125	GEN. SFC CUB. PACKAGE
139	GEN. LOOP SEAL TANK
160	GT 2C COOLER
162	GT 4S COOLER
164	GT 4S COOLING AIR FILTER
170	TRIP VALVE BOARD
182	GT ENHANCED COOLING AIR COOLER
184	GT ENHANCED COOLING AIR COMPRESSOR
190	GT ENHANCED COOLING AIR DRAIN MIST SEPARATOR
192	GT ENHANCED COOLING AIR COOLER PUMP (A)
194	GT ENHANCED COOLING AIR COOLER PUMP (B)
201	HEAT RECOVERY STEAM GENERATOR
204	STACK
215	HRSG PRE-HEATER RETICULATION PUMP
219	HRSG BLOW DOWN TANK
221	HRSG BLOW DOWN PIT
305	LUBE OIL PURIFIER
308	GLAND STEAM CONDENSER
331	CONDENSATE EXTRACTION PUMP (A)
332	CONDENSATE EXTRACTION PUMP (B)
333	CONDENSATE EXTRACTION PUMP (C)
334	HP/IP FEED WATER PUMP (A)
335	HP/IP FEED WATER PUMP (B)
342	SAMPLING EQUIPMENT
344	CHEMICAL DOSING EQUIPMENT
345	ST FLASH TANK
346	CLOSED COOLING WATER COOLER
348	CLOSED COOLING WATER PUMP (A)
349	CLOSED COOLING WATER PUMP (B)
353	EMERGENCY D/G PACKAGE
355	CLOSED COOLING WATER EXPANSION TANK
503	GT COOLING AIR FILTER
506	CEMS ENCLOSURE
510	ACC
511	ACC DRAIN POT
512	ELECTRICAL PACKAGE FOR ACC
513	CONDENSATE TANK
529	ACC DRAIN PUMP (A)
530	ACC DRAIN PUMP (B)
531	SCR SKID
532	HRSG BURNER SKID
533	DUCT BURNER BLOWER SKID
541	CONDENSER VACUUM DUCT (A)
542	CONDENSER VACUUM DUCT (B)
701	DEMIN. WATER STORAGE TANK
702	DEMIN. WATER PUMPS
703	RAW / FIRE WATER STORAGE TANK
704	RAW WATER PUMPS
705	FIRE PUMP HOUSE
706	HYDROGEN TRAILER
707	AMMONIA STORAGE / UNLOADING
709	FUEL GAS ABSOLUTE SEPARATOR
710	GAS COMPRESSORS / SCRUBBERS, DRAIN TANK & PRV STN
711	ENCLOSED AUX. BOILER PACKAGE
712	UTILITY GAS YARD INCLUDING CONDITIONING EQUIP
713	ACC TRANSFORMERS
714	GT TRANSFORMERS
715	BOP / HRSG & CCW MCC / PDC
716	BOP / HRSG & CCW TRANSFORMERS
717	MAIN ELECTRICAL PACKAGE
718	NITROGEN TANK



ISSUED FOR INFORMATION

0 10 20 40 60 80 100Metres

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Reference Drawings	Drawing No.	Rev.	Revision	Name	Date	Approved

Rev.	Revision	Name	Date	Approved
C	SITE BOUNDARY UPDATED	J.R.	21.05.20	K.G.
B	LAYOUT UPDATE	A.C.	21/04/22	K.G.
A	ISSUED FOR INFORMATION	A.C.	21/03/01	K.G.

Name		Name		Name	
Designation		Designation		Designation	
Date		Date		Date	

Drawn	A. CELLIERS
Design	A. CELLIERS
Checked	A. CELLIERS
Approved	K.GAFNER
Date	2021/02/08
Scale	1:1000
Original	A0

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Project: PHAKWE RICHARDS BAY GAS POWER 3

SITE LAYOUT
1800MW COMBINE CYCLE
TWO TRAINS OF M701JAC IN (1x1x1)

Drawing Number: 7499 - SIT - SI - 01

Rev. C

Phakwe Richards Bay Gas Power 3 Combined Cycle Power Plant, KwaZulu-Natal Province

Cumulative Map
Industrial Developments

Legend

- Substation
- Secondary Roads
- Regional Road
- Main Road
- Existing Power Line
- Railway Line
- Phakwe Richards Bay Gas Power 3 CCPP

Known Industrial and Energy Developments:

- Karpowerships (in process)
- Chlor-Alkali Plant (authorised)
- Phinda Power 320MW RMPP (authorised)
- Eskom Richards Bay CCPP (authorised)
- Fermentech Fertilizer Supplier (existing)
- Bidvest Tank Terminals (existing)
- Richards Bay Gas to Power (auhthorised)
- Bayside Aluminium Richards Bay (existing)
- Foskor Richards Bay (existing)
- Mondi Richards Bay (existing)
- Port Richards Bay (existing)
- Richards Bay Coal Terminal (existing)
- South32 Alliminium (existing)
- Tata Steel (Richards Bay Alloys) (existing)

Scale: 1: 50 000
Projection: GCS_WGS_1994
Ref: PRBGP3 CCPP - Cumulative Map

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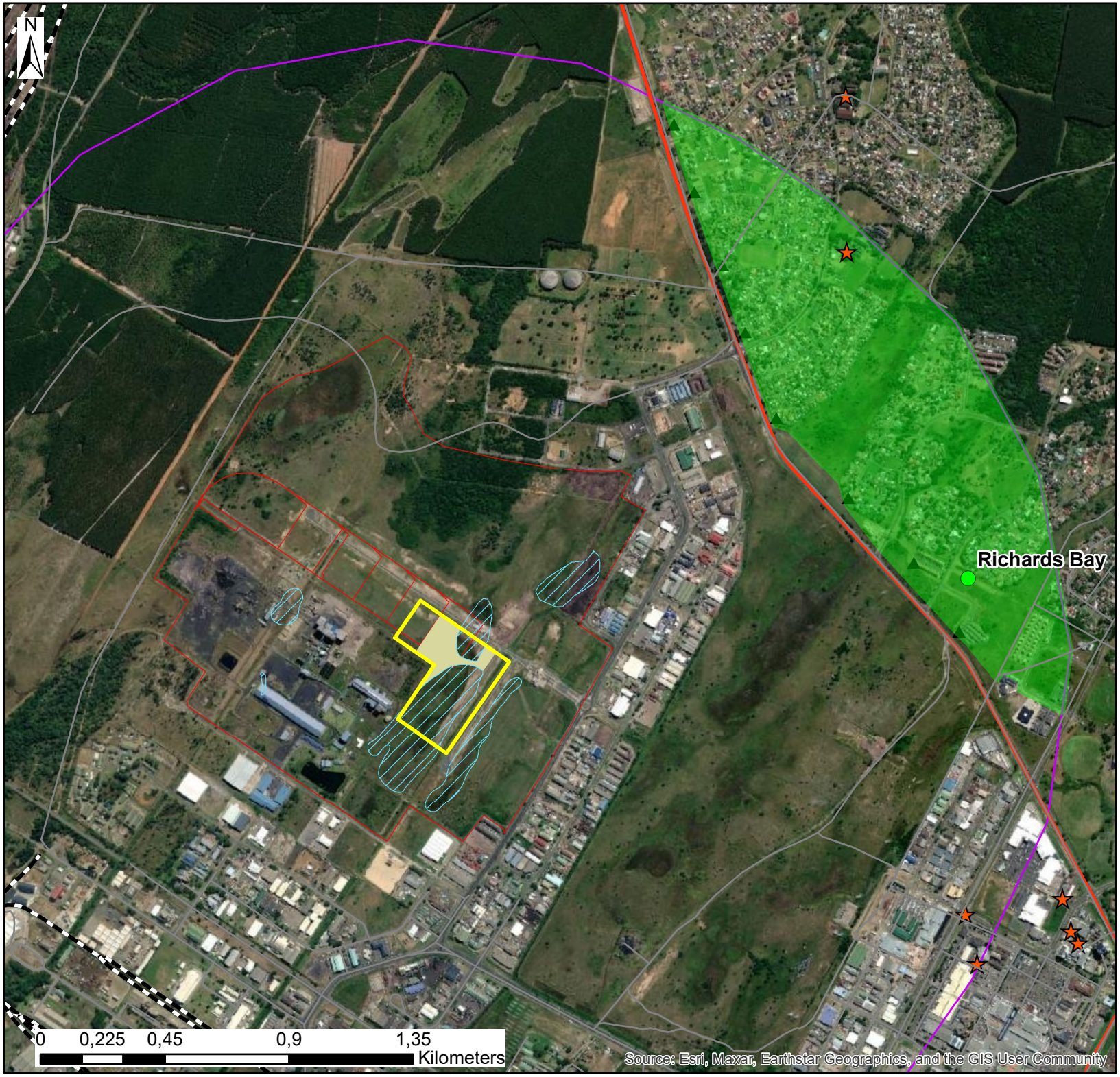
Cumulative mapping is based on available data (Nov 2021)



Phankwe Richards Bay Gas Power 3 CCPP, KwaZulu-Natal Province

Sensitivity Map

Legend

- Town
- Substation
- Railway Line
- Secondary Roads
- Regional Road
- Main Road
- Existing Power Line
- Perennial River
- Non-perennial River
- Phankwe Richards Bay Gas Power 3 CCPP
- RBIDZ Phase 1F

Environmental Sensitivities

- Sensitive Noise Receptors
- Sensitive Air Quality Receptors
- Noise Sensitivity Area
- Wetlands (NBA, 2018)
- Maputaland Wooded Grassland (Medium sensitivity)
- Noise Buffer (2000m)

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Scale: 1:11 000
Projection: GCS_WGS_198-
Ref: PRBGP3 Prelim Sens

APPENDIX B:
EAP CURRICULUM VITAE

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Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: joanne@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current:	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005:	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997:	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel,	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
Northern Cape		
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the folar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP
Wind Garden & Fronteer WEFs, Eastern Cape	Wind Relc	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor

Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape	Wind Relic	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	liso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

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Johannesburg, South Africa

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Tel: +27 (11) 656 3237

CURRICULUM VITAE OF NICOLENE VENTER

Profession : Public Participation and Social Consultant

Specialisation: Public participation process; stakeholder engagement; facilitation (workshops, focus group and public meetings; public open days; steering committees); monitoring and evaluation of public participation and stakeholder engagement processes

Work Experience: 23 years' experience as a Public Participation Practitioner and Stakeholder Consultant

VOCATIONAL EXPERIENCE

Over the past 23 years Nicolene established herself as an experienced and well recognised public participation practitioner, facilitator and strategic reviewer of public participation processes. She has experience in managing public participation and stakeholder engagement projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and stakeholder engagement projects and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. She has successfully undertaken several public participation processes for EIA, BA and WULA projects. The EIA and BA process include linear projects such as the NMPP, Eskom Transmission and Distribution power lines as well as site specific developments such as renewable energy projects i.e. solar, photo voltaic and wind farms. She also successfully managed stakeholder engagement projects which were required to be in line with the Equator Principles, locally and in neighbouring countries.

SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Public Participation, Stakeholder Engagement and Awareness Creation
- Public Speaking and Presentation Skills
- Facilitation (workshops, focus group meetings, public meetings, public open days, working groups and committees)
- Social Assessments (Stakeholder Analysis / Stakeholder Mapping)
- Monitoring and Evaluation of Public Participation and Stakeholder Engagement Processes
- Community Liaison
- IFC Performance Standards
- Equator Principles
- Minute taking, issues mapping, report writing and quality control

EDUCATION AND PROFESSIONAL STATUS

Degrees / Diplomas / Certificates:

- Higher Secretarial Certificate, Pretoria Technicon (1970)

Short Courses:

- Techniques for Effective Public Participation, International Association for Public Participation, IAP2 (2008)
- Foundations of Public Participation (Planning and Communication for Effective Public Participation), IAP2 (2009)
- Certificate in Public Participation – IAP2SA Modules 1, 2 and 3 (2013)

Certificate in Public Relations, Public Relation Institute of South Africa, Damelin Management School (1989)

Professional Society Affiliations:

- Member of International Association for Public Participation (IAP2): Southern Africa

EMPLOYMENT

Date	Company	Roles and Responsibilities
November 2018 – current	Savannah Environmental (Pty) Ltd	Public Participation and Social Consultant <u>*Tasks include:*</u> *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.*

Date	Company	Roles and Responsibilities
2016 – October 2018	Imaginative Africa (Pty) Ltd *(Director of Imaginative Africa)*	Independent Consultant *Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:* *<u>Tasks include:</u>* *Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved* *<u>Clients</u>:* *SiVEST Environmental* *Savannah Environmental* *Baagi Environmental* *Royal Haskoning DHV (previously SSI)*
2013 - 2016	Zitholele Consulting *Contact person: Dr Mathys Vosloo* *Contact number: 011 207 2060*	Senior Public Participation Practitioner and Project Manager <u>Tasks included:</u> *Project managed public participation process for EIA/BA/WULA/EAL projects. Manages two Public Participation Administrators. Public Participation tasks as outlined as above and including financial management of public participation processes.*
2011 - 2013	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements <u>Tasks included:</u> *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document,*

		Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc. *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved* *<u>Clients</u>:* *Bohlweki Environmental* *Bembani Sustainability (Pty) Ltd* *Naledzi Environmental*
2007 – 2011	SiVEST SA (Pty) Ltd *Contact person: Andrea Gibb* *Contact number: 011 798 0600*	Unit Manager: Public Participation Practitioner *<u>Tasks included:</u>* *Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation tasks as outlined as above and including financial management of public participation processes.*
2005 – 2006	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant Public Participation and Stakeholder Engagement Practitioner *<u>Tasks included:</u>* *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical*

		information communicated to and consultation with all level of stakeholders involved. *<u>Clients</u>:* *Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)*
1997 - 2004	Imaginative Africa (Pty) Ltd *(company owned by Nicolene Venter)*	Independent Consultant: Public Participation Practitioner. *<u>Tasks included:</u>* *Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, affected landowners, etc.* *Managing interaction between Stakeholders and Team Members, liaising with National, Provincial Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.* *<u>Clients</u>:* *Greyling Liaison (currently Golder Associates); Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental*

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS

PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Lichtenburg PVs (3 PVs) & Power Lines (grid connection), Lichtenburg, North West Province	*Atlantic Energy Partners* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	*IL Energy* *EAP: Savannah Environmental*	
Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province	*Building Energy* *EAP: Savannah Environmental*	
Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province	*Atlantic Energy Partners and ABO Wind* *EAP: Savannah Environmental*	
Upilanga Solar Park, Northern Cape (350MW CSP Tower)	*Emvelo Capital Projects (Pty) Ltd*	
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	
Sirius Solar PV3 and PV4, near Upington, Northern Cape Province	*Solal*	
Geelstert PV 1 and PV2 solar energy facilities, near Aggeneys, Northern Cape	*ABO Wind*	
Naledi PV and Ngwedi PV solar energy facilities, near Upington, Northern Cape	*Atlantic Energy Partners and Abengoa*	
Kotulo Tsatsi PV1, Kotulo Tsatsi PV3 and Kotulo Tsatsi PV4 solar energy facilities, near Kenhardt, Northern Cape	*Kotulo Tsatsi Energy*	
Tlisitseng PV, including Substations & Power Lines, Lichtenburg, North West Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province		
Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province		
Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province	*Surya Power* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
De Aar Solar Energy Facility, De Aar, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province		
Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province		

Platsjambok East PV, Prieska, Northern Cape Province		
Renosterburg PV, De Aar, Northern Cape Province	*Renosterberg Wind Energy Company* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province	*Solar Reserve South Africa* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*

Basic Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upilanga Solar Park, Northern Cape (x6 100MW PV's and x3 350MW PV Basic Assessments)	*Emvelo Capital Projects (Pty) Ltd*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Sirius Solar PV Solar Energy Facility, Upington, Northern Cape Province	*SOLA Future Energy*	
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	

WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Aletta Wind Farm, Copperton, Northern Cape Province	*BioTherm Energy* *EAP: SiVEST*	*Public Participation*
Eureka Wind Farm, Copperton, Northern Cape Province		
Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	*Public Participation*
Droogfontein Wind Farm, Loeriesfontein, Northern Cape Province		
Four Leeuwberg Wind Farms, Loeriesfontein, Northern Cape Province		
Noupoort Wind Farm, Noupoort, Northern Cape Province		
Mierdam PV & Wind Farm, Prieska, Northern Cape Province		
Platsjambok West Wind Farm & PV, Prieska, Northern Cape Province		

Basic Assessments and Environmental Management Programmes

Project Name & Location	**Client Name**	**Role**
Cluster of Renewable Energy Developments, Eastern Cape Province	*Wind Relic*	

Nama Wind Energy Facility, Northern Cape Province	*Genesis ECO* *EAP: Savannah Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Zonnequa Wind Energy Facility, Northern Cape Province		

CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Upington Concentrating Solar Plant and associated Infrastructures, Northern Cape Province	*Eskom Holdings* *EAP: Bohlweki Environmental*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	**Client Name**	**Role**
450MW gas to power project and associated 132kV power line, Richards bay, KwaZulu-Natal	Phinda Power Producers	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders & Landowners*
4000MW gas to power project and associated 400kV power lines, Richards bay, KwaZulu-Natal	Phinda Power Producers	
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
132/11kV Olifantshoek Substation and Power Line, Northern Cape	*Eskom*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders*
Grid connection infrastructure for the Namas Wind Farm, Northern Cape Province	*Genesis Namas Wind (Pty) Ltd*	
Grid connection infrastructure for the Zonnequa Wind Farm, Northern Cape Province	*Genesis Zonnequa Wind (Pty) Ltd*	
Khunab Solar Grid Connection, near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	
Pluto-Mahikeng Main Transmission Substation and 400kV Power Line (Carletonville to Mahikeng), Gauteng and North West Provinces	*Eskom Holdings* *EAP: Baagi Environmental*	
Thyspunt Transmission Lines Integration Project, Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Westrand Strengthening Project, Gauteng Province		*Public Participation,*

Mookodi Integration Project, North-West Province		
Transnet Coallink, Mpumalanga and KwaZulu-Natal Provinces		
Delarey-Kopela-Phahameng Distribution power line and newly proposed Substations, North-West Province		*Public Participation, Landowner and Community Consultation*
Invubu-Theta 400kV Eskom Transmission Power Line, KwaZulu-Natal Province	*Eskom Holding* *EAP: Bembani Environmental*	
Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province	*Eskom Holdings* *EAP: SiVEST*	*Public Participation, Landowner and Community Consultation*
Tweespruit-Welroux-Driedorp-Wepener 132Kv Power Line, Free State Province		
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	*Eskom Holdings* *EAP: Zitholele*	
Vaalbank 132Kv Power Line, Free State Province		
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		

PART 2 AMENDMENTs

Project Name & Location	***Client Name***	***Role***
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	*Transalloys (Pty) Ltd*	*Project Manage the Public Participation Process*
Zen Wind Energy Facility, Western Cape	*Energy Team (Pty) Ltd*	
Hartebeest Wind Energy Facility, Western Cape	*juwi Renewable Energies (Pty) Ltd*	
Khai-Ma and Korana Wind Energy Facilities	*Mainstream Renewable Power (Pty) Ltd*	

FACILITATION

Project Name & Location	***Client Name***	***Meeting Type***
Bloemfontein Strengthening Project, Free State Province	Eskom Holdings EAP: Baagi Environmental	Public Meetings
Mooidraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province	Eskom Holdings EAP: SSI	Focus Group Meetings
Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province	Eskom Holdings EAP: Savannah Environmental	Focus Group Meetings & Public Meetings
Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings)	Eskom Holdings EAP: ACER Africa	Public Meetings
Majuba-Venus 765kV Transmission Power Lines, Mpumlanaga Province		
Thabametsi IPP Power Station, Limpopo Province	Thabametsi Power Company EAP: Savannah Environmental	Focus Group Meeting & Public Meeting
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Focus Group Meetings & Public Meetings

SCREENING STUDIES

Project Name & Location	***Client Name***	***Role***
Potential Power Line Alternatives from Humansdorp to Port Elizabeth, Eastern Cape Province	*Nelson Mandela Bay Municipality* *EAP: SiVEST*	*Social Assessment*

ASH DISPOSAL FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province	*Eskom Holdings SOC Ltd* *EAP: Zitholele Consulting*	*Public Participation, Landowner and Community Consultation*
Kendal 30-year Ash Disposal Facility, Mpumalanga Province		
Kusile 60-year Ash Disposal Facility, Mpumalanga Province		
Camden Power Station Ash Disposal Facility, Mpumalanga Province		
Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province	*Eskom Holdings SOC Ltd* *EAP: Lidwala Environmental*	
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		
Hendrina Ash Dam Expansion, Mpumalanga Province		

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Expansion of LOX and Diesel Storage at the Air Products Facility in Coega, Eastern Cape	*Air Products South Africa (Pty) Ltd*	*Project Manage the Public Participation Process* *Facilitate all meetings* *Consultation with Government Officials, Key Stakeholders & Landowners*
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	*Transnet* *EAP: Bohlweki Environmental*	
Realignment of the Bulshoek Dam Weir near Klawer and the Doring River Weir near Clanwilliam, Western Cape Province	*Dept of Water and Sanitation* *EAP: Zitholele*	*Public Participation*

STAKEHOLDER ENGAGEMENT

Project Name & Location	***Client Name***	***Role***
Socio-Economic Impact Study for the shutdown and repurposing of Eskom Power Stations: Komati Power Station, Hendrina Power Station & Grootvlei Power Station	*Urban-Econ*	*Project Management for the stakeholder engagement with Community*

		Representatives in the primary data capture area
First State of Waste Report for South Africa	*Golder Associates on behalf of the Department of Environmental Affairs*	*Secretarial Services*
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Golder Associates on behalf of the Department of Water and Sanitation*	
Orange River Bulk Water Supply System		
Levuvu-Letaba Resources Quality Objectives		

FACILITATION

Project Name & Location	***Client Name***	***Meeting Type***
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	*Department of Water and Sanitation* *Golder Associates*	*Secretarial Services*
Orange River Bulk Water Supply System		*Secretarial Services*
Levuvu-Letaba Resources Quality Objectives		*Secretarial Services*
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	*Samancor Chrome (Pty) Ltd* *EAP: Environment al Science Associates*	*Public Meeting*
SANRAL N4 Toll Highway Project (2nd Phase), Gauteng & North West Provinces	*Department of Transport* *EAP: Bohlweki Environmental*	*Public Meetings*

MINING SECTOR

Environmental Impact Assessment and Environmental Management Programme

Project Name & Location	**Client Name**	**Role**
Zero Waste Recovery Plant at highveld Steel, Mpumalanga Province	*Anglo African Metals* *EAP: Savannah Environmental*	*Public Participation*
Koffiefontein Slimes Dam, Free State Province	*Petra Diamond Mines* *EAP: Zitholele*	*Public Participation*
Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe	*Applicant: Green Fuel* *EAP: SiVEST*	*Public Participation & Community Consultation*
BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga	*BHP Billiton Group* *EAP: Jones & Wagener*	*Public Participation*

ENVIRONMENTAL AUTHORISATION AMENDMENTS

Project Name & Location	***Client Name***	***Role***
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	*Transalloys (Pty) Ltd*	*Public Participation*
Zen Wind Energy Facility, Western Cape	*Energy Team (Pty) Ltd*	
Hartebeest Wind Energy Facility, Western Cape	*juwi Renewable Energies (Pty) Ltd*	
Khai-Ma and Korana Wind Energy Facilities	*Mainstream Renewable Power (Pty) Ltd*	
Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	*South Africa Mainstream Renewable Power Developments* *EAP: SiVEST*	

SECTION 54 AUDITS

Project Name & Location	***Client Name***	***Role***
Mulilo 20MW PV Facility, Prieska, Northern Cape	*Mulilo (Pty) Ltd*	*Public Participation: I&AP Notification process*
Mulilo 10MW PV Facility, De Aar, Northern Cape	*Mulilo (Pty) Ltd*	
Karoshoek CSP 1 Facility/ Solar One, Upington, Northern Cape	*Karoshoek Solar One (Pty) Ltd*	

savannah environmental

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: tebogo@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF TEBOGO MAPINGA

Profession : Business Operations Manager and EAP

Specialisation: Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Permitting

Work Experience: 14 years' experience in Environmental Management, National Water Act, Mineral and Petroleum Resources Development Act, Project Management, Compliance Auditing, Stakeholder Engagement, Policy and Legislation Advisory and Peer Review.

VOCATIONAL EXPERIENCE

Tebogo is an experienced professional with 14 years across the fields of Environment, Permitting, Project Management, Contract Management and Business Development, within the built infrastructure and most recently renewable energy sectors. I have an excellent track record and across-the-board proficiency within the following business environments: Business Development | Tender Management | Environmental Regulations & Compliance (Renewable Energy, Power, Infrastructure, Mining, ect) | Project Finance Environmental Due Diligence | Project Management (including contract management) | Design, Execution and management Project Permitting Processes | Team Management | Stakeholder Interfaces | Policy and Legislation Advisory.

I'm an assertive individual with a passion for renewable energy industry and power markets. I am a self-motivated and results orientated individual, able to effectively and expediently learn and absorb the nuances of new markets and take on strong leadership roles accordingly. I possess a strong business development, environmental and permitting acumen which also comes with the ability to cultivate significant synergies between stakeholders and authorities; and maintaining those relationships.

SKILLS BASE AND CORE COMPETENCIES

- Renewable Energy Permitting;
- Environmental Management;
- Environmental Due Diligence and Analysis;
- Tender and Bid Management;
- Project Management and client liaison;
- Contract Management;
- Report Writing, drafting proposals and tenders;
- Review of ECO Monitoring Reports and External Audit Reports
- Financial management and marketing;
- Understanding and Implementation of all Environmental Regulations and all other relevant legislation;
- • Water Use Licence Applications (NWA)
- • General Authorisations (NWA)
- Ability to work independently and in a team;
- Good verbal, writing and presentation skills;
- Time management and workload management; and
- Facilitation and Training skills.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

BSc (Zoology and Physiology), The University of Limpopo

Short Courses:

- MS WORD- Computer Course (University of Limpopo (2006)
- Environmental Assessment Administration (2012)

Professional Society Affiliations:

- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 115518)
- IAIAsa Member

Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

EMPLOYMENT

Date	Company	Roles and Responsibilities
April 2021 - Current:	Savannah Environmental (Pty) Ltd	Business Operations Manager & EAP Tasks include: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, and permit applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, project management, staff management and co-ordination, client liaison and relationship management.
February 2018 – March 2021	Zitholele Consulting (Pty) Ltd	Senior Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, mining rights and permit applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations and conducting peer reviews. Conducted Rain Readiness Assessments for Eskom.

Date	Company	Roles and Responsibilities
April 2014 – December 2017	Savannah Environmental (Pty) Ltd	Senior Environmental Consultant & Principal Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, mining rights and permit applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations and environmental screening reports..
April 2013 – March 2014	GIBB Engineering and Science	Senior Environmental Scientist Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments. Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations and environmental screening reports.
April 2010 – March 2013	Department of Forestry, Fisheries and the Environment	Environmental Officer Specialised Production: Tasks included: The review of BARs, EIRs, EMPr's and Environmental Authorisations mainly for Parastatal projects (Eskom projects, SANRAL projects, Rand Water Project), Renewable energy projects and National Projects; and Drafting recommendations for EIA submissions.
April 2008 – March 2010	Strategic Environmental Focus	Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments. Ensuring environmental compliance on permitting processes, client liaison, project management and relationship management, public participation processes for environmental authorisations and environmental screening reports.
January 2007 – March 2008	Phaki Phakanani Environmentyal Consultants	Environmental Consultants Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes

Date	Company	Roles and Responsibilities
		(EMPrs), environmental amendments. Ensuring environmental compliance on permitting processes, client liaison, project management and relationship management, public participation processes for environmental authorisations and environmental screening reports.

PROJECT EXPERIENCE

Project experience includes project management, EIA, BA and EMPr documentation development, integrated water use license applications, general authorisations, and impact assessments, compliance auditing and monitoring, vegetation rehabilitation and monitoring plans, integrated waste management plans and waste licencing.

Industry experience includes conduction Rain Readiness Assessments for Eskom Power Stations, the waste sector (IWMP's and waste licencing), road infrastructure (BAR, S&EIR, WUL/GA, Waste Licence), Filling station applications for Shell SA and BP, private sector clients across varying industries (various permits), mining sector (BAR & S&EIR), conservation sector (biodiversity plans), renewable energy industry (BAR, S&EIR) as well as the gas industry.

RENEWABLE POWER GENERATION PROJECTS: WIND & SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Thabametsi Coal Fired Power Station	G7 Renewable Energy (Pty) Ltd	Environmental consultant
Richards Bay CCPP Power Project	Eskom SOC Ltd	Project Manager Environmental consultant
Gunstfontein Wind Energy Facility	Ginstfontein Wind Farm (Pty) Ltd	Project Manager Environmental consultant
Pofadder 3 Wind and 1 solar Energy Facilities	Mainstream Renewable Power South Africa	Project Manager Environmental consultant
Solar Reserve Kotulo Tsatsi PV 2 Facility	Solar Reserve Pty (Ltd)	Project Manager Environmental consultant

Environmental Permitting, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Klawer Wind Farm FC Permitting	Building Energy and G7	Project Manager, Environmental consultant, Public Participation
Karusa Wind Farm FC Permitting (GA and Biodiversity Permit)	Karusa Wind Farm (Pty) Ltd	Project Manager, Environmental consultant, Public Participation
Roggeveld Wind Farm FC Permotting	Building Energy and G7	Project Manager, Environmental consultant, Public Participation
Soetwater Wind Farm FC Permitting (GA and Biodiversity Permit)	Soetwater Wind Farm (Pty) Ltd	Project Manager, Environmental consultant, Public Participation

Nxuba Wind Farm FC Permitting (GA and Biodiversity Permit)	Nxuba Wind Farm (Pty) Ltd	Project Manager, Environmental consultant, Public Participation
Adams PV Facility Upgrading of Charles Street FC Permitting	Aurora Power Solutions (Pty)	Project Manager, Environmental consultant, Public Participation
Bellatrix PV Facility FC Closure	Aurora Power Solutions (Pty)	Project Manager, Environmental consultant, Public Participation

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Proposed Housing Development on Portion 237 of the Farm Hartebeestpoort 328 in Koedoespoort, Gauteng Province	Housing Development Agency	Project Manager, Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
Pienaarspoort Wind Energy Facility, Northern Cape Province	ABO Wind renewable energies (Pty) Ltd	Environmental consultant
Doornkop Maize Mill EIA, Mpumalanga Province	Department of Rural Development and Land Reform	Project Manager, Environmental consultant, Public Participation
Proposed Housing Development on Portion 237 of the Farm Hartebeestpoort 328 in Koedoespoort, Gauteng Province	Housing Development Agency	Project Manager, Environmental consultant, Public Participation
Karusa Wind Energy Facility Grid Connection BAR	Karusa Wind Farm (Pty) Ltd	Project Manager, Environmental consultant, Public Participation
Soetwater Wind Energy Facility Grid Connection BAR	Soetwater Wind Farm (Pty) Ltd	Project Manager, Environmental consultant
Gunstfontein Wind Energy Facility Grid Connection	Gunstfontein Ind Farm (Pty) Ltd	Project Manager, Environmental consultant
Great Fish River Watercourse Crossing BAR	African Clean Energy Developers (Pty) Ltd (ACED)	Project Manager, Environmental consultant

Screening Studies

Project Name & Location	Client Name	Role
Bobididi Solar Facility	Environmental Screening- Root 60FOUR Energy (Pty) Ltd	Project Manager, EAP
Hazelwood Stormwater Environmental Screening	Johannesburg Water	Project Manager, Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role

Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO
Environmental compliance monitoring for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO

Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
EIA, WULA and waste variation for the retrofitting of the FGD at Medupi Power Station	Eskom SOC Ltd	Project Manager, Environmental consultant, Public Participation

SPECIALIST STUDIES

Project Name & Location	Client Name	Role
Rain Readiness Assessments for the Matla, Kriel, Majula and Kusile Substations	Eskom SOC Ltd	Environmental specialist

CURRICULUM VITAE

Name	Anita Rautenbach
Profession	Zoological/Ecological Consultant
Name of Firm	Rautenbach Biodiversity Consulting
Present Appointment	Zoologist/Ecologist
Date of Birth	18 March 1971
Nationality	South African
ID No.	710318 0154 085

OVERVIEW

Anita graduated with a Master's degree in Biological Science from the School of Life Sciences, University of KwaZulu-Natal Durban. Her Master's dissertation investigated patterns and processes of rodent and shrew assemblages in the Savanna Biome of KwaZulu-Natal.

Her main interest involves fauna taxonomy, distribution patterns and ecology. She has been involved in various research projects and ecological assessments in southern Africa. Anita has approximately 12 years of in the environmental field and is currently registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP).

EDUCATION

- 2007: BSc. Zoology & Geography – University of South Africa
- 2010 – BSc. Honours (Biological Science – University of KwaZulu-Natal
- 2013 – MSc (Biological Science) – University of KwaZulu-Natal

PROFESSIONAL QUALIFICATIONS

- MSc (Biological Science)

MEMBERSHIP TO PROFESSIONAL SOCIETIES

- SACNASP – Professional Natural Scientist – (400725/15) – Zoological sciences
- Zoological Society of Southern Africa

PUBLICATIONS

- Solano, E., Taylor, P, J., Rautenbach, A., Ropiquet, A., Castiglia, R. 2014. Cryptic speciation and chromosomal repatterning in the African climbing mice *Dendromus* (Rodentia, Nesomyidae). PloS One (DOI:10.1371/journal.phone.0088799).
- Rautenbach, A., Dickerson, T., Schoeman, M.C. 2013. Diversity of rodents and shrew assemblages in different vegetation types of the savannah biome in South Africa: no support for nested subset or competition hypotheses. African Journal of Ecology 5(1) pp. 30-40.
- Taylor, P.J., Rautenbach, A., Schoeman, M.C., Combrink, X. 2007. A winter survey of the smaller mammals of the uMkhuze section of the iSimangaliso Wetland Park, KwaZulu-Natal Province, South Africa. (https://www.researchgate.net/228787004)

EMPLOYMENT RECORD

- March 2015 – current Rautenbach Biodiversity Consulting – (Full time

Fauna/flora/vegetation/biodiversity/ecological assessments)

- March 2012 – March 2015 Rautenbach Biodiversity Consulting – Part time – Fauna assessments
- March 2012 – Feb 2013 GVK Siya Zama Building and Renovations – HSE officer
- March 2013 – March 2015 GVK Siya Zama Building and Renovations – Regional HSE Manager
- April 2007 – August 2011 Durban Natural Science Museum – Mammal technician
- 1997 – 2007 Dr D Storm – Receptionist
- 1992 – 1997 Drs Smith, Snyman & Partners (Medical typist)
- 1990 – 1991 Drs Brits & Griesel Pathologists (Medical typist)

LANGUAGE PROFICIENCY

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Fluent	Fluent	Fluent

YEARS OF WORKING EXPERIENCE

12+ Years

COUNTRIES OF WORK EXPERIENCE

- South Africa
- Swaziland
- Mozambique
- Kenya
- Madagascar

FIELDS OF SPECIALISATION

- Biodiversity/ecological assessments
- Fauna assessments
- Flora & vegetation assessments – (KZN & Mpumalanga vegetation types)
- Threatened species assessments.

PROJECTS EXPERIENCE (selected projects)

Ecological assessments (inclusive of fauna)

- Section 24G contravention – Retrospective ecological assessment related to the unlawful construction of an irrigation dam on the Farm Neederland 202 HT, Mpumalanga. Commissioned by Enprocon (Pty) Ltd. 2019.
- Proposed development of the Pavua dam hydropower facility, Mozambique. Commissioned by The Biodiversity Company. 2017.
- Proposed housing development in Amaoti, KwaZulu-Natal. Commissioned by The Biodiversity Company.
- Proposed Thukela-Goedertrou pipeline development, KwaZulu-Natal. Commissioned by The Biodiversity Company. 2017.
- Proposed development of the Shixini 3 Macadamia Orchards, Eastern Cape. Commissioned by Afzelia Environmental Consultants. 2005.
- Proposed Kingsburg housing development, Durban, KwaZulu-Natal. Commissioned by Afzelia Environmental Consultants.
- Proposed Ingogo dams development, KwaZulu-Natal. Commissioned by Enprocon (Pty) Ltd.
- Proposed upgrade of Queen Nandi, Kwamashu and Inanda interchanges, KwaZulu-Natal. SANRAL
- Proposed development of a new dig-out port in Durban, KwaZulu-Natal Projects. Transnet capital projects.

Small mammal (rodents, shrews, bats) assessments

- Proposed development of a new mine in Kenya. Base Titanium.

- Small mammal (rodents & shrews) assessments, Phinda, KwaZulu-Natal. Phinda Game Reserve.
- Small mammal assessment (rodents, shrews) Albert Falls Dam, KwaZulu-Natal. Durban Natural Science Museum.
- Small mammal assessment as part of the Ecorat project, Swaziland. Durban Natural Science Museum. 2005.
- Small mammal assessment (rodents, bats, shrews) as part of the Operation Wallacea Bioblitz. Durban Natural Science Museum.
- Small mammal assessment in Madagascar – University of KwaZulu-Natal. 2005.

Ecological assessments (inclusive of fauna, flora and vegetation)

- Biodiversity Assessments – Hulamin Aluminium - Ongoing
- Section 24G contravention – Retrospective ecological assessment related to the unlawful enlargement of an irrigation dam on the Farm Witklip 4/207 HT, Mpumalanga. Commissioned by Enprocon (Pty) Ltd
- Proposed housing development on Erf 2082, Shelley Beach, KwaZulu-Natal. Commissioned by The Biodiversity Company.
- Proposed development of an opencast pit and underground decline shaft, ZAC Colliery, KwaZulu-Natal. Commissioned by The Biodiversity Company.
- Proposed development of the Richards Bay Combined Cycle Gas Turbine Power Plant, Richards Bay, KwaZulu-Natal. Commissioned by Savannah Environmental. 2018.
- Proposed development of a new abattoir in the Inkosi Langibalele municipal area. Commissioned by The Biodiversity Company.
- Section 24 G contravention – Retrospective assessment for the unlawful construction of a dam on Portion 5 of the Farm Tweefontein 3344, Newcastle, KwaZulu-Natal.
- Proposed housing development in Craigside, Newcastle. Commissioned by Enprocon (Pty) Ltd. 2017.
- Proposed Mdzonyana open-cast mining development, Limpopo province. Commissoned by Afzelia Environmental Consultants.
- Section 24G contravention – Retrospective ecological assessment related to the unlawful construction of a dam on the Farm Stefco 4/428, KwaZulu-Natal. Commissioned by Enprocon (Pty) Ltd. 2017.
- Retrospective terrestrial ecological assessment relating to the non-compliance of the provisions of Section 24F and Section 1 of NEMA on the Farm Doornkloof 376 HT.
- Proposed Umzimkhulu housing development, KwaZulu-Natal. Commissioned by The Biodiversity Company. 2017.
- Proposed development of pecan nut orchards and irrigation dams on Mtebeni Ranches, Pongola, KwaZulu-Natal. Commissioned by Enprocon (Pty) Ltd. 2020.
- Proposed Wilmar vegetable oil processing facility, Richards Bay, KwaZulu-Natal. Commissioned by Savannah Environmental. 2019.
- Proposed Wilmar vegetable oil pipeline development, Richards Bay, KwaZulu-Natal. Commissioned by Savannah. 2019.
- Proposed 1800 gas to power plant development, Richards Bay, KwaZulu-Natal. Commissioned by Savannah Environmental.

Threatened species assessments

- Specialist input to the wetland offset plan for the proposed Richards Bay Combined Cycle Gas Turbine Power Plant, Richards Bay, KwaZulu-Natal Province (*Hemisus guttatus* & *Crocidura mariquensis* assessment). Commissioned by Savannah Environmental. 2019.
- Proposed development of a housing estate, Coral Lagoon (Pty) Ltd, Durban, KwaZulu-Natal. *Bradypodion melanocephalum* assessment – Commissioned by Coral Lagoon (Pty) Ltd. 2017.

Flora and vegetation assessments

- Proposed development of Msinsi Mews in Waterfall, Durban. KJS Developers. Ongoing.
- Proposed business park development on Erf 947, Port Edwards, KwaZulu-Natal. Commissioned by The Biodiversity Company. 2019.

- Proposed mining development on the farm The Corner RE/11328, Umzumbe, KwaZulu-Natal. Commissioned by The Biodiversity Company. 2019
- Proposed development of a hospital in Newcastle, KwaZulu-Natal. Commissioned by Enprocon (Pty) Ltd. 2018.
- Proposed development of the Maphumulo Integrated Energy Centre, Glendale, KwaZulu-Natal. Commissioned by The Biodiversity Company.
- Proposed development of Portion 1 of Erf 286, Forest Hills, KwaZulu-Natal. Commissioned by The Biodiversity Company. 2017

COMPUTER LITERACY

- Microsoft Windows platforms
- Microsoft Office Suites including Office 365
- Google Earth
- QGIS 3.2 (GIS Software)
- Statistica
- BINMATNEST
- Ecosim
- Primer
- Distance

COURSES / CONFERENCES / WORKSHOPS

- 2007 Introduction to Bats – Bat Interest Group KZN
- 2009 ArcGIS Desktop – University of KwaZulu-Natal
- 2018 Conference – 'Bringing IAIA Back' - IAIAsa
- 2021 Guide to snake identification – African Snakebite institute (certificate)
- 2020 Verreauxs Eagle and Wind Farms – Birdlife South Africa (certificate)
- 2020 Cape Vulture Guidelines – Birdlife South Africa (certificate)
- 2021 Guidelines for pre-construction monitoring of bats at wind energy facilities – Inkululeko Wilflife Services (certificate)

REFERENCES

Mr Daniel Cillie
Bukhali Environmental Resource Consulting
+34 326 3849
danielcillie@telkomsa.net

Mr Sheldon Singh
SAT Environmental Consultants
+72 4555 168
sheldon@satenviro.co.za

Mr Andrew Husted
The Biodiversity Company
+27 81 319 1225
Info@thebiodiversitycompany.com

CURRICULUM VITAE
LOURENS DU PLESSIS

PERSONAL INFORMATION AND CONTACT DETAILS

Name:	Lourens Martinus du Plessis
Date of birth:	1969-11-13
Marital status:	Married
Nationality:	South African
Profession/specialisation:	Geographer/environmental GIS specialist
Company:	MetroGIS (Pty) Ltd
Years with firm:	11 years
Position:	Director
Experience:	20 years
Postal address:	PO Box 384, La Montagne, 0184
Telephone/fax:	012 349 2884/5 (w) 082 922 9019 (cell) 012 349 2880 (fax)
E-mail:	lourens@metrogis.co.za

KEY QUALIFICATIONS AND EXPERIENCE

Primary function

The application of Geographic Information Systems (GIS) in environmental planning and management, impact assessments and spatial modeling.

Experience and expertise

- Data sourcing and acquisition
- Data capture
- Data evaluation
- Data conversion and transfer
- GIS database development, implementation and maintenance
- Spatial analysis/modelling (visibility, slope, aspect, shadow, surface, raster, proximity, etc.)
- Digital terrain/elevation modeling
- Terrain evaluation
- Image processing
- Impact assessment and impact management
- Environmental management
- Decision support systems interface development
- Project management
- Map production, display, queries and reporting
- Environmental sciences expertise
- Process development
- Visual impact assessment

Technological (software) expertise

- Arc/Info and ArcGIS
- ArcView
- PlanetGIS
- Vistapro (virtual landscape rendering software)
- Various GIS support software packages and applications
- Range of Microsoft standard applications (including Microsoft Word/Excel/Access, etc.)

Awards

Award: Best South African Environmental Technical Paper
Awarded for: National Environmental Potential Atlas (ENPAT National)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1995

Award: Map Gallery Most Analytical Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1997 International ESRI User Conference

Award: Best Cartographic Map Gallery Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1998 International ESRI User Conference

Award: QDC Performance Award
Awarded for: ENPAT Development
Awarded by: Q Data Consulting
Date: 1998

Award: Best South African Environmental Technical Paper
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1998

Publications/maps featured in publications

Name: Environmental Potential Atlas for South Africa
Authors: W. van Riet, J. van Rensburg, P. Claassen, L. du Plessis and T. van Viegen
Publisher: J.L. van Schaik
Date: 1997

Name: ESRI Map Book (Volume 13)
Authors: Various
Publisher: Environmental Systems Research Institute (ESRI)
Date: 1998

Name: Pilanesberg Official Map and Park Guide
Authors: North-West Parks & Tourism Board and Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: KwaZulu-Natal - A celebration of biodiversity
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: Garden Route - Still Bay to Storms River (Discover the Magic)
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2003

Name: Lowveld and Kruger Guide

Authors: High Branching Team
Publisher: Jacana Media (Pty) Ltd
Date: 2004

Name: Heights to Homes to Oceans (H_2O) Water Wise information poster
Authors: Rand Water
Publisher: Rand Water
Date: 2004

Name: Kruger National Park Map and Photographic Guide
Authors: Andy Tinker Photography
Publisher: Andy Tinker Photography
Date: 2007

WORK EXPERIENCE/EMPLOYMENT DETAILS

GisLAB CC (Geographic Information Systems Laboratory - University of Pretoria)
Period: 4/1990 - 9/1997
Position: Member / Project Manager

GISBS (Geographic Information Systems Business Solutions - Q Data Consulting)
Period: 10/1997 - 10/1999
Position: Project Manager

MetroGIS (Pty) Ltd
Period: 11/1999 - to date
Position: Director / Project Manager

EDUCATION/QUALIFICATIONS

Degree: BA (University of Pretoria) Geography and Anthropology (Majors)
Other Subjects: Archaeology, Philosophy and Political Science
Date Received: 1993

PROJECTS SUMMARY
*(A brief description of **some** prominent and relevant projects)*

General projects

GIS mapping and database for Black Eagle habitats and flight patterns in the Karoo National Park

Environmental planning and development control schemes for the Drakensberg *Babangibone, Cathkin Peak and Garden Castle* development nodes

Goukou River (Stilbaai) Environmental Structure Plan

Conservation and open space proposals for the Umhlanga Forest

Grootvlei mine water pumping operation (Blesbokspruit sub-catchment)

GIS services for the Saldannah steel plant

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographic data

- ENPAT Northern Province (Limpopo Province)
- ENPAT Mpumalanga
- ENPAT North-West

ENPAT Metropolitan (1:50,000 scale GIS decision support systems) containing environmental and socio-economic geographic data that were evaluated for conservation opportunities, development constraints and agricultural constraints

- ENPAT Gauteng
- ENPAT Cape Town
- ENPAT Durban Functional Region (DFR)
- ENPAT Bloemfontein/Botshabello
- ENPAT Port Elizabeth

ENPAT National (1:1,000,000 scale GIS decision support system) and ENPAT publication

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Northern Province (Limpopo Province)
- EMF Mpumalanga
- EMF North-West

Spatial Development Initiatives (SDI). The fast tracking of the EMF concept for priority SDI's

- Lubombo Corridor SDI
- Coega Industrial Development Zone (IDZ)
- Wild Coast SDI
- West Coast Investment Initiative

Sigma colliery: North-West strip operation

Development masterplan for the Tswaing Crater Museum

Conservation plan for the Rietvlei Nature Reserve

GIS services for the planning and management of the Chobe National Park (Botswana)

GIS services for an environmental overview of South Africa

Demarcation/delineation of regions in South Africa

Orange-Vaal (ORVAAL) transfer scheme - Caledon cascades scheme

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographic data

- ENPAT Eastern Cape
- ENPAT Free State
- ENPAT Kwa-Zulu Natal

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active

identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Eastern Cape
- EMF Free State
- EMF Kwa-Zulu Natal

Hennops River EMF (environmental inventory and management proposals in Centurion)

The Important Bird Areas (IBA) of South Africa map and database

Centurion Metropolitan Substructure Environmental Management Framework (EMF)

Alexandra renewal project EMF

Carbon Sinks and Sequestration - Eastern Cape Wild Coast. Information maps for the "*Carbon Sinks - A Rehabilitation Option for South Africa's Natural Environment*" report

Prince Edward and Marion Islands. Maps for the World Heritage Site (WHS) bid document

Theewaterskloof and Genadendal - Integrated spatial data management system

Gauteng Communication Network Strategy (GAUCONS). Environmental zones for the control of the construction of telecommunication structures

Gauteng Industries Buffer Zones. The mapping of industrial and mining activities, the creation of buffer control zones and the development of a GIS-based decision support system for the Gauteng Province

Limpopo National Park (LNP) Mozambique. Base maps for fieldwork and planning

Schmidtsdrift Environmental Management Program Report (EMPR)

Loch Vaal Environmental Management Framework (EMF)

Rustenburg - Strategic Environmental Assessment (SEA). The creation of environmental control zones, a GIS-based decision support system and information poster

Faerie Glen Nature Reserve Strategic Environmental Assessment (SEA)

Willow Quarries - Environmental Impact Assessment (EIA). Modeling of mining expansion plan and the potential impact on Golden Mole habitats

Ekurhuleni Metropolitan Municipality (EMM) Environmental Management Framework (EMF)

Limpopo - State of the Environment Report (SoER)

Windhoek (Namibia) - Environmental Structure Plan (ESP)

Gauteng Supplementation and Implemetation of EIA Regulations Project (EIA SIP)

Siyanda District Municipality Environmental Management Framework (EMF)

Olifants and Letaba River Catchments Environmental Management Framework (EMF)

Regional Strategic Environmental Assessments (Regional Assessments)

Regional assessment for the Eskom Wind Energy Facility (Sere) in the Western Cape

Regional assessments for the Eskom Wind Integration Project (WIP)

- Area 1: West Coast (Saldanha to Garies)
- Area 2: Overberg Region
- Area 3: Beaufort West region
- Area 4: Eastern Cape (Tsitsikamma to Port Elizabeth)
- Area 5: Northern Cape (Hondeklipbaai to Port Nolloth)

Sandveld wind energy Regional Assessment

West Coast National Park (Saldanha area) Regional Assessment

Regional Assessment for the Theewaterskloof Municipal area

Brand-se-Baai (Exxaro) wind energy regional assessment

Overberg (BioTherm) wind energy regional assessments

- Area 1: Gordons Bay to Pearly Beach)
- Area 2: Napier RA (Agulhas NP/Swellendal region)

Suurplaat/Sutherland (Investec Wind Energy Development) Regional Assessment

Waterberg (Limpopo) Concentrating Solar Power (CSP) Regional Assessment (Exxaro)

Visual Impact Assessments (VIA), viewshed analyses and visual assessments
Some recent or current projects include:

- Coal strip mining in Zimbabwe viewshed analyses
- Viewshed analyses and sensitivity mapping for telecommunication masts in the northern provinces (Limpopo, Mpumalanga and North-West)
- Siemens 3rd license cellular communications infrastructure EIAs. Viewshed analyses and sensitivity mapping for over 4,000 telecommunication mast sites in all major metropolitan areas of South Africa.
- CSIR high mast viewshed analysis and sensitivity mapping
- Atlantis Open Cycle Gas Turbine power station VIA
- Kynoch Gypsum Tailings dam extension VIA
- N1 Western Bypass Shell service station VIA
- Coega regional hazardous waste processing facility VIA
- Robinson Deep landfill extension VIA
- Hazardous waste blending platform VIA
- Mercury-Ferrum-Garona transmission line integration VIA
- Matimba B (Medupi) coal-fired power station VIA
- Concentrating Solar Power (CSP) plant in Upington VIA
- Zeus to Mercury transmission line (comparative viewshed analyses)
- Mmamabula (Botswana) transmission line and power station viewshed analyses
- Petronet new multi-products pipeline VIA
- Wind energy facility (Sere) in the Western Cape province VIA
- Ankerlig power station conversion and transmission line VIA
- Gourikwa power station conversion and transmission line VIA
- Kyalami strengthening project VIA
- Steelpoort integration project VIA
- Medupi reservoir and telecommunication mast VIA
- Cookhouse wind monitoring masts VIA for a Basic Assessment Report
- Hopefield wind monitoring masts VIA for a Basic Assessment Report
- Amakhala wind monitoring masts VIA for a Basic Assessment Report
- Caledon, Worcester and Tulbach wind monitoring masts VIAs for Basic Assessment

Reports

- Overberg masts VIA for a Basic Assessment Report
- Britannia Bay wind monitoring mast VIA for a Basic Assessment Report
- Brand-se-Baai wind monitoring masts VIA for a Basic Assessment Report
- Deep River wind monitoring masts VIA for a Basic Assessment Report
- Happy Valley wind monitoring masts VIA for a Basic Assessment Report
- River Bank wind monitoring mast VIA for a Basic Assessment Report
- Uiekraal wind monitoring masts VIA for a Basic Assessment Report
- Beaufort West wind monitoring masts VIA for a Basic Assessment Report
- Laingsburg Wind monitoring masts VIA for a Basic Assessment Report
- Rheboksfontein, Suurplaat and West Coast wind monitoring masts VIAs for Basic Assessment Reports
- Cookhouse wind energy facility VIA
- Hopefield wind energy facility VIA
- Mokopane Integration Project VIA
- Cradle of Humankind World Heritage Site (WHS) viewshed protection zone, visual character assessment and visual zonation plan
- Proposed Indwe wind energy facility VIA
- Proposed Amakhala wind energy facility VIA
- Proposed Boontjieskraal wind energy facility VIA
- Proposed Britannia Bay wind energy facility VIA
- Proposed Brand-se-Baai wind energy facility VIA
- Proposed Upington and Pofadder solar thermal facilities VIAs
- Proposed Dorper wind energy facility VIA
- Proposed Flagging Trees wind energy facility VIA
- Proposed Rheboksfontein, Suurplaat and West Coast wind energy facilities VIAs
- Proposed Riverbank wind energy facility VIA
- Proposed Waterberg photovoltaic plant VIA
- Eskom wind intergration projects VIAs (current)
- Welgedacht water care works VIA

PROFESSIONAL AFFILIATIONS

Application for *Geographical Information Sciences (GISc) Professional Practitioner* submitted to (and currently under review by) The South African Council for Professional and Technical Surveyors (PLATO).

LANGUAGES

	Reading	**Writing**	**Speaking**
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

726 Wiedrigh st
Moreleta Park
0181

Cell: 082 – 565 4059
Tel: 012 – 004 0362
Fax 086 – 621 0292
E-mail: morne@menco.co.za
morne@eares.co.za

Morné de Jager

Personal Data

Identity Number	711221 5062 080
Date of Birth	21 December 1971
Sex	Male
Marital Status	Married, three children
Driver's license	Code 08
Nationality	South African
Home Language	Afrikaans (speak, read and write)
Other Languages	English (speak, read and write)
Higher Educational Qualifications	B.Ing (Chemical Engineering) [Pretoria University]
Previous Employment	JCI Wates Meiring and Barnard Department of Water Affairs and Forestry M2 Environmental Connections cc
Current Employment	Enviro-Acoustic Research cc

Short Resumé

Morné started his career in the mining industry as a bursar Learner Official (JCI, Randfontein), working in the mining industry, doing various mining related courses (Rock Mechanics, Surveying, Sampling, Safety and Health [Ventilation, noise, illumination etc] and Metallurgy. He did work in both underground (Coal, Gold and Platinum) as well as opencast (Coal) for 4 years. He changed course from Mining Engineering to Chemical Engineering after his second year of his studies at the University of Pretoria.

After graduation he worked as a Water Pollution Control Officer at the Department of Water Affairs and Forestry for two years (first year seconded from Wates, Meiring and Barnard), where duties included the perusal (evaluation, commenting and recommendation) of various regulatory required documents (such as EMPR's, Water Licence Applications and EIA's), auditing of licence conditions as well as the compilation of Technical Documents.

Since leaving the Department of Water Affairs, Morné has been in private consulting for the last 15 years, managing various projects for the mining and industrial sector, private developers, business, other environmental consulting firms as well as the Department of Water Affairs. During that period he has been involved in various projects, either as specialist, consultant, trainer or project manager, successfully completing these projects within budget and timeframe. During that period he gradually moved towards environmental acoustics, focusing on this field exclusively since 2007.

He has been interested in acoustics as from school days, doing projects mainly related to loudspeaker design. Interest in the matter brought him into the field of Environmental Noise Measurement, Prediction and Control. He has been doing work in this field for the past 8 years, and was involved with the following projects in the last few years:

Project Experience – Acoustics

Wind Energy Facilities	*Full Environmental Noise Impact Assessments for - Bannf (Vidigenix), iNCa Gouda (Aurecon SA), Kangnas (Aurecon), Plateau East and West (Aurecon), Wolf (Aurecon), Outeniqwa (Aurecon), Zen (Savannah Environmental – SE), Goereesoe (SE), Springfontein (SE), Garob (SE), Project Blue (SE), ESKOM Kleinzee (SE), Walker Bay (SE), Oyster Bay (SE), Hidden Valley (SE), Happy Valley (SE), Deep River (SE), Tsitsikamma (SE), AB (SE), West Coast One (SE), Hopefield II (SE), Namakwa Sands (SE), VentuSA Gouda (SE), Dorper (SE), Amakhala Emoyeni (SE), Klipheuwel (SE), Cookhouse (SE), Cookhouse II (SE), Rheboksfontein (SE), Suurplaat (SE), Karoo Renewables (SE), Koningaas (SE), Eskom Aberdene (SE), Spitskop (SE), Castle (SE), Khai Ma (SE), Poortjies (SE), Korana (SE), IE Moorreesburg (SE), Saldanha (Terramanzi), Loeriesfontein (SiVEST), , Rhenosterberg (SiVEST), Noupoort (SiVEST), Prieska (SiVEST), Canyon Springs (Canyon Springs), Msenge Emoyeni (Windlab), Gunstfontein (SE), Komsberg (ARCUS), Umsinde Emoyeni (ARCUS), Dwarsrug (SiVEST)*
Mining and Industry	*Full Environmental Noise Impact Assessments for - BECSA – Middelburg (Golder Associates), Kromkrans Colliery (Geovicon Environmental), SASOL Borrow Pits Project (JMA Consulting), Lesego Platinum (AGES), Tweefontein Colliery (Cleanstream), Evraz Vametco Mine and Plant (JMA), Goedehoop Colliery (Geovicon), Hacra Project (Prescali Environmental), Der Brochen Platinum Project (J9 Environment), Delft Sand (AGES), Brandbach Sand (AGES), Verkeerdepan Extension (CleanStream), Dwaalboom Limestone (AGES), Jagdlust Chrome (MENCO), WPB Coal (MENCO), Landau Expansion (CleanStream), Otjikoto Gold (AurexGold), Klipfontein Colliery (MENCO), Imbabala Coal (MENCO), ATCOM East Expansion (Jones and Wagner), IPP Waterberg Power Station (SE), Kangra Coal (ERM), Schoongesicht (CleanStream), EastPlats (CleanStream), Chapudi Coal (Jacana Environmental), Generaal Coal (JE), Mopane Coal (JE), Glencore Boshoek Chrome (JMA), Langpan Chrome (PE), Vlakpoort Chrome (PE), Sekoko Coal (SE), Frankford Power (REMIG), Strahrae Coal (Ferret Mining), Transalloys Power Station (Savannah), Pan Palladum Smelter, Iron and PGM Complex (Prescali), Fumani Gold (AGES), Leiden Coal (EIMS), Colenso Coal and Power Station (SiVEST/EcoPartners), Klippoortjie Coal (Gudani), Rietspruit Crushers (MENCO), Assen Iron (Tshikovha), Transalloys (SE), ESKOM Ankerlig (SE), Pofadder CSP (SE), Nooitgedacht Titano Project (EcoPartners), Algoa Oil Well (EIMS), Spitskop Chrome (EMAssistance), Klippoortjie Coal (Gudani), Vlakfontein South (Gudani), Leandra Coal (Jacana), Grazvalley and Zoetveld (Prescali), Tjate Chrome (Prescali), Langpan Chromite (Prescali), Vereeniging Recycling (Pro Roof), Meyerton Recycling (Pro Roof), Hammanskraal Billeting Plant 1 and 2 (Unica)*
Road and Railway	*K220 Road Extension (Urbansmart), Boskop Road (MTO), Sekoko Mining (AGES), Davel-Swaziland-Richards Bay Rail Link (Aurecon), Moloto Transport Corridor Status Quo Report and Pre-Feasibility (SiVEST), Postmasburg Housing Development (SE), Tshwane Rapid Transport Project, Phase 1 and 2 (NRM Consulting/City of Tshwane), Transnet Apies-river Bridge Upgrade (Transnet), Gautrain Due-diligence (SiVest), N2 Piet Retief (SANRAL)*
Airport	*Oudtshoorn Noise Monitoring (AGES), Sandton Heliport (Alpine Aviation), Tete Airport Scoping*
Noise monitoring	*Peerboom Colliery (EcoPartners), Thabametsi (Digby Wells), Doxa Deo (Doxa Deo), Harties Dredging (Rand Water), Xstrata Coal – Witbank Regional (Xstrata), Sephaku Delmas (AGES), Amakhala Emoyeni WEF (Windlab Developments), Oyster Bay WEF (Renewable Energy Systems), Tsitsikamma WEF (Cennergi and SE), Hopefield WEF (Umoya), Wesley WEF (Innowind), Ncora WEF (Innowind), Boschmanspoort (Jones and Wagner), Nqamakwe WEF (Innowind), Hopefield WEF Noise Analysis (Umoya), Dassiesfontein WEF Noise Analysis (BioTherm), Transnet Noise Analysis (Aurecon), Jeffries Bay Wind Farm (Globeleq), Sephaku Aganang (Exigo), Sephaku Delmas (Exigo), Beira Audit (BP/GPT), Nacala Audit (BP/GPT), NATREF (Nemai), Rappa Resources (Rayten)*
Small Noise Impact Assessments	*TCTA AMD Project Baseline (AECOM), NATREF (Nemai Consulting), Christian Life Church (UrbanSmart), Kosmosdale (UrbanSmart), Louwlardia K220 (UrbanSmart), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Slag Milling Plant (AGES), Arcelor Mittal WEF (Aurecon), RVM Hydroplant (Aurecon), Grootvlei PS Oil Storage (SiVEST), Rhenosterberg WEF, (SiVEST), Concerto Estate (BPTrust), Ekuseni Youth Centre (MENCO), Kranskop Industrial Park (Cape South Developments), Pretoria Central Mosque (Noman Shaikh), Soshanguve Development (Maluleke Investments), Seshego-D Waste Disposal (Enviroxcellence), Zambesi Safari Equipment (Owner), Noise Annoyance Assessment due to the Operation of the Gautrain (Thornhill and Lakeside Residential Estate), Upington Solar (SE), Ilangalethu Solar (SE), Pofadder Solar (SE), Flagging Trees WEF (SE), Uyekraal WEF (SE), Ruuki Power Station (SE), Richards Bay Port Expansion (AECOM), Babalegi Steel Recycling (AGES), Safika Ladium (AGES), Safika Cement Isando (AGES), RareCo (SE), Struisbaai WEF (SE), Perdekraal WEF (ERM), Kotula Tsatsi Energy (SE), Olievenhoutbosch Township (Nali)*
Project reviews and amendment reports	*Loperberg (Savannah), Dorper (Savannah), Penhoek Pass (Savannah), Oyster Bay (RES), Tsitsikamma (Cennergi), Amakhala Emoyeni (Windlab), Spreeukloof (Savannah), Spinning Head (SE), Kangra Coal (ERM), West Coast One (Moyeng Energy), Rheboksfontein (Moyeng Energy), De Aar WEF (Holland)*

INFOTOX (Pty) Ltd

2001/000870/07

Retrieval and scientific interpretation of ecotoxicological information

PostNet Suite 112 Private Bag X25723 Monumentpark 0105 SOUTH AFRICA

Tel: 27(12) 346 4668 Fax: 086 513 5478 Cell: 082 416 5864

e-mail: Info@infotox.co.za www.infotox.co.za

Name of Firm:	INFOTOX (Pty) Ltd	**Name of Staff:**	Marlene (Martha Helena) Fourie
Years with Firm:	20	**Profession:**	Toxicological Scientist
Date of Birth:	19/09/1964	**Nationality:**	South African
Professional Registration	• The South African Council for Natural Scientific Professions (SACNASP): Professional Natural Scientist (Pr Sci Nat) Toxicological Science, No 400190/14		
Membership of Professional Societies:	• Toxicology Society of South Africa (TOXSA)		
Detailed Tasks Assigned:	Environmental Human Health Risk Assessment according to: • Hazard assessment of relevant chemical substances • Exposure assessment of human receptor communities • Dose-response assessment • Noncancer (systemic) human health risk quantification • Cancer risk quantification, if applicable • Risk characterisation		
Key Qualifications:	• BSc (Biochemistry), University of Stellenbosch, 1985. • BSc (Hons) (Biochemistry), University of Stellenbosch, 1986. • MSc (Reproductive Biology), University of Pretoria, 1996. • PhD (Reproductive Biology), University of Pretoria, 1999. • MSc (Epidemiology), University of Pretoria, 2009.		
Employment record:	• Medical Natural Scientist at the Andrology Unit, Department of Urology, University of Pretoria and the Pretoria Academic Hospital, 1987 to 2001. Duties were laboratory and toxicological research to conduct technique development with the aim of improving the diagnosis and treatment of male infertility. • Toxicological Scientist, INFOTOX (Pty) Ltd, 2001 to present. Duties are environmental human health risk assessment and impact assessment, assessment of effects of environmental contaminants on domestic animal and wildlife health and welfare, hazard classification of chemical substances and waste according to the United Nations Globally Harmonised System for Hazard Classification and Labelling of Chemical Substances.		
Selected experience:	Dr Fourie is a registered Professional Natural Scientist (Pr Sci Nat, Toxicological Science). She has specialised in environmental toxicology, human health risk assessment and human health impact assessments. Dr Fourie is also competent in other areas of expertise including epidemiology, community health baseline assessments, data processing, statistical interpretation of analytical data, radionuclide risk assessment and chemical hazard classification according to international criteria. Dr Fourie has in-depth practical experience in the assessment of health risks associated with exposure to the criteria air pollutants and other airborne		

	toxicants. She is proficient in health-risk based contaminated site investigations with single- or multi-pathway risk assessment of contaminated soil, water and food. Clarification of the association and causality of exposure to toxic substances and the manifestation of adverse health effects in communities is a key competence of INFOTOX. Dr Fourie has conducted community health risk assessments for a wide range of exposures associated with airborne emissions from industries. This includes acute-duration exposures (e.g., hydrogen sulfide, ammonia, hydrogen fluoride) and chronic exposures to systemic toxicants and carcinogens. She has experience in dioxin risk assessment and assessment of hazards in the category Unknown or Variable Composition, Complex Reaction Products or Biological Materials (UVCB) group, which is characteristic of petroleum industries. Dr Fourie has also conducted Rapid Appraisal Health Impact Assessments (RAHIAs), according to the Good Practice guidance of the International Finance Corporation (IFC), a member of the World Bank Group. She has extensive experience in full community health risk assessments, including quantitative food chain health risk assessment, based on soil or water contamination, uptake into food commodities and assessment of health risks based on food consumption rates characteristic of particular communities. Dr Fourie has extensive experience in the application of SANS 10234 and has completed the UNITAR training course on GHS classifications. She has conducted classifications for many waste streams of organic and inorganic nature, new veterinary medicines, agricultural products, and more. Full-time participation in INFOTOX projects has been on a continuous basis since 2002 to the present date.
Publications and Conferences	• Due to the confidential nature of work done for clients, unfortunately, few of the client reports illustrating professional competence in Toxicology are available in the public domain. • Conferences are attended on a regular basis as required for SACNASP registration.
Certification:	I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describes me, my qualifications and my experience.  November 2021

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CURRICULUM VITAE

Dr WCA VAN NIEKERK (April 2021 Rev 1.0)

Dr Willie van Niekerk holds BSc, Hons BSc and MSc degrees from the University of Potchefstroom (South Africa), and a PhD from the University of South Africa. He is the Managing Director of INFOTOX (Pty) Ltd. INFOTOX is a specialist company in the discipline of Health Sciences. Dr Van Niekerk is a Qualified Environmental Professional (QEP)[1], Environmental Toxicologist, certified by the Institute of Professional Environmental Practice (IPEP) in the USA, and a registered Professional Natural Scientist (Pr Sci Nat, Environmental Science) in South Africa. He has specialised in environmental toxicology and health risk assessment, but has experience in many other areas in the disciplines of analytical and environmental sciences, including radionuclide risk assessment. Among these are health-risk based contaminated land investigations, the assessment of exposure to the criteria air pollutants and other airborne toxicants, sampling and chemical analysis of soil, water and other materials for industrial or environmental characterisation, statistical interpretation of analytical data, and the development of quality assurance documentation for scientific studies. Clarification of the association and causality of exposure to toxic substances and the manifestation of adverse health effects in communities is a key competence of INFOTOX.

[1] The Qualified Environmental Professional (QEP) certification is the first and only credential of its kind in the USA. It is a multi-media, multi-disciplinary, board-certified credential that requires environmental professionals to view “the big picture” and to have the skills and knowledge to resolve “real world problems”. It is international in scope and has received accreditation by the Council of Engineering and Scientific Specialty Boards (CESB). The CESB is an independent organization which accredits engineering, scientific, and technology certification programs. The QEP certification is now recognized by the Board for Global EHS Credentialing.

It is notable that Dr Van Niekerk wrote a chapter on human and wildlife risk assessment in the Risk Assessment Manual for Abandoned Mines in Namibia, which was funded by the German Federal Ministry for Economic Cooperation and Development, through the Federal Institute for Geosciences and Natural Resources. The project was coordinated under the Ministry of Mines and Energy of the Government of the Republic of Namibia. INFOTOX also conducted an assessment of reproductive effects of sulfur dioxide on commercial wildlife farming, and the health effects of chlorine on domestic animals.

Cancer risks are quantified and non-cancer risks are interpreted for acute and chronic exposure to hazardous substances. Quantitative exposure assessment and an understanding of the toxicology and mode of action of hazardous chemicals and mixtures of chemicals are fundamental in the health risk assessment approach.

Dr Van Niekerk has extensive experience in waste hazard assessment, treatment and disposal. He has conducted assessments of waste treatment and destruction such as pyrolysis followed by high-temperature oxidation, burning of waste as alternative fuel in cement kilns, and waste incineration. He has pertinent experience in the assessment of formation of dioxins and other products of incomplete combustion in waste combustion processes, and the multi-pathway assessment of exposure and health risks associated with exposure to these hazardous substances.

He is a specialist in risk-based classification of mining and processing wastes and has carried out many site-specific investigations in this field.

As part-time Professor in Vista University in Pretoria, he lectured for three years on the chemistry and toxicology of hazardous waste.

Dr Van Niekerk has worked with several law firms on environmental health risk projects and has acted as expert witness in litigation cases. Dr Van Niekerk assisted Dr Marlene Fourie of INFOTOX in preparing health-risk based defense of class actions on behalf of law firms in London. He is currently conducting a number of health risk assessment projects under legal privilege. Several of these studies are structured in anticipation of potential class actions.

QUALIFICATIONS

- BSc (Chemistry), Potchefstroom, 1965.
- Hons BSc (Chemistry), Potchefstroom, 1966.
- MSc (Chemistry), Potchefstroom, 1967.
- PhD (Chemistry), UNISA, 1973.
- QEP (Qualified Environmental Professional), IPEP, USA, 1996.

Other training programmes:

- Time Management Training, DIMENCI, 1982.
- Selling: Getting Down to Basics and Selling: Without Seeing, Chris Penman, UK (presented in Johannesburg).
- Performance Appraisal Management, DIMENCI, 1983.
- Introspection, DIMENCI, 1983.
- Recession Survival, Johan Coetzee Consultants, 1983.
- Management of Conflict, AEC, 1985.

- Situation Leadership, Leadership Studies Productions, CA (presented in Pretoria), 1986.
- Selective Analysis of Ideas, Sales Analysis Institute, USA (presented in Pretoria), 1986.
- Principles of Marketing, UNISA, 1989.
- Rational Management, Kepner Tregoe, 1990.
- Strategic Thinking for Strategic Planning, The Pacific Institute Inc, USA (presented in Pretoria), 1991.
- Effective Communication of Health Risks, Air & Waste Management Association, Denver CO, 1993.
- Management of Technology, University of Stellenbosch, 1995.
- Implementation of ISO 14000 in Environmental Management, Air & Waste Management Association, Nashville TE, 1996.

CAREER HISTORY

- Soil and Irrigation Research Institute, 1968 to 1971.
- Atomic Energy Board, 1971 to 1982.
- SMM Instruments, 1982 to 1984.
- Atomic Energy Corporation, 1984 to August 1997.
- INFOTOX, 1997 onwards (Managing Director).

INTERNATIONAL EXPERIENCE

- Illinois Institute of Technology, Chicago, 1980: Visiting scientist, participated in Love Canal environmental pollution studies.
- Visited research institutes and other organisations in the USA, England, Belgium, The Netherlands, Germany, Switzerland and Italy. Visits relating specifically to environmental sciences and technologies:
- United Nations, Geneva, 1991.
- RIVM, The Netherlands, 1991.
- Sever Trent Water, England, 1991.
- Battelle, Columbus, Ohio, 1993.
- University of Illinois at Chicago, USA, 1993, 1996
- USA Geological Survey, Virginia, USA, 1993.
- Triangle Laboratories, North Carolina, USA, 1993.
- USEPA, Cincinnati, Ohio, USA, 1996.
- TERA, Cincinnati, Ohio, 1996.
- USEPA, Cincinnati, Ohio, USA, 1997.
- TERA, Cincinnati, Ohio, 1997.

PROFESSIONAL INSTITUTIONS

- Member of the South African Chemical Institute (SACI), Council member 1987 to1988 and 1992 to 1993, Chairman of Northern Transvaal Section 1992 to 1993, member of committee, 1980 to 1995. Active member until 1996.

- Founder member of the South African Association for Mass Spectrometry (SAAMS), first chairman and member of the committee, 1981 to 1991. Active member until 1996.
- Member of the Chromatography Association of South Africa (ChromSA). Active member until 1996.
- Member of the National Association for Clean Air (NACA).
- Member of the Toxicology Society of South Africa (TOXSA).

CEDAR TOWER
SERVICES

CURRICULUM VITAE

Jenna Lavin

Tel: 083 619 0854 (c); 013 0131 (w)
E-mail address: jenna.lavin@cedartower.co.za
ID number: 8512050014089

EDUCATION:

Tertiary

2014 -	M.Phil in Conservation of the Built Environment (University of Cape Town) Ongoing - expected to graduate in 2015
2011	Continued Professional Development Course in Urban Conservation Management (University of Cape Town) Part I and Part II
2010	M.Sc. with Distinction in Archaeology (University of Cape Town) Title: *Palaeoecology of the KBS member of the Koobi Fora Formation: Implications for Pleistocene Hominin Behaviour*.
2007	B.Sc. Honours in Archaeology (University of Cape Town) Title: *The Lost Tribes of the Peninsula: An Investigation into the historical distribution of Chacma baboons (Papio ursinus) at the Cape Peninsula, South Africa.* Koobi Fora Field School, Rutgers University (U.S.A.)/ National Museums of Kenya
2006	B.Sc. Archaeology (University of Cape Town) B.Sc. Environmental and Geographic Science (University of Cape Town)

Secondary

1999-2003	Rustenburg High School for Girls Firsts in English, Afrikaans, Mathematics HG, Biology HG, History HG, Entrepeneurship.

CEDAR TOWER
SERVICES

EMPLOYMENT HISTORY:

PROFESSIONAL DEVELOPMENT
Environmental and Heritage Management:

- Head of Heritage Operations for Heritage CTS Consultants and member of OpenHeritage NPC.
  July 2016 to present

- Assistant Director for Policy, Research and Planning at Heritage Western Cape.
  August 2014 to June 2016

Responsibilities include drafting of new heritage related policy, the grading and declaration of Provincial Heritage Sites, the development of Conservation Management Plans, facilitating the development of inventories of heritage resources through local authorities as well as managing the development of the Western Cape's Heritage Information Management System (HIMS).

Acting Deputy Director from April to December 2015.

- Heritage Officer for Palaeontology and for the Mpumalanga Province at the South African Heritage Resources Agency (SAHRA).
  January 2013 to June 2014

Responsibilities include dealing with palaeontological permit applications in terms of Section 35 of the NHRA and development applications in terms of Section 38 of the NHRA. Projects included the development of a National Palaeotechnic Report identifying significant palaeontological deposits throughout SA, as well as developing professional relationships between SAHRA and the Palaeontological Society of South Africa (PSSA) and the Geological Society of South Africa (GSSA). During this time, I was part of the team that developed the digitised National Palaeontological Sensitivity Map (http://www.sahra.org.za/about/news/nov2013/palaeosensitivitymap), the first of its kind in the world.

- Heritage Officer for Archaeology, Palaeontology and Meteorites at Heritage Western Cape (HWC).
  September 2010 to December 2012

HWC is a Public Entity that forms part of the Heritage Resource Management Component of the Provincial Governments' Department of Cultural Affairs and Sport (DCAS). Projects included the declaration of Pinnacle Point and the West Coast Fossil Park as Provincial Heritage Sites (PHS), the management of the development of the Baboon Point PHS Conservation Management Plan as well as an educational outreach program as part of the DCAS MOD Centre Project.

- Heritage Officer for the Archaeology, Palaeontology and Meteorites Unit of the South African Heritage Resources Agency (SAHRA) as part of a three month contract.
  January 2010 to March 2010

- Environmental Control Officer, Amathemba Environmental Management Consulting
  Part time: 2007 to 2009

Other

My private experience as a traveler in South Africa, Tanzania, Kenya, Namibia, Zambia, Malawi and Mozambique has inspired a passion for the conservation of environmental and heritage resources. I am passionate about sustainable living, with my Bachelor of Science in Environmental and Geographical Science providing a framework on which to base my values.

With a friend, I established the fundraising initiative, Chicks4Change, through which we managed to organize a number of successful events and raise R40 000 for Project Rhino to assist with anti-poaching initiatives.

In 2013 I was asked to join the panel of judges for the Ministerial awards for Heritage in the Western Cape. From 2013 to July 2014, I was a member of the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee. In July 2014, I presented at the Conference for the Palaeontological Society of South Africa on the use of GIS in the management of palaeontological resources in the face of increased development pressures. In April 2015 I participated in a conference on Landscape Archaeology hosted by the Leakey Foundation in San Fransisco, presenting on the management of archaeological landscapes in South Africa. In April 2016, I presented at the ICAHM Conference in Salalah, Oman on the management of archaeological heritage in South Africa.

In November 2013, I was awarded a bursary from the Department of Arts and Culture to complete the Masters in Philosophy in Conservation of the Built Environment through the UCT Faculty of Engineering and the Built Environment in 2014 and 2015.

I am a paid up member of the Association for Southern African Professional Archaeologists (ASAPA), the Association of Professional Heritage Practitioners (APHP), the Palaeontological Society of South Africa (PSSA) and ICOMOS South Africa, for which I am Vice-President of the Board. I am also a member of the International Committee for Archaeological Heritage Management (ICAHM).

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

MICHAEL PAUL OBERHOLZER

Proposed Position: Risk Assessor

Name of Company: RISCOM (PTY) LTD

Name of Staff: Michael Paul Oberholzer

Profession: Chemical Engineer

Date of Birth: 20 August 1959

Years with Company: 20

Nationality: South African

Membership in Professional Societies:

- Registered Professional Engineer (Registration No.: 910085) with the Engineering Council of South Africa
- Member of the South African Institute of Chemical Engineers
- Charted Chemical Engineer Institute of Chemical Engineers (UK) (Registration No: 20561539)
- Approved Inspection Authority for Major Hazard Installation (MHI) Risk Assessments, South Africa
- Technical Steering Committee for Risk Assessments

Key Qualifications:

Michael Oberholzer is currently director of RISCOM. He is a registered professional engineer and holds a BSc (Chemical Engineering) from the University of the Witwatersrand (1982). Mike has over 20 years of experience with Dow chemicals and Sentrachem in all aspects of project implementation. This includes Process Engineering Manager, Project Manager and Commissioning Manager. Since leaving Dow, Mike has concentrated on process safety and has completed a number of risk assessments studies and process hazard analyses in various industries, including assignments in the chemical, petrochemical, agrochemical, mining, offshore oil and gas and food industries.
A selection of relevant projects is included in the following sections.

NUCLEAR

2008 to present	Safety report for marine and land-based incidents for proposed nuclear sites
2008	Safety report for aircraft accidents into nuclear facility
2008	Appointed to conduct risk assessment of fuel plant, Pelindaba
2006	Risk assessment of tank farm for PBNR
2005	Consequence analysis of fuel plant layout, Pelindaba
2003–2005	Chairman of HAZOP studies for PBNR

LNG

Lead Process Engineer for quantitative risk assessment of:

2020	Importation and Distribution of liquid natural gas (LNG) into the COEGA SEZ
2020	The proposed Tema terminal from LNG to VRA in Ghana, West Africa
2020	LNG importation, storage and transportation for SRK
2020	LNG importation, storage and power production for SE Solutions
2020	LNG based power plant for Mulilo
2014	LNG importation and storage facilities for the CSIR in the Western Cape
2016	LNG based power plant, Western Cape
2016	LNG importation and transportation for Delta Natural Gas

OIL AND GAS

Lead Process Engineer for quantitative risk assessment of:

2021	The Puma Energy Depot at Walvis Bay, Namibia
2021	The Proposed Novo LNG Hub at the Highveld Industrial Park near Emalahleni, Mpumalanga Province
2021	MHI risk assessment of the Sunrise Energy LPG overland pipeline at Saldanha Bay
2021	MHI risk assessment of the Sunrise Energy LPG terminal at Saldanha Bay
2021	MHI risk assessment of the OTMS Pipelines at Saldanha Bay, Western Cape
2019	Fire risk assessment for SamCol, Mozambique
2019	Occupied building risk assessment for Tema Fuel Company, Ghana
2019	Fire risk assessment for Thebe Unico, Durban
2019	LPG pipeline changes as part of the Port of Berbera, Somiland
2017	Fire risk assessment for condensate tanks, Kenya
2015	A natural gas pipeline for the Transnet in Durban North
2014	LNG facilities for the CSIR in the Western Cape
2014	CNG overland pipeline in Groutville, KwaZulu-Natal
2013	LPG installations for NGK, Cape Town
2013	LPG installations for Easigas (Port Shepstone)
2013	LPG installations for Sunrise Energy in Saldanha Bay
2012	LPG installations for Trellidor, Durban
2011	LPG installations for Afripak, Durban
2010–2011	LPG installations for Monsanto, Brits and Groblersdal
2010	LPG installations for Air Liquide
2009	A compressed natural gas plant, Gauteng
2004-2005	The Egoli Gas depots in Langlaagte and Cottesloe

Lead Process Engineer for:

2006	An emergency plan and oil spill contingency for Petronas, with regards to offshore drilling (Mozambique)
2006	Determination of hazardous areas from releases of H_2S from vents and pipelines
2005	Flare studies for Total facilities in Angola The studies consisted of calculating the radiation from flares at various locations and the subsequent evaluation of the safety distances from the flares The studies included air dispersion for H_2S in the event of flameout

TANK FARM AND FLAMMABLE STORAGE AND TRANSPORTATION

Lead Process Engineer for quantitative risk assessment of:

2021	MHI risk assessment of the Cape Ocean terminal at the Saldanha Bay IDZ
2021	MHI risk assessment of the Bayer facility in Brits, North West
2021	75 MW thermal dual fuel facility near Kathu, Northern Cape
2020	Ola Energy LPG Terminal in Mombasa, Kenya
2020	X-Storage facility in Beira, Mozambique
2020	MHI risk assessment of the Saldehco Pipelines in Saldanha Bay, Western Cape
2020	MHI risk assessment for the Teraco data centre in Brackengate, Cape Town
2020	MHI risk assessment for the Amazon data centre in Atlantic Hills, Cape Town
2020	MHI risk assessment for the Amazon data centre at the Film Studios, Cape Town
2020	MHI risk assessment for the Amazon data centre in Brackengate, Cape Town
2019	EIA risk assessment for new tank farm, Coega
2019	MHI risk assessment for OTGT, Coega
2018	Bulk tank farm and LPG facility at Coega
2018	LPG facility for Monsanto at Brits
2017	New fuel depot and import pipeline at Durban
2017	New fuel depot at Alrode
2017	Fire risk assessment at fuel storage tanks, KwaZulu Natal
2017	LPG and liquid tank farm in Tema, Ghana
2017	LPG facility in Kenya
2016	The OTGC facility in Cape Town
2016	LPG facility for Monsanto at Groblersdal
2015	A bulk crude-oil tank farm for Oil tanking MOGS in Saldanha Bay
2014	The First Rand Bank data centre facilities in Pretoria and Johannesburg
2014	The Vopak facility in the Island View Complex in Durban
2014	The Econ Oil facility in Marble Hall, Limpopo
2014	An occupied building risk assessment of BP facilities in Mozambique
2013	The Air BP facility in East London
2013	A crude storage facility at Saldanha Bay
2013	VSAD Terminal Lesedi at Heidelberg
2012	Kenmare Moma Mine in Mozambique
2012	Golder Africa study for tank farm (LPG and other fuels) near Heidelberg, Gauteng
2012	CSIR study for tank farm (LPG and other fuels) at Coega, Eastern Cape
2011-2012	BP fuel depots at Langlaagte and Pretoria
2010	Transnet Pipelines fuel depots around South Africa
2008	Multi-product tank farms in the Island View Complex in Durban
2007	Petroleum tank farm in the Western Cape
2005	An overland pipeline near Mossel Bay
2005	Holcim waste fuel blending
2004	Petroleum tank farms in Island View Complex in Durban and the Western Cape

WAREHOUSING

Lead Process Engineer for quantitative risk assessment of:

2020	MHI risk assessment for the Arch Wood protection facility in Port Shepstone
2017	Warehouse for Lonza, Chloorkop
2017	Storage of hazardous goods at Umbogintwini, KwaZulu Natal
2017	Storage of hazardous goods, Johannesburg

POWER PLANTS

Lead Process Engineer for quantitative risk assessment of:

2021	The proposed Impofu Wind Farm battery storage (West) near Clarkson
2021	The proposed Impofu Wind Farm battery storage (North) near Clarkson
2021	The proposed Impofu Wind Farm battery storage (East) near Oyster Bay
2021	Mulilo Total gas to power plant at the Coega SEZ
2021	Engie gas to power plant at the Coega SEZ
2021	320 MW Phinda Power plant at Richards Bay, KwaZulu Natal
2020	Newcastle gas engine power plant at Newcastle, KwaZulu Natal
2020	315 MW Gas engine power plant at Saldanha Bay
2020	200 MW Gas-to-Power plant at Atlantis, Western Cape
2020	1000 MW Gas-to-Power plant Zone 13 at Coega, Eastern Cape
2020	1000 MW Gas-to-Power plant Zone 10 (North) at Coega, Eastern Cape
2020	1000 MW Gas-to-Power plant Zone 10 (South) at Coega, Eastern Cape
2020	MHI risk assessment of the Richards Bay Gas power 2 plant in Richards Bay
2020	The proposed Coal to Urea project at EMalahleni, Mpumalanga
2020	The proposed Nseleni Independent floating power plant at the port of Richards Bay
2018	EIA risk assessment for new power plant, Richards Bay
2016	LNG based power plant, Western Cape
2015	An Eskom power plant in the Free State
2013	A refurbished power plant in Maputo, Mozambique
2012	Matla power station in the Witbank areas
2012	Energy recovery project for Anglo American
2010	Coal-based power plants in the Witbank areas
2009	Coal-based power plants in the Waterberg areas
2008	Proposed gas-fired power plants in Mozambique
2008	The conversion of the peaking power to a CCGT plant located at Atlantis, Western Cape
2006	Coal-based power plants near Witbank and Vaal South
2006	Proposed peaking power plants in KZN and Eastern Cape
2006	The expansion of the peaking power plant located at Atlantis, Western Cape
2005	The EcoElecrica Independent Power Generation Project at Mittal Steel in Vanderbijlpark
2004	Iscor Power Project at Vanderbijlpark

FOODS AND BEVERAGES

Lead Process Engineer for quantitative risk assessment of:

2021	MHI risk assessment of the Chill Beverages International facility in Stellenbosch
2017	Johnson & Johnson static ignition study, in Cape Town
2014-2016	The Spar distribution centres in the South Rand, North Rand, Western Cape and Eastern Cape
2015	A soya crushing facility for Russell Stone Protein in Bronkhorstspruit
2014	The Sasko Bakery facility in Bloemfontein
2014	The Peninsula Beverage Company facility in Cape Town
2014	The Chill Beverages International facility in Stellenbosch
2014	The Kynoch fertilizer facility in Endicott, Gauteng
2013-2014	The Coca-Cola Fortune facilities in Port Elizabeth, Port Shepstone and Polokwane
2013	The Quantum Food chicken processing plant at Hartesbeesfontein
2013	The ABI bottling facility in Johannesburg reviewed
2013	The new Unilever ice cream factory facilities at Chloorkop
2011	The Rainbow Chickens processing plant, Rustenburg
2010	The Famous Brands facility in Midrand
2010	The McCain Foods facility in George
2010	The Coca-Cola Canners facility in Germiston
2005	The ABI bottling facilities in Johannesburg, Midrand and Pretoria

CHEMICALS AND MANUFACTURING

Lead Process Engineer for quantitative risk assessment of:

2022	MHI risk assessment of the Lanxess Facility in Merebank, Durban
2022	MHI risk assessment of the Dow Chemicals in New Germany, KwaZulu Natal
2022	MHI risk assessment of the Isegen Facility at Isipingo, KwaZulu Natal
2021	MHI risk assessment of the FFS refiners' facility in Prospecton, KwaZulu Natal
2021	MHI risk assessment of the Belgotex Floorcoverings LPG Installation in Pietermaritzburg, KwaZulu Natal
2021	MHI risk assessment of the Emalahleni Water Reclamation Plant
2021	The Caustic Soda Make-up Plant in Chloorkop, Kempton Park
2021	MHI risk assessment for the Tweefontein water reclamation plant located near Ogies
2020	MHI risk assessment for Foskor, KwaZulu Natal
2019	MHI risk assessments for Isegen, Durban and Germiston.
2017	Relocation of chemical plant from Port Shepstone to Cato Ridge
2016	A-Gas storage and handling facility in Cape Town
2016	NCP chlor-alkali facility at Chloorkop
2016	The Arch Water Products facility at Chloorkop
2015	Two SA Calcium Carbide facilities in KwaZulu-Natal
2015	The Arch Wood Protection facility in Port Shepstone
2015	The Arengo ethanol plant in Cradock
2015	A water reclamation facility at the Optimum Colliery in Mpumalanga
2014	The Foskor facility in Richards Bay
2013	The Eagle Inks facility in Pinetown
2013–2016	New bio-generation plants converting animal waste to electricity
2013	The Unilever facility in Phoenix, Durban
2013	A rapid wall facility in Richards Bay
2013	The Transnet Rail Engineering facilities in Germiston and Uitenhage
2012	The BAE Systems Land Systems facility in Alrode
2012	The CONSOL Glass facility in Nigel
2012	An ArcelorMittal polyurethane facility
2012	Isegen facilities at Durban and Germiston
2012	A MAP plant in Richards Bay
2012	An occupied building risk assessment and hazardous area classification for Synthomer, Durban
2012	New hydrogen fluoride and aluminum fluoride plant in Richards Bay
2012	The Chevron lubricant manufacturing facility
2011	Steel plant in Witbank
2011	Steel plant in Saldanha Bay
2011	Platinum refinery in Springs
2011	New hydrogen fluoride and aluminum fluoride plant in Gauteng
2010	Steel plant in Cato Ridge
2010	A bulk argon storage facility in Johannesburg
2009	An aluminum fluoride plant in KwaZulu-Natal
2009	Shell Chemicals, Durban
2009	The Unico facility in Durban
2008	The Revertex facility in Durban
2007	A new chlor-alkali facility in the Eastern Cape
2002–2008	Ammonia refrigeration plants throughout South Africa
2007	Alkylation plant in KwaZulu-Natal
2006	The Element Six facility in Springs
2006	The Singisi Forest Products wood product facility in Kokstad
2006	The Lanxess facility in Merebank, Durban
2006	A 900 t butane storage facility in Durban This study considered fires and explosions from an accidental loss of containment of material
2005	Impala Platinum BMR expansion

This included the consequent modelling of fires and explosions of flammable liquid and gases as well as air dispersion of toxic gases

2005 NCP Chlorchem expansion
This included the consequent modelling of fires and explosions of flammable liquid and gases as well as air dispersion of toxic gases

2005 The Dow Chemical Company facilities at Canelands, Chloorkop, Sasolburg and Berlin
This included the consequent modelling of fires and explosions of large flammables and toxic gases

2004 The Magalies Water purification plant at Vaalkop

REFINERIES

Lead Process Engineer for quantitative risk assessment of:

2009 A refinery expansion in Suriname

2006 Fire zoning classification of Saudi Aramco's Luberef facility, Saudi Arabia. The study defined the fire zones as per the requirements of Saudi Aramco

2006 Building risk assessment of the Saudi Aramco Luberef facility, Saudi Aramco. The study consisted of a full quantitative risk assessment as per API 752

2005 PetroSA refinery near Mossel Bay

HAZOP AND LOPA/SIL STUDIES

HAZOP Chairman for:

2010 to present BP Southern Africa covering depots at Langlaagte, Pretoria, East London and Cape Town

2022 The Total Gantry Secondary Shut Down Valves

2022 The Total IVT Rail Siding Upgrade at the Island View Terminal in Durban

2021 The Puma HFO Terminal at Matola, Mozambique

2021 The Puma Energy Terminal at Walvis Bay, Namibia

2021 The Biodiesel Blending Project at the Shell Depot in Witbank

2021 Valve Replacement at the Shell Depot at Alrode, Gauteng

2021 The MLA Stripping Pump Project, Island View in Durban

2021 The Engen SDCO Depot Located at Elliot, Eastern Cape

2021 The Shell Kroonstad Depot ULP Conversion Project, Free State

2021 The Firewater Pump House Changes at the Airports Company South Africa at the Cape Town International Airport

2021 The Valve Operation Tank at the Shell Mossel Bay Depot

2021 The Totalgaz Depot at Blackheath in Cape Town

2021 The Totalgaz Depot at Polokwane

2021 The Totalgaz Depot at Chamdor, Gauteng

2021 The Pump House changes at the Engen Terminal, East London

2021 The Engen Aliwal North depot at Aliwal North, Eastern Cape

2021 The tank 10 repairs, modification and upgrade project at the Shell depot at Alrode

2021 The West Coast petroleum (SDCO) depot build review at Morreesburg

2021 The Total IVT rail siding upgrade project in Durban

2021 The Shell Witbank Depot firefighting compliance project

2021 The Idwala Carbonates Ore Sorter project in Port Shepstone

2021 Process Hazard Analysis for firefighting at the Engen SDCO in Vryburg

2021 Adjustment of the set pressure of the crude line surge relief valve at the Natcos Fynnland site 2 at the Island View complex in Durban

2021 Process Hazard Analysis for remedial work at the Engen terminal in Vryburg

2021 Natcos Fynnland site tie-in to the multiple product pipeline at the Island View complex in Durban

2021 Process Hazard Analysis for remedial work at the Engen SDCO in Queenstown

2021	Process Hazard Analysis for a fire protection upgrade at Rheinmetall Denel Munition in Somerset West and Wellington, Cape Town
2020	LRP to Diesel change over at the Total Island View terminal in Durban
2020	Shell Rocky Drift depot additive underground tank replacement project at White River
2020	T-009 MOV changes at the Shell depot at Alrode
2020	The Bushveld Electrolyte company's vanadium electrolyte plant in East London
2020	Shell Island view terminal VRU rail connection project located in Durban
2020	Underground additive tank replacement at the Shell depot located at Alberton
2020	Underground additive tank replacement at the Shell depot located at Mossel Bay
2020	Shell Rocky Drift Tank 03 conversion project in White River
2020	Process Hazard Analysis for the AIR BP Beira depot underground tank replacement in Beira
2020	Bidvest bank terminal bulk liquid, handling and storage facility (LPG section) in Richards Bay
2020	Fire Hazard Assessment of the Indy Oil facility in Pietermaritzburg
2020	Biodiesel storage and blending pipeline upgrade at the Shell depot in Witbank
2020	Biodiesel storage and blending pipeline upgrade at the Shell depot in Alberton
2020	Underground tank replacement for the Shell depot in Polokwane
2020	New HFO tank farm at Mali (completed using teleconferencing)
2020	Automation of the road gantry at the Puma depot in Malawi
2020	Tank changes for the Puma depot at Matola, Mozambique
2020	Extension of the fuel lines at Cape Town International Airport
2020	Changes to the additive tanks at the Shell depot at Kroonstad
2020	Changes to the Shell depot at Kroonstad
2019	Automation of the tank inlet valves at the Shell depot, Alrode
2019	New LNG facility at Tema, Ghana
2019	New fuel tank for Puma Energy, Malawi
2019	New tank for SamCol, Mozambique
2019	Fertilizer blending facility and warehouse, Durban
2019	Astron berth changes, island View
2019	ULP product line changes at the Shell depot, Witbank
2019	Dust HAZOP for Johnson & Johnson, Cape Town
2019	Revalidation of BP depot at East London
2019	Revalidation of BP depot at Pretoria
2018	Changes to ULP tank at the Shell depot in Witbank
2018	New diesel tank farms for Vivo, at the port and mine in Guinea (completed using Teleconferencing)
2018	New double walled tanks at the Total depot, Alrode
2018	Diesel tank for Total, Aldag
2018	Changes to the Oily Water System at BP Cape Town
2018	Firefighting system upgrades at the Total depot, Ladysmith
2018	New LPG facility at Richards Bay
2017	Changes to acrylates storage at Vopak, Island View Complex, Durban
2017	New fuel tanks for Vopak at the Island View Complex, Durban
2017	Pipeline changes for Total at the Island View Complex, Durban
2017	New LPG facility at Coega
2016	Vopak tank farms at Island View, Durban
2016	Engen depots in Namibia
2016	A reactor upgrade at the Engen facility in Durban
2015	An ice-cream factory for Unilever at Chloorkop
2015	The national multi-product pipeline for Transnet in Durban
2015	Fuel transport pipelines for Oiltanking MOGS in Saldanha Bay
2014	The Enerwaste medical waste facility in Waltloo, Pretoria
2014	The Tongaat-Hulett Starch mill in Germiston
2014 to 2016	The VTTI Burgan Oil facility in Cape Town
2013	The Sunrise Energy LPG terminal in Saldanha
2013	The SimsGas facility in Chamdor
2013	The Vanchem Vanadium Products facility in eMalahleni
2013	The ArcelorMittal facility in Newcastle

2013	The Proxa brine treatment facility in New Vaal
2010	Sasol projects at Secunda and Sasolburg
2007–2010	A chrome chemical facility, KZN
2007	Chlorine expansion, Gauteng
2007	LOPA study for a large LPG installation and chemicals, Durban
2004–2004	Project upgrades at petroleum tank farms
2003–2005	Proposed nuclear installation at PBMR
2002–2004	Chevron on eight oil platforms off the coast of Cabinda

Education:

BSc (Chemical Engineering), University of the Witwatersrand, South Africa, 1982

Employment Record:

2002 to present Director, RISCOM, South Africa
Involved in process safety consulting including MHI risk assessments and facilitating process hazard analysis studies (HAZOP, SIL & LOPA)

2001–2002 **Managing Member, Penoc Consulting, South Africa**
Involved in Process Engineering Project Management and Process Safety Consulting for various projects

1995–2001 **Process Manager for Dow Chemicals, South Africa**
Managed the cost estimation, project approvals, process designs and commissioning of various plants within the group

1993–1995 **Technical Manager for Sentrachem, Durban South Africa**
Managed the Technical Department of a facility conducting technical investigations, projects and continual plant improvements

1986–1993 **Process Engineer for Sentrachem, Germiston, South Africa**
This involved conducting plant investigations, design of new plants, installing and commissioning new equipment

Languages:

	Speaking	**Reading**	**Writing**
English (first)	Excellent	Excellent	Excellent
Afrikaans	Good	Good	Average

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this data correctly describes me, my qualifications and my experience.

Date: 28th of January 2022

Full name of staff member: Michael Paul Oberholzer