
NIGEL GAS TRANSMISION PIPELINE GAUTENG PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

June 2019

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

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: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

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.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

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/occur 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 are 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 assessment practitioner: An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

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

Environmental impact assessment: 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: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

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.

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed."

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

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.

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.

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

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.

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.

ABBREVIATIONS AND ACRONYMS

DEA	National Department of Environmental Affairs
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Office
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
km ²	Square kilometres
m ²	Square meters
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SHE	Safety, Health and Environment

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LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

An overview of the contents of the Environmental Management Programme, as prescribed by Appendix 4 of the 2014 EIA Regulations (GNR 326) as amended, and where the corresponding information can be found within the reported is provided in **Table 1.1**

Table 1.1: Legal requirements in terms of the EIA regulations

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)	Cross-reference in this Environmental Management Programme
Content of environmental management programme (EMPr)	
(1) (a) An EMPr must comply with section 24N of the Act and include: <ul style="list-style-type: none"> i. Details of the EAP who prepared the EMPr; and ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae. 	Chapter 4 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 2
(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.	Chapter 2
(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 environmental impact assessment process for all phases of the development including- <ul style="list-style-type: none"> (i) planning and design (ii) pre-construction activities (iii) construction activities (iv) rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities; 	Chapter 5-9
(f) a description of proposed mitigation 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- <ul style="list-style-type: none"> (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; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation 	Chapter 5-9
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f)	Chapter 5-9
(i) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 5-9
(j) an indication of the persons who will be responsible for the implementation of the impact management actions;	Chapter 5-9
(k) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Chapter 5-9
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Chapter 5-9
(m) an environmental awareness plan describing the manner in which- <ul style="list-style-type: none"> i. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and 	Chapter 6

EIA REGULATIONS 2014 (as amended) GNR 326: Appendix 1 CONTENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)	Cross-reference in this Environmental Management Programme
ii. risks must be dealt with in order to avoid pollution or the degradation of the environment; and.	
(n) any specific information that may be required by the Competent Authority	
(2) where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	

CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for Iliza Gas (Pty) Ltd as part of the proposed gas transmission pipeline development in Gauteng. Iliza Gas (Pty) Ltd is proposing the development of a natural gas transmission pipeline to the Consol Glass factory in Nigel, from the Farm Grootfontein 165 Portion 44, Gauteng Province, where it connects with the distribution node on the larger Maputo – Gauteng natural gas pipeline network. This connection node is located near (10m) the Nigel-Springs Road in Nigel. The proposed project falls within the City of Ekurhuleni Metropolitan Municipality, in the Gauteng Province. The current pipeline route utilises the road reserve for its entire length.

The EMPr has been developed on the basis of the findings of the Basic Assessment (BA), and must be implemented to protect 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. This EMPr is applicable to all Iliza Gas employees and contractors working on the pre-construction, construction, operation, and decommissioning of the Nigel Gas Pipeline, and forms a binding contract with those parties involved. The document must 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 BA report of the project.

In terms of the Duty of Care provision in S28(1) of the 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, stopped or minimised. In terms of the NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. While they may be additional permits required (i.e. permits for from the Department of Water and Sanitation), the contents of this Report will find application throughout the life cycle of the project.

CHAPTER 2: PROJECT DETAILS

Iliza Gas (Pty) Ltd is proposing the development of a natural gas transmission pipeline to the Consol Glass factory in Nigel, from the Farm Grootfontein 165 Portion 44, Gauteng Province, where it connects with the distribution node on the larger Maputo – Gauteng natural gas pipeline network. This connection node is located near (10m) the Nigel-Springs Road in Nigel. The proposed project falls within the City of Ekurhuleni Metropolitan Municipality, in the Gauteng Province. The current pipeline route utilises the road reserve for its entire length.

The project will have a lifespan of 25 years after which the pipeline and associated infrastructure will be decommissioned. The proposed construction method for water crossings and road crossings is horizontal directional drilling (where absolutely necessary due to the prohibitive cost of this methodology). Horizontal drilling does not require trenches and does not disrupt the land surface. Trenching will be utilised for the portions in the road reserve, representing the largest length for the proposed pipeline. The construction period for the proposed pipeline is approximately 6-8 months.

Iliza Gas (Pty) Ltd identified route C (refer to Figure 2.1) as the most preferred from a technical and environmental perspective, following a screening and feasibility exercise. Route C is approximately 10 km length, and planned with a 0.15m width. Safety concerns related to the transmission of compressed gas necessitated the methodology of underground pipe laying (i.e. no surface pipe laying) for the entirety of the proposed pipeline length. This is to avoid access to the pipeline and potential tampering with the pipe, possibly leading to loss of life and/or related emergency incidents.

The development is proposed to include the following infrastructure:

- 10km, 10inch (or 0.25 m) diameter carbon steel pipeline;
- A High-Pressure Customer Metering Station, 12 x 14 m, 3m tall housed on Consol property enclosed by wall.

The proposed natural gas pipeline will connect to an existing high-pressure gas distribution pipeline and the gas will be used at the endpoint in the Consol Factory for glass smelting operations. Permitting has already been granted for this route by the following authorities, as the proposed route C will be located within servitudes of these organisations, should it be approved:

- o Transnet;
- o Gautrans; and
- o Ekurhuleni Metropolitan Municipality (wayleave approval).

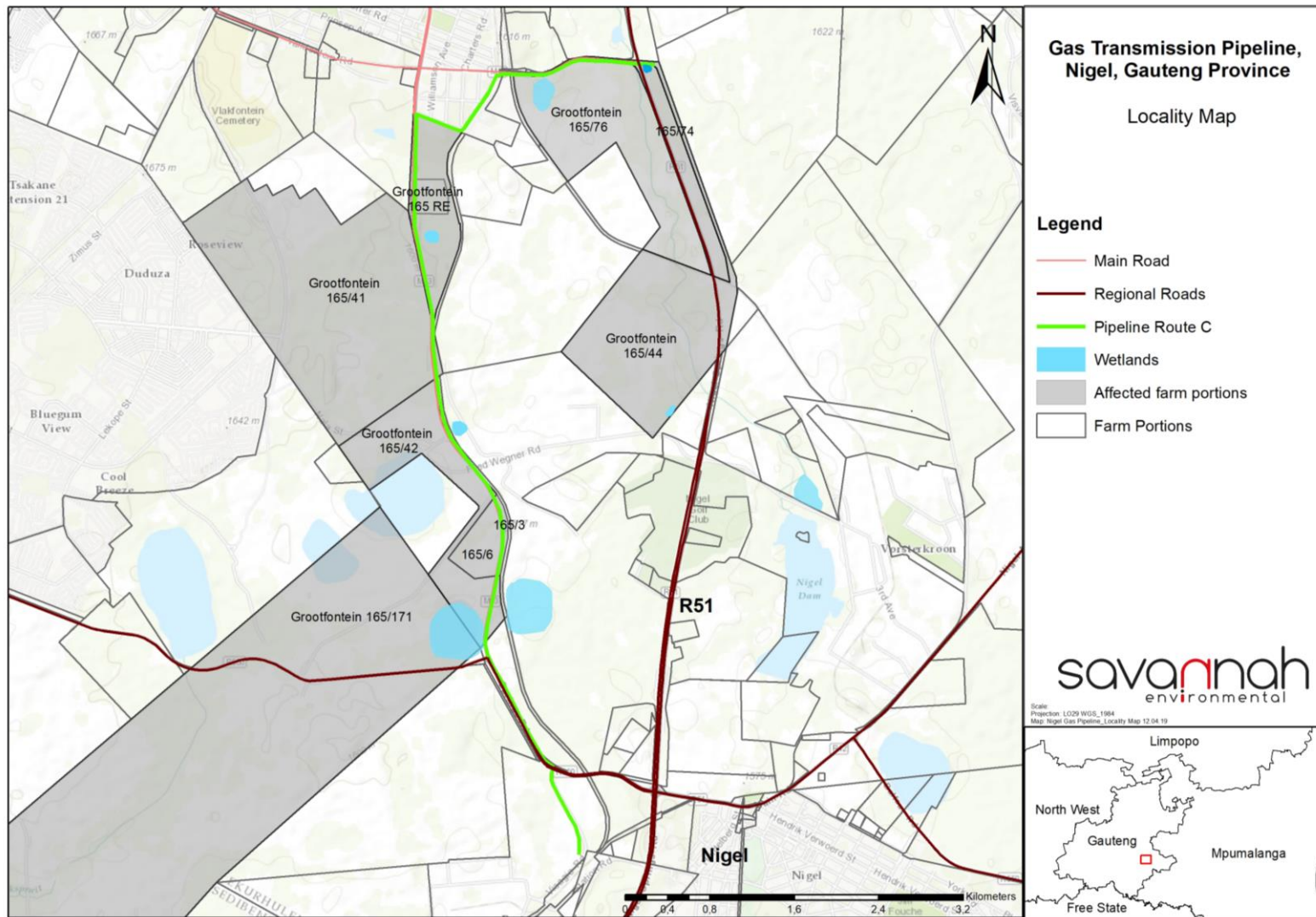


Figure 2.1: Locality map showing the proposed location of the Nigel Gas Pipeline.

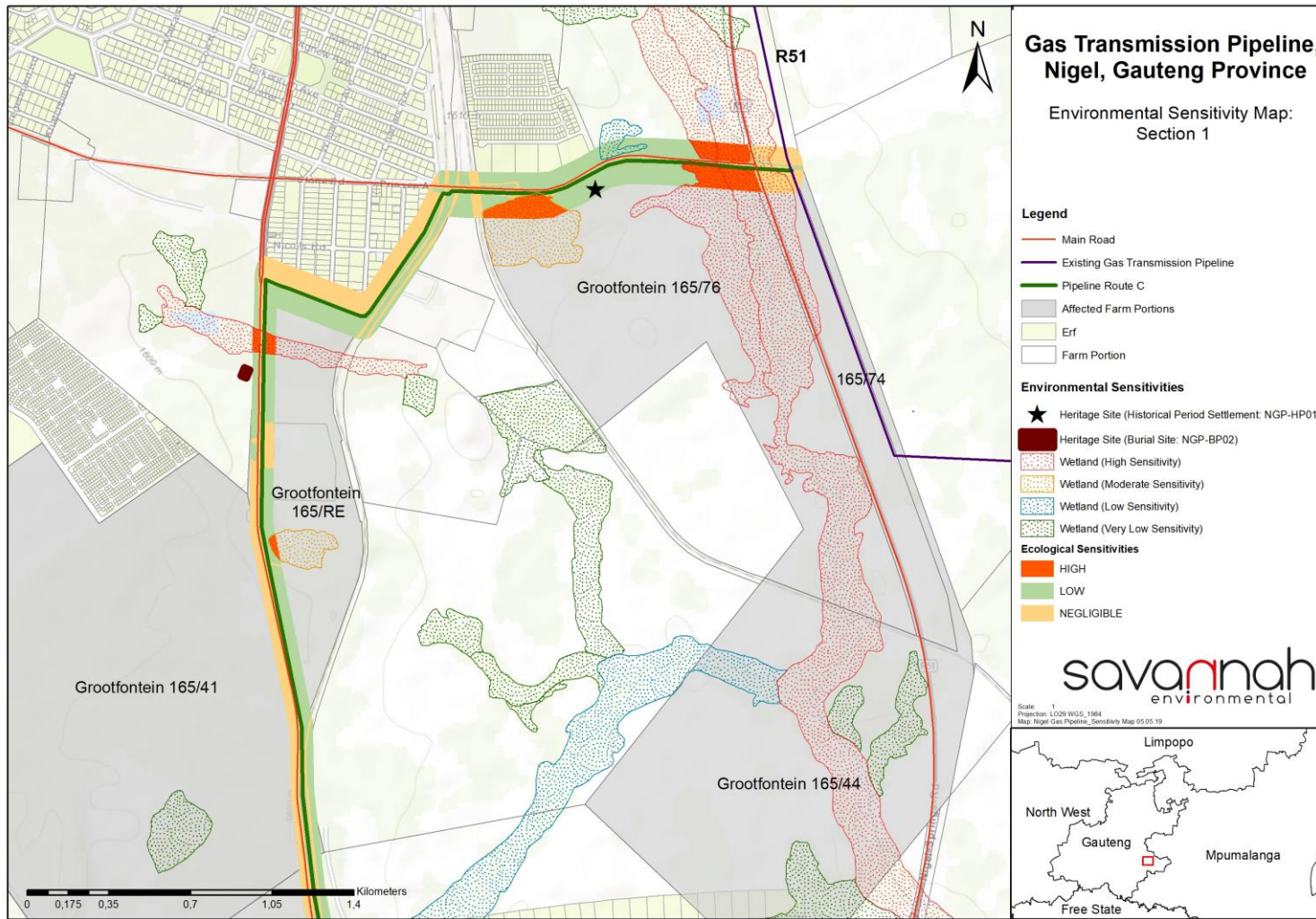


Figure 2.2 : Map illustrating Section 1 of the pipeline and the environmental sensitivities of the site.

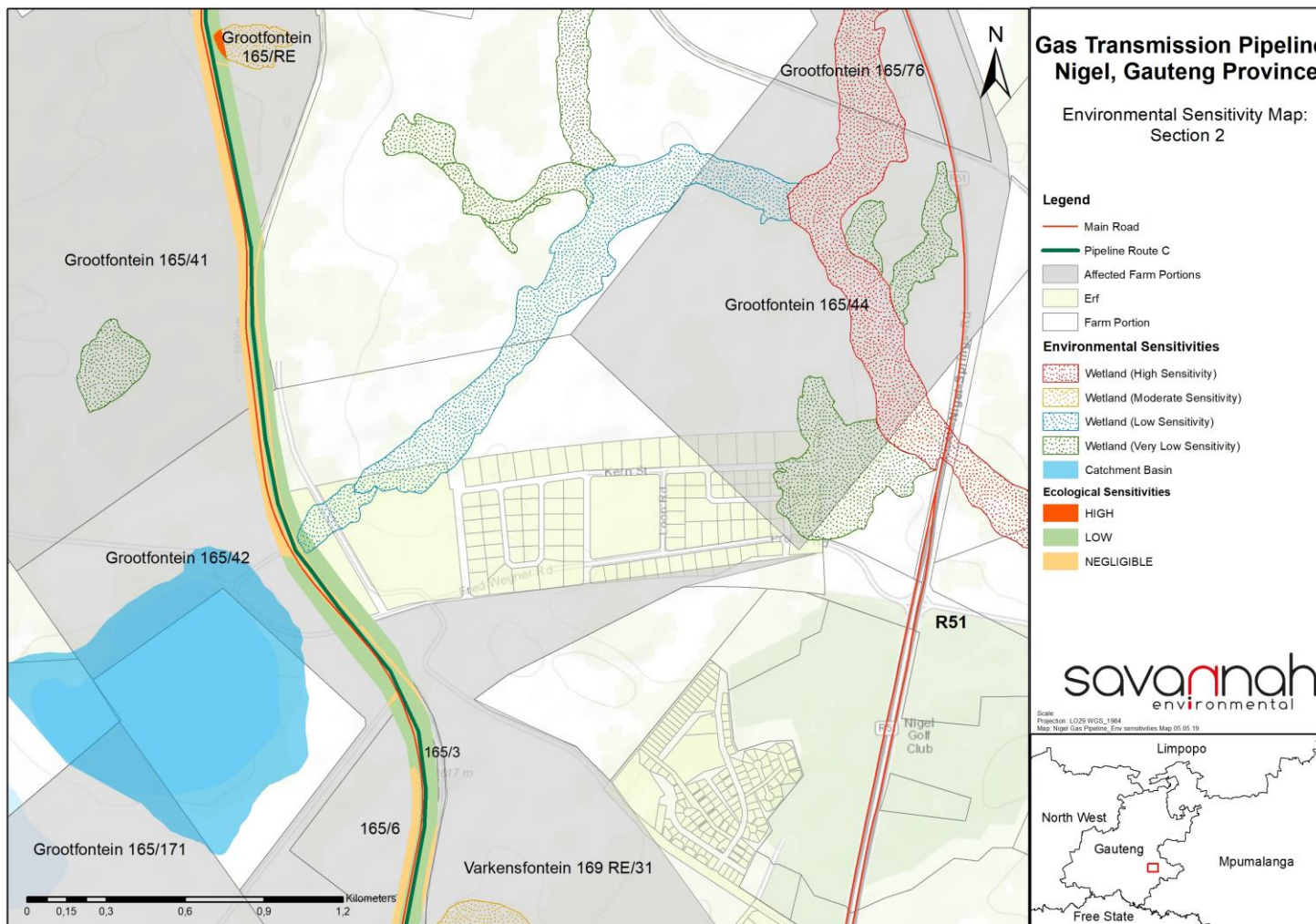


Figure 2.3 : Map illustrating Section 2 of the pipeline and the environmental sensitivities of the site.

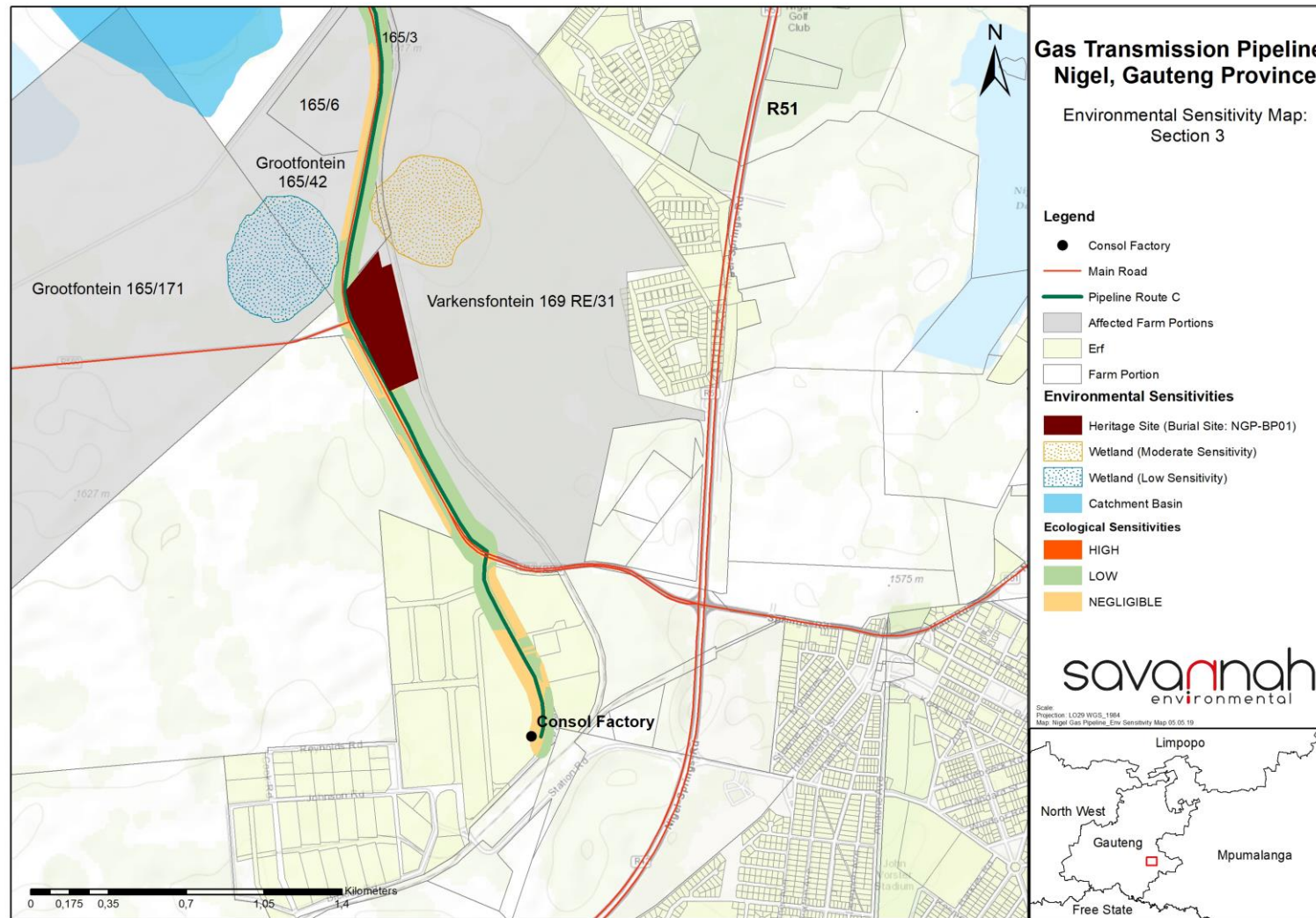


Figure 2.4: Map illustrating Section 3 of the pipeline and the environmental sensitivities of the site

Table 2.1: A detailed description of the Nigel Gas Pipeline

Province	Gauteng Province
Municipality	City of Ekurhuleni Metropolitan Municipality
Ward number(s)	Ward 88, 98 and 111
Nearest town(s)	The project site is located in Nigel, and runs adjacent to Valkfontein Road (M45) for approximately 1,5km and Nigel Dunnottar Road for approximately 7,4km.
Farm name(s) and number(s)	<ul style="list-style-type: none"> - Varkensfontein 169 RE of portion 31 - Grootfontein 165 portion 42 - Grootfontein 165 portion 6 - Grootfontein 165 portion 3 - Grootfontein 165 portion 41/RE - Grootfontein 165 RE - Grootfontein 165 portion RE/46 - Grootfontein 165 Portion 76 - Grootfontein 165 Portion 74 - Grootfontein 165 Portion 44 - Grootfontein 165 Portion 75 - Grootfontein 165 Portion 46
SG 21 Digit Code	Surveyor-General Database property ID's: <ul style="list-style-type: none"> - TOIR00000000016900031 - TOIR00000000016500042 - TOIR00000000016500006 - TOIR00000000016500003 - TOIR00000000016500041 - TOIR00000000016500000 - TOIR00000000016500046 - TOIR00000000016500076 - TOIR00000000016500074 - TOIR00000000016500044 - TOIR00000000016500075 - TOIR00000000016500046
Current Zoning	Agricultural (and industrial?)
Site Coordinates	Start: 26°21'10.94"S, 28°27'23.92"E Middle: 26°22'0.10"S, 28°26'1.78"E End: 26°25'14.11"S, 28°26'56.72"E

2.1 Findings of the Environmental Impact Assessment

The findings of the BA report provide a detailed assessment of the potential impacts that may result from the development of the Nigel Gas Pipeline. This section provides a conclusion to the environmental assessment process by providing a summary of the salient results of the Basic Assessment report. In so doing, it draws on the information gathered as part of the BA process and the knowledge gained by the environmental assessment practitioner (EAP), independent Specialists, and presents an informed opinion of the environmental impacts associated with the proposed development.

From the conclusions of the detailed BA process undertaken no environmental fatal flaws were identified with Nigel Gas Pipeline provided that the recommended mitigation measures are implemented, specifically in terms of avoidance of sensitive features within the development footprint and the undertaking of the construction and operational monitoring as specified by the Specialists. The development footprint was designed by the developer in order to respond to and avoid any sensitive environmental and social features located within the project site. This approach ensured the application of the mitigation hierarchy (i.e. avoid, minimise and offset) to the pipeline project which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site and its environmental challenges. The application of the mitigation hierarchy was undertaken by the developer prior to the commencement of the BA process for Environmental Authorisation, as detailed in the BA report. Therefore, it is concluded that the development footprint is suitable and appropriate from an environmental perspective for the pipeline and will not have a detrimental impact on any sensitive features present.

The potential environmental impacts associated with the Nigel Gas Pipeline identified and assessed through the BA process included, detailed further below:

- » Ecological Impacts;
- » Impact on the Wetlands; and
- » Heritage Impacts.

2.1.1 Ecological Impacts

At present, the project area and development corridor in particular, are deemed highly disturbed due to ongoing disturbance through fires, invasive species, grazing, illegal dumping, pedestrian movements, road verge maintenance, historical infrastructure and recent construction. The development corridor remains unfenced and open to the public which promotes ongoing impacts identical to those just mentioned. No sensitive Species of Conservation Concern were observed within the development corridor, with the remainder of the species observed regarded as Least Concern (LC) in terms of their conservation status. Overall the ecological contribution of development corridor was deemed to be low, with no sensitive species observed and few ecological process areas and habitats due to the small size and highly disturbed character of the development corridor.

The CBA classification for the development corridor also does not correspond to the real-world condition of the plant and animal species observed during the field assessment, and therefore contributes poorly to the ecological function of the broader area. As such, no functional CBA zones were deemed present within the development corridor, as confirmed by the site assessment results, and thus the proposed development will not significantly impact the overall quantity and quality of the remaining CBA areas in the broader study area.

Furthermore, while the vegetation type present on site has a high conservation value according to Mucina and Rutherford (2012), the highly degraded real-world condition of the vegetation units observed within the development corridor confirmed a minimal overall conservation contribution, with the exception of wetland vegetation areas. Only the degraded mixed grassland vegetation unit within the development corridor resembles Tsakane Clay Grassland, but is highly degraded, with poor ecological functioning and a low conservation contribution, and as such does not represent a good conservation opportunity and does not currently contribute to the overall health and conservation status of the Tsakane Clay Grassland vegetation type. Should the development proceed, the loss of the highly degraded Tsakane Clay Grassland vegetation unit in the project area will not significantly reduce the conservation potential and current distribution of the

vegetation type as a whole, due primarily to the severely degraded nature of this vegetation unit within the project area, and in particular the development corridor.

In addition, the mixed invasive woodland vegetation unit was not deemed to contribute significantly to the ecological functioning of the study area, due largely to the low species diversity, invasive nature of the vegetation within this unit, and the limited extent thereof. There are a vast number and variety of alien invasive plant species present onsite, particularly near the bridge structures, immediate road reserve and areas where previous construction activities have degraded the environment.

The ecological impacts of all aspects for the proposed project were assessed and considered to be ecologically acceptable (i.e. no fatal flaws were determined), provided that the mitigation measures provided in this report are implemented, and that relevant licencing is obtained from the Department of Water and Sanitation (DWS) for works conducted within or near the watercourses. Implementation of recommended mitigation measures is an important element of the mitigation strategy and will reduce all identified impacts to low negative

2.1.2 Impacts on Wetlands

The findings of the wetland assessment suggests that owing to a range of existing impacts within the wetlands and catchment area (linked predominantly to alterations in water inputs and storm water runoff as well as surface water runoff through the wetland systems), the wetlands are generally in a modified condition with the level of modification varying according to the level of disturbance from 'Severely' modified (F PES Class) to 'Moderately' modified ('C' PES Class). Only one wetland (W6) was regarded as 'Natural / Unmodified' ('A' PES Class). Wetland Unit 1 (W1) was considered to be 'Greatly' Modified ('E' PES Class). Both Wetland Units 2 and 4 (W2, W4) were considered to be 'Largely' Modified ('D' PES Class). Wetland Unit 5 (W5) have been 'Severely' Modified, whilst Wetland 9 (W9) have been 'Moderately' Modified.

With the mitigation measures recommended in the wetland assessment, impacts on aquatic ecosystem integrity and functioning can be potentially reduced to a sufficiently low level. Based on the outcomes of the wetland assessment, specifically also considering the existing disturbances impacting on the affected wetland and resulting in the modified condition of the affected wetland, together with the fact that expected impacts can be mitigated to Low significance through the application of a number of easily implementable mitigation measures.

2.1.3 Heritage Impacts

In terms of heritage resources, the landscape around the project area is primarily well known for the occurrence of Iron Age farmer sites and a Colonial frontier denoting industrial expansion in Gauteng. The landscape around Nigel has been inhabited, developed and exploited continuously for centuries, the remnants of which are visible in transformed agriculture and rural settlement as well as mining areas. The following general recommendations are made based on general observations in the proposed Nigel Gas Transmission Pipeline Project area pertaining to a number of identified occurrences of heritage potential. These sites identified are discussed in the section below.

The poorly preserved remains of a Historical Period settlement area occur along a northern section of the project footprint south of the M45 road (Site EXIGO-NGP-HP01). The site is rated as low heritage significance and impact seems unlikely but legislation requires that an alteration / destruction permit be obtained from the relevant heritage resources authority (SAHRA, SAHRA Built Environment Unit) should the site be altered at

any stage. It is recommended that the site and its surrounds be closely monitored by an informed ECO during development in order to avoid the destruction of previously undetected heritage remains.

Two burial sites occur in the project area and these highly significant heritage resources are protected in terms of heritage and social by the National Heritage Resource Act (NHRA 1999). It is essential that the long-term conservation of the sites is ensured. The Nigel Municipal Cemetery (Site EXIGO-NGP-BP01) occurs east of the M63 road and approximately 10m east from the proposed pipeline alignment. The pipeline alignment runs within the road reserve which had previously been impacted on by the establishment and construction of municipal services (water and electricity lines) and impact on the adjacent cemetery is unlikely. It is primarily recommended that a heritage conservation buffer of at least 10m be implemented from the nearest graves in the cemetery, to the periphery of the impact buffer of construction activities. It is further recommended that a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities be observed. A temporary construction barricade should be erected along areas where this measure proves unfeasible, i.e. in areas where construction activities might encroach on the 3m buffer.

An additional informal cemetery was documented in an open field directly west of the M63 road and south of Dunnotar, approximately 100m west of the proposed pipe alignment (Site Exigo-NGP-BP02). Even though impact on the site seems improbable it is recommended that a conservation buffer of at least 50m be implemented around the site. The developer should consider fencing off the burial site in order to clearly demarcate the presence and extent of this sensitive heritage resource in the larger development landscape.

Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended during the construction phase of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.

CHAPTER 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 gas pipeline. 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 Nigel Gas Pipeline. The document will 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). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Nigel Gas Pipeline and/or as the project develops. 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).

The EMPr has the following objectives:

- » Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the Nigel Gas Pipeline.
- » 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 was not considered in the BA process.

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

Iliza Gas (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 contract documentation. Since this EMPr is part of the BA process for the Nigel Gas Pipeline, it is important that this document be read in conjunction with the BA 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. The document must be adhered to and updated as relevant throughout the project life cycle.

CHAPTER 4: STRUCTURE OF THIS EMPR

The first three chapters provide background to the EMPr and the Nigel Gas Pipeline, while the chapters which follow consider the following:

- » Planning & Design activities;
- » Construction activities;
- » Rehabilitation activities;
- » Operation activities; and
- » Decommissioning activities.

These chapters set out the procedures necessary for Iliza Gas (Pty) Ltd as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in a table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. Furthermore, the objectives and EMPr tables are required to be reviewed and possibly modified throughout the life of the Nigel Gas Pipeline whenever changes, such as the following occur:

- » Planned activities change (i.e. in terms of the components of the gas pipeline).
- » 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 further degradation of the environment.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant or should be modified, etc.

4.1. Project Team

In accordance with the requirements of Appendix 4 of the EIA Regulations of 2014 (as amended in 2017), the details of the consulting team from Savannah Environmental (Pty) Ltd responsible for the BA process and compilation of this EMPr are as follows:

- » **Hermien Slabbert** – the principle author of this report. She holds a BSc degree with Honours in Environmental Management and has two years of experience in the renewable energy sector. She has worked on Solar Photovoltaic projects and has provided assistance basic assessments (BAs), amendment applications and General Authorisation (GA) applications. She has also done GIS mapping (ArcGIS) for small and large-scale projects.
- » **Gideon Raath** - Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS

specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

- » **Jo-Anne Thomas**, is a Director at Savannah Environmental (Pty) Ltd. Jo-Anne has a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A** of this EMPr.

The Savannah Environmental team has extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than twelve (12) years. They have managed and drafted Environmental Management Programmes for various waste water treatment infrastructure development projects throughout South Africa.

4.2 Details of Specialist Consultants

Specialist Study	Specialist Company	Specialist Name
Ecological Impact Assessment	Savannah Environmental	Gideon Raath
Wetland Impact Assessment	Nkurenkuru Ecological and Biodiversity	Gerhard Botha
Heritage Impact Assessment	Exigo Sustainability	Neels Kruger

CHAPTER 5: MANAGEMENT PROGRAMME: DESIGN AND PLANNING

Overall Goal: undertake the design and planning phase in such a way that:

- » The preferred route of the gas pipeline, and associated infrastructure adheres to identified environmental constraints.
- » The pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- » Adequate consideration has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable).
- » The construction activities to be undertaken without significant disruption to other land uses and activities.

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

5.1 Objectives

OBJECTIVE 1: Ensure the pipeline adheres to identified environmental constraints.

No-go and sensitive areas have been identified within the project site. Mitigation measures must thus be correctly implemented to minimise or avoid impacts on identified no-go and sensitive areas (as detailed in Section C of this EMPr).

Project Component/s	<ul style="list-style-type: none"> » 10km, 10inch (or 0.25 m) diameter carbon steel pipeline; » A High-Pressure Customer Metering Station, 12 x 14 m, 3m tall housed on Consol property enclosed by wall. 	
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas. 	
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction of the Pipeline » Horizontal Directional Drilling 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » The proposed design of the pipeline responds to the identified environmental constraints and opportunities. » Planning of infrastructure placement was optimal, such that site activities have taken into consideration and avoided as far as possible areas of high sensitivity. 	
Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Developer Contractor	Pre-construction
Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Developer	Pre-construction
Where necessary, permits from the relevant provincial authorities for destruction or removal of listed species must be obtained prior to commencement of construction.	Developer	Pre-construction
Prior to construction commencing, any additional environmental permits and authorisations required (e.g. water use license, and protected plant permits, etc.) must be obtained.	Developer	Project Planning
Retain and maintain natural and / or cultivated vegetation immediately adjacent to the development footprint/servitude.	Developer	Project Planning

Plan all ancillary buildings and infrastructure in such a way that clearing of vegetation is minimised.		
A designated access to the site must be created and clearly marked to ensure safe entry and exit.	Developer Contractor	Design
Where possible, construction vehicles carrying materials to the site must avoid using roads through densely populated built-up areas so as to not disturb existing retail and commercial operations.	Developer Contractor	Design and Planning
Contractors and construction workers must be clearly informed of the no-go areas, and all no-go areas must be clearly demarcated prior to construction commencing. Demarcation of buffer zones must include all buffer zones that may be applicable.	Developer Contractor	Prior to the commencement of construction
A stormwater management plan must be developed for implementation during construction. This must include appropriate means for the handling of stormwater within the site, as well as appropriate drainage around the site (Appendix E).	Developer Contractor	Design
Plan the placement of light fixtures for the plant and the ancillary infrastructure in such a manner so as to minimise glare and impacts on the surrounding area.	Developer Contractor	Planning.
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Developer Contractor	Pre-construction
No temporary site camps must be allowed outside the development footprint of the pipeline	Developer	Design and Planning
An independent Environmental Control Officer (ECO) must be appointed for the construction phase to monitor compliance with conditions contained in the Environmental Authorisation.	Developer	Pre-construction
If required, a training and skills development programmes will be initiated prior to the commencement of the construction phase.	Developer Contractor	Pre-construction
Construction is to make use of local labour as far as possible and or required.	Developer Contractor	Pre-Construction
Establish clear rules and regulations for access to the proposed site.	Developer Contractor	Pre-Construction
Local community organisations and policing forums must be informed of construction times and the duration of the construction phase.	Developer Contractor	Pre-Construction
The proponent must ensure all safety standards are adhered to during installation and operation of the pipeline, and that adequate safety measures are employed during both phases	Developer Contractor	Construction & Operation
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Pre-construction
A comprehensive employee induction programme must be developed and utilised to cover land access protocols, fire management and road safety.	Contractor	Pre-construction
Have a personnel trained in first aid on site to deal with smaller incidents that require medical attention.	Contractor	Pre-construction

Prepare a Emergency Responses Plan		Developer	Pre-construction
Performance Indicator	<ul style="list-style-type: none"> » The design meets the objectives and does not degrade the environment unnecessarily » Demarcated no-go areas are avoided at all times. » Design and layouts accurately reflect mitigation measures and recommendations in the Basic Assessment Report, as far as possible. » Minimal exposure of ancillary infrastructure and lighting at night to observers on or near the site. » Training and skills development programme undertaken prior to the commencement of construction phase, if required. » Employee induction programme, covering access control protocols, emergency response and health and safety aspects is implemented for all staff working on site. » Ensure safety standards are adhered to during installation and operation of the pipeline, and that adequate safety measures are employed during both phases 		
Monitoring	<ul style="list-style-type: none"> » Review of the design of the pipeline and the route by the Project Manager and the Environmental Officer (EO) prior to the commencement of construction. » Monitor on-going compliance with the emergency response plan and Method Statements. 		

OBJECTIVE 2: Ensure the selection of the best environmental option for the alignment of the pipeline and associated infrastructure.

The gas pipeline will be constructed within the existing road reserve and existing access roads will be used as far as possible.

Project Component/s	<ul style="list-style-type: none"> » 10km, 10 inch (or 0.25 m) diameter carbon steel pipeline; » A High-Pressure Customer Metering Station, 14 x 18 m, housed on Consol property enclosed by a 4m high wall. 		
Potential Impact	<ul style="list-style-type: none"> » Construction activities that unnecessarily degrade the environment, particularly with respect to loss of indigenous flora, and erosion. 		
Activities/Risk Sources	<ul style="list-style-type: none"> » Alignment of the pipeline and associated infrastructure. 		
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure selection of best environmental option for alignment of the linear infrastructure. » Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts. 		
Mitigation: Action/Control	Responsibility	Timeframe	
Select an alignment for the pipeline that curtails environmental impacts and enhances environmental benefits.	Developer Contractor	Prior to submission of the final construction layout plan	
Consider design level mitigation measures recommended by the specialists as detailed within the BA Report and relevant appendices regarding the associated infrastructure.	Contractor	Design	

OBJECTIVE 3: Minimise stormwater runoff within the temporary construction camp and along the pipeline route.

Project Component/s	<ul style="list-style-type: none"> » Stormwater management components. » All hard engineered surfaces (i.e. platform foundations of the duct access shafts). 		
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Potential Impact	» Poor stormwater management and alteration of the hydrological regime outside of the project site.		
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).		
Mitigation: Target/Objective	» Appropriate management of stormwater to minimise impacts on the environment.		
Mitigation: Action/Control	Responsibility	Timeframe	
Appropriately plan hard-engineered erosion protection structures.	Developer Contractor	Planning and design	
Design an appropriate stormwater management plan for implementation during construction and operation (Appendix E). This plan must ensure the suitable handling of stormwater within the project footprint.	Developer Contractor	Planning and design	
Construction must include appropriate design measures that allow surface and sub-surface movement of water. Drainage measures must promote the dissipation of stormwater runoff.	Developer Contractor	Planning and design	
Performance Indicator	» Appropriate stormwater management plan developed for implementation prior to commencement of construction.		
Monitoring	» Minimal soil erosion.		

OBJECTIVE 4: To ensure effective communication mechanisms

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

Project component/s	» Gas pipeline; » A High-Pressure Customer Metering Station, 14 x 18 m, housed on Consol property enclosed by a 4m high wall.		
Potential Impact	» Noise and dust impacts on affected and surrounding landowners and land uses.		
Activity/risk source	» Activities associated with the gas pipeline construction and operation. »		
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners » 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 (following the guidelines of the grievance mechanism in Appendix B) to be implemented during the construction phases of the facility. This procedure should 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.	Developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)	
Develop and implement a grievance mechanism for the construction phase of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)	

Performance Indicator	» Effective communication procedures in place.
Monitoring	<ul style="list-style-type: none"> » A Public Complaints register must be maintained, by the Contractor and monitored by the ECO, to record all complaints and queries relating to the project and the action taken to resolve the issue. » All correspondence should be in writing. » The developer and contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.

OBJECTIVE 5: Ensure that all relevant personnel and staff are familiar with the provisions of the EMPr, as well as the conditions of the Environmental Authorisation and requirement for environmental preservation.

It is recommended that a pre-construction environmental compliance workshop be undertaken before any construction commences on site. This workshop can be combined with a site handover meeting, but must take place before any activities take place on site before any equipment is moved onto site. Furthermore, all construction workers should receive an induction presentation, as well as on-going environmental education, awareness and training on the importance and implications of the EMPr and the environmental requirements it prescribes.

Project Component/s	<ul style="list-style-type: none"> » All components and activity impacts mentioned in the EMPr » All components and activity impacts mentioned in the BA Report
Potential Impact	<ul style="list-style-type: none"> » Positive impact on creating project awareness » Skills improvement » Project compliance
Activities/Risk Sources	<ul style="list-style-type: none"> » Compliance workshop » Slide presentations » On-going environmental education and awareness training
Mitigation: Target/Objective	» Environmental sensitivities are taken into consideration, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Provision should be made in contract and tender documentation to attend a workshop.	<ul style="list-style-type: none"> » The Main Civil Contractor (including contract manager, site agent and foreman) » The Electrical Contractor (including contract manager, site agent and foreman) » The Consulting Engineers (electrical, civil and structural, whichever applicable) » Project Management 	Pre-construction
Induction training must ensure that construction workers/staff understand that no form of wildlife poaching, collecting or other form of disturbance will be permitted on the construction site or the adjacent areas, as well as all emergency response, and health and safety procedures applicable to the construction phase	EO	Pre-construction
Performance Indicator	» Staff attendance & performance	

	<ul style="list-style-type: none">» Ensure that the design implemented meets the objectives and mitigation measures in the BA Report» The contractor must keep records of all environmental training sessions, including names, dates and the information presented. Details of the environmental induction must be included in the environmental control reports.
Monitoring	<p>As a minimum, ongoing training should include:</p> <ul style="list-style-type: none">» 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;» Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractors Health and Safety Representative);» Explanation of the mitigation measures that must be implemented when carrying out activities; and» Explanation of the specifics of this EMPr and its specification (no-go areas, sensitive areas, etc.).

CHAPTER 6: 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 noise impacts, traffic and road use.
- » Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- » Minimises impacts on wetlands in the study area.
- » Minimises the impact on heritage sites in the study area.
- » An environmental baseline during construction activities on the site, where possible is established.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Iliza Gas (Pty) Ltd must ensure that the proposed gas pipeline complies with the requirements of all environmental authorisations and permit, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Thus, Iliza Gas (Pty) Ltd, as the Developer will retain various key roles and responsibilities during the construction phase of the gas pipeline.

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

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager, Site Manager, Internal Environmental Officer, Safety and Health Representative, Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that the key procedures are executed. Thus, **Figure 6.1** provides an organogram indicating the organisational structure for the implementation of the EMPr.

The **Construction Manager** must:

- » Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that the Developer and its Contractor(s) are made aware of all stipulations within the EMPr.
- » Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes through input from the independent ECO.
- » Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
- » Be fully knowledgeable with the contents of all relevant licences and permits.

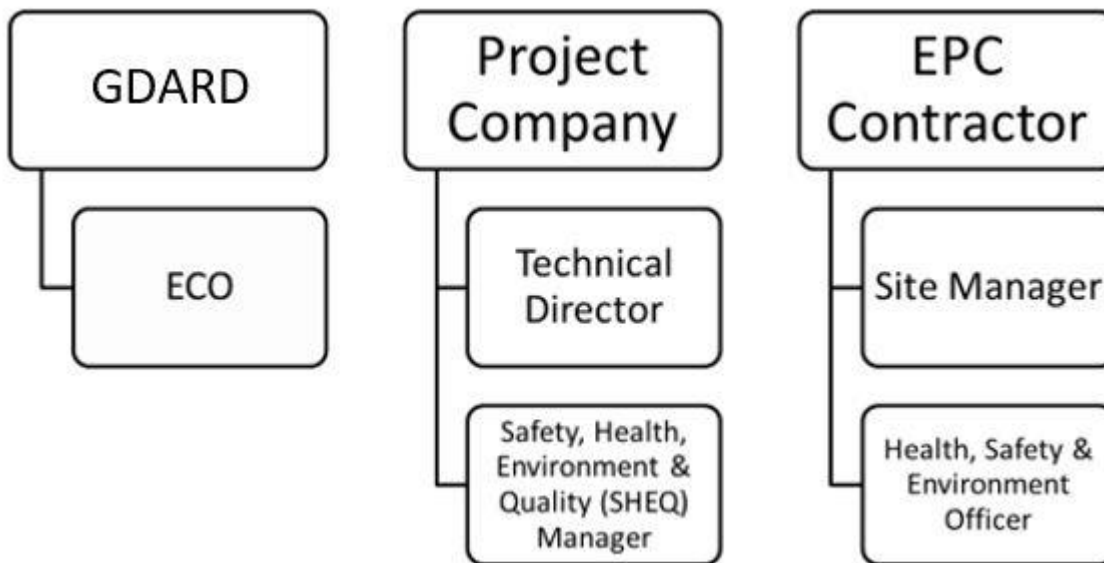


Figure 6.1: Organisational structure for the implementation of the EMPr.

Site Manager (Contractors' on-site Representative) will:

- » Be fully knowledgeable with the contents of the EIA.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Technical Director, the ECO, the Internal Environmental Officer and relevant discipline engineers on matters concerning the environment.
- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

An independent **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 with the contents of the EIA.
- » Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation.
- » Be fully knowledgeable, maintain, update and review the EMPr.
- » Be fully knowledgeable of all the licences and permits issued for the site.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.

- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Compilation of the Environmental Audit Report or Environmental Completion Statement, six months after completion of construction or at a frequency in compliance with the Environmental Authorisation. Reports should be submitted to the relevant authority and the Project Proponent.
- » Monitoring must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO. Reports should be submitted to the relevant authority as directed in the EA.
- » Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » ECO site inspections to be undertaken once a month to ensure compliance with the EMPr, or as directed in the Environmental Authorisation. The duration of these visits may be increased or decreased at the discretion of the ECO in consultation with the Engineers Representative.
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

As a general mitigation strategy, the Environmental Control Officer (ECO) should, where possible, be present to ensure the correct demarcation of no-go areas, and to supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter, site compliance inspections at a frequency stipulated in the EA, or otherwise once monthly for the duration of the construction period, is required. However, in the absence of the ECO it is suggested that a designated owner's Environmental Officer be present (EO) to deal with any environmental issues that may arise, such as fuel or oil spills, and to ensure contractor compliance to the conditions of the EA and EMPr. The ECO shall remain employed until all rehabilitation measures have been complied with and the site is handed over for operation.

Contractors and Service Providers: It is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor will appoint an Internal Environmental Officer (EO) who will be responsible for informing contractor 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 Internal Environmental Officer and Contractor's obligations in this regard include the following:

- » Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- » Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued for the site.
- » Ensure a copy of the Environmental Authorisation and EMPr is easily accessible to all on-site staff members.
- » Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.

- » Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended environmental awareness training included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Provide environmental induction training to contractors on site prior to commencing of construction activities (this can also be undertaken by the EO).
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.
- » Manage the day-to-day on-site implementation of this EMPr, and the compilation of regular Monitoring Reports.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
- » Inform staff of the environmental issues and request implementation of appropriate control measures from the various contractors..

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken.
- » Ensuring that any instructions issued by the Site Manager and EO are adhered to.
- » Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors, receive training before the commencement of construction in order for the sub-contractors to constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained on the environmental obligations).

6.2 Objectives

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

OBJECTIVE 1: Minimise storm water runoff

The Contractor and ECO must take all reasonable measures to ensure that there is effective Stormwater management.

All unattended open excavations shall be adequately demarcated and/or fenced. Appropriate measures must be taken to avoid sedimentation in wetlands due to earthworks.

Project Component/s	» Storm water management components
Potential Impact	» Hazards to landowners and the public. Sedimentation in wetlands due to earthworks. » Erosion

Activities/Risk Sources	<ul style="list-style-type: none"> » Any unintended or intended open excavations (foundations and trenches). » Movement of construction vehicles in the area and on-site. 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid sedimentation in wetlands due to earthworks. » Appropriate management of storm water to minimise impacts on the environment. 	
Mitigation: Action/Control	Responsibility	Timeframe
Storm water management plans must be compiled by an engineer approved by DEA, DWS and the ECO for the project.	Contractor	Site establishment, and duration of construction
All stormwater structures must comply with DWS and regional road authority requirements.	Contractor	Site establishment, and duration of construction
The road engineer must ensure that suitable stormwater structures are included in the road design in order to minimise erosion and sedimentation of watercourses.	Contractor	Site establishment, and duration of construction

OBJECTIVE 2: Appropriate handling and management of waste and hazardous waste

Activities during the construction phase could lead to impacts resulting from waste management and materials handling. Good supervision and control of waste on site is critical for the minimisation of these impacts.

Project Component/s	<ul style="list-style-type: none"> » Pipeline » Associated Infrastructure 	
Potential Impact	<ul style="list-style-type: none"> » Risk to environment due to poor waste management practices » Inefficient use of resources resulting in excessive waste generation. 	
Activities/Risk Sources	<ul style="list-style-type: none"> » Hydrocarbon use and storage » Other construction wastes 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management legislation » To minimise production of waste » To ensure appropriate waste handling, storage and disposal » To avoid environmental harm from waste disposal 	
Mitigation: Action/Control	Responsibility	Timeframe
A Waste Management Plan must be developed and implemented during construction.	Contractor	Construction
Construction waste must be disposed of at a licenced dump/landfill (on a regular basis) to ensure correct disposal and no unnecessary accumulation of construction wastes on site.	Contractor	Duration of construction
Initiate recycling programmes at the construction site.	Contractor	Duration of construction
The waste management hierarchy must be adopted at the construction site: where waste is prevented, if it cannot be prevented it should be minimised. If waste can't be minimised it must be reused or recycled. If this is not an option it should be used for energy recovery. This may involve selling waste to third part recovery organisations. Lastly if energy recovery is not possible waste should be disposal of.	Contractor	Duration of Contract
Should waste be stored on site, it cannot be temporarily stored for longer than 80 days.	Contractor	Duration of construction

Dispose of all solid waste collected at an appropriately registered waste disposal site. The disposal of waste shall be in accordance with all relevant legislation.	Contractor	Duration of construction
SABS approved spill kits to be available and easily accessible.	Contractor	Duration of construction
Spillages during construction should be cleaned up using absorbent material. Absorbent materials used to clean up spillages should be disposed of in a separate and labelled hazardous waste bin.	Contractor	Duration of construction
The storage area for hazardous material (such as bonding/sealing liquids and chemicals used during pipeline installation) must be concreted, bunded, covered, labelled and well ventilated.	Contractor	Duration of construction
All hazardous waste must be disposed at an appropriately registered hazardous waste disposal facility.	Contractor	Duration of construction
Records of all waste being taken off site must be recorded and kept as evidence.	Contractor	Duration of construction

OBJECTIVE 3: Maximize local employment and business opportunities associated with the construction phase.

Employment opportunities will be created during the construction phase, specifically for semi-skilled and unskilled workers. Employment of locals and the involvement of local SMMEs would enhance the social benefits associated with the project, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs.

Project Component/s	» Construction activities associated with the establishment of the pipeline.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» The inflow of various specialists from outside the study area and even abroad. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area.
Enhancement: Target/Objective	» The developer should aim to employ as many low-skilled and semi-skilled workers from the local area as possible.

Mitigation: Action/Control	Responsibility	Timeframe
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible.	Developer, Local Municipality, and Contractor	Duration of construction
If possible, a broad-based approach should be followed to identify and involve relevant organisations which could assist the main contractor and developer in identifying people whose skills may correspond with the required job specifications.	Developer, Local Municipality, and Contractor	Pre-construction
Where possible, an equitable process should be promoted whereby locals and previously disadvantaged individuals (including women) are considered for employment opportunities.	Developer, and Local Municipality	Duration of construction

Where possible, conditions that are conducive must be created for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	Developer, Municipality, Contractor	Local and	Pre-construction
Communication efforts concerning job creation opportunities should refrain from creating unrealistic expectations.	Developer		Pre-construction and construction
Performance Indicator	<ul style="list-style-type: none"> » Where possible, job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate as per the adopted local procurement policy (if one has been developed). » Locals and previously disadvantaged individuals (including women) are considered during the hiring process, if possible. » The involvement of local labour is promoted as far as possible. 		
Monitoring	<ul style="list-style-type: none"> » Monitor indicators listed above to ensure that they have been met for the construction phase. » The developer and the EPC contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes. 		

OBJECTIVE 4: Safety concerns with construction crews on site

Project Component/s	» Construction activities associated with the establishment of the pipeline.		
Potential Impact	» Safety concerns with construction crews on site.		
Activities/Risk Sources	» The inflow of workers from outside the study area and even abroad.		
Enhancement: Target/Objective	» No incidents related to security		
Mitigation: Action/Control	Responsibility	Timeframe	
All new workers must be screened before employment.	Developer, Contractor	Duration of construction	of
Performance Indicator	» No incidents reported.		

OBJECTIVE 5: Minimise impacts related to transportation of equipment and materials to site, including increased light pollution.

Heavy and light-duty vehicles will be transporting goods, personnel and building materials.

Project Component/s	» Local roads		
Potential Impact	» Increase in disruption to traffic		
Activities/Risk Sources	<ul style="list-style-type: none"> » Increase in traffic and movement of vehicles. » Construction vehicles and traffic signalling will increase the night time light levels. 		
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic associated with the construction of the development on local traffic volume, local communities, existing infrastructure, property owners and road users. » 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	
Where possible, heavy vehicle traffic should be discouraged from using roads during peak traffic hours.	The developer, Contractor, and Local Municipality	Duration of construction	of

Road signs and speed limits should be adhered to at all times.	The developer, and Local Municipality	Pre-construction, and construction
Transport of material and waste should comply with the necessary road regulations.	The developer, and Local Municipality	Pre-construction, and construction
Machinery and equipment are to be switched off when not used.	The developer, Contractor	Pre-construction, and construction
Performance Indicator	» Vehicles are roadworthy, inspected regularly and speed limits are adhered to. » Provision of traffic warning signs	
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr.	

OBJECTIVE 6: Minimise the potential increased erosion due to vegetation clearing for infrastructure.

The soil on site may be impacted in terms of:

- » Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) which will also lead to accelerated erosion;
- » Incorrect storage or handling of topsoil;
- » Poor rehabilitation;
- » Exposure of soil due to deep trenching;
- » Erosion from rainwater;
- » Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities which will affect soil forming processes and associated ecosystems; and
- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere.

Project Component/s	» Construction activities associated with the Gas Pipeline. » Vegetation clearing.	
Potential Impact	» Soil and rock degradation and erosion » Increased run-off over the site.	
Activities/Risk Sources	» Removal of vegetation, excavation, stockpiling, compaction, and pollution of soil. » Bare soils surfaces due to the removal of vegetation and trenching » Earthworks which destroy the natural layers of the soil profiles.	
Mitigation: Target/Objective	» Minimise area of disturbance from construction work » Minimise soil degradation (mixing, wetting, compaction, etc.) and erosion. » Revegetate, maintain and monitor the site. » Keep the project footprint as small as possible.	
Mitigation: Action/Control	Responsibility	Timeframe
Any erosion observed as a result of the construction works should be rectified immediately and monitored thereafter to ensure interventions are successful.	ECO and Contractor	Pre-construction and construction
All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential.	ECO and Contractor	Construction
Topsoil should be removed and stored separately from subsoil and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	ECO and Contractor	Construction

Where feasible, phased development and vegetation clearing should be practiced so that cleared areas are not left denuded and vulnerable to erosion for extended periods of time.	ECO and Contractor	Construction
Reinstate as much of the eroded area to its pre-disturbed, "natural" levels (as far as possible).	ECO and Contractor	Construction
Rehabilitate laydown areas immediately after they are no longer required.	ECO and Contractor	Duration of contract
Performance Indicator	<ul style="list-style-type: none"> » No activity outside demarcated disturbance areas » Limited soil erosion around site » No activity in restricted areas 	
Monitoring	<ul style="list-style-type: none"> » Limited level of soil erosion around the site. » Acceptable state of excavations, as determined by the EO. » Monthly inspections of sediment control devices by the EO. » An incident reporting system must record non-conformances. » On-going visual assessment of compliance with erosion prevention by Contractor and ECO. » Monitor visual signs of erosion such as the formation of gullies after rainstorms and the presence of dust emissions during wind storms. » Any signs of soil erosion on site should be documented (including photographic evidence and coordinates of the problem areas) and submitted to the management team of the project. » Monitor compliance of construction workers to restrict construction work to the clearly defined limits of the construction site to keep footprint as small as possible. Monitoring to be undertaken by the ECO. 	

OBJECTIVE 7 : Minimise the impacts on fauna and flora

Project construction activities are likely to reduce available habitat, and disturb existing faunal communities on site. The clearing of vegetation will lead to alien plant invasion and increased erosion.

Project Component/s	<ul style="list-style-type: none"> » Pipeline » Associated infrastructure. 	
Potential Impact	<ul style="list-style-type: none"> » The clearing of natural vegetation within the project footprint will lead to the temporary loss of highly degraded Tsakane Clay Grassland (endangered vegetation). » The clearing of natural vegetation within the project footprint may lead to the loss of Species of Conservation Concern (SCC). » Loss of biodiversity and ecosystem function and processes. » The lack of an effective alien vegetation management plan may lead to alien plant invasion following construction. » Increased erosion due to vegetation clearing for infrastructure. » Loss of areas classified as CBA or ESA due to vegetation clearance. 	
Activities/Risk Sources	<ul style="list-style-type: none"> » Site preparation and earthworks. » Construction-related traffic. » Mobile construction equipment. » Pipe line construction activities. 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction 	
Mitigation: Action/Control	Responsibility	Timeframe

Laydown areas and turning areas must be located in areas that have already been impacted or show evidence of degradation. The EO must identify such areas.	Contractor, ECO	Construction
Vegetation clearing for the establishment of infrastructure must be kept to a minimum, by only clearing what is absolutely needed in order to further construction.	The developer	Construction, Pre-construction
Vegetation impacted during the construction phase must be restored.	The developer	Construction
Topsoil must be stockpiled separately to subsoil in order to conserve the existing seedbank and aid in the restoration of natural grasslands during rehabilitation.	Contractor	Construction
Should any SCC be identified during excavation, these must be relocated or removed from the construction footprint by a qualified specialist prior to commencement of further activities.	Contractor, ECO	Construction
In the event that SCC are identified during construction works, the relevant permits must be obtained from the relevant departments in order to remove such species prior to commencement of further activities.	The developer, ECO	Construction
Prohibit all employees from harvesting wild plants or hunting any animals on site.	Contractor, ECO	Construction
Prohibit open fires.	Contractor, ECO	Construction
Rehabilitate laydown areas immediately after they are no longer require.	The developer, Contractor	Construction
Develop an invasive management plan and implement during construction to ensure alien species do not invade disturbed or cleared areas and that ongoing invasions are controlled and limited as far as possible.	Contractor, ECO	Construction
Where required by DWS for water features, implement the horizontal directional drilling methodology to reduce the impact on surface water features and wetland vegetation as far as possible.	Contractor, ECO	Construction
Where unavoidable, and as far as possible, conduct trenching work through the wetland vegetation unit during the dry season.	Contractor, ECO	Construction
An Alien Plant Monitoring and Management Plan must be developed and implemented during the construction and operation phases to reduce the establishment and spread of undesirable alien plant species.	The developer, Contractor	Construction
Alien plants must be removed from the site through appropriate methods for the specific species of concern such as hand pulling, application of chemicals, cutting etc., on a regular basis during construction. Removal must occur prior to plants developing seeds.	The developer, Contractor	Construction
Any erosion observed as a result of the construction works should be rectified immediately and monitored thereafter to ensure interventions are successful.	The developer, Contractor	Construction
All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential.	The developer, Contractor	Construction
Reinstate as much of the eroded area to its pre-disturbed, "natural" levels.	The developer, Contractor	Construction

Where feasible, phased development and vegetation clearing should be practiced so that cleared areas are not left denuded and vulnerable to erosion for extended periods of time.	Contractor, ECO	Construction
Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation and habitats for fauna » Limited impacts on faunal species (i.e. noted/recorded fatalities) 	
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » Recording fauna fatalities to monitor success of relocation efforts. » An incident reporting system will be used to record non-conformances to the EMPr. 	

OBJECTIVE 8: Minimise Loss/Disturbance of wetland habitat/fauna and sedimentation and erosion and minimise impacts on localized surface water quality

Vegetation clearing during construction could result in the direct physical destruction or disturbance of aquatic habitat, disturbance of wetland habitat, encroachment/colonisation of habitat by invasive alien plants and impacts on water quality. Construction activities and the physical removal and disturbance of narrow strips of wetland vegetation during the construction phase would have biological impacts (it would be however be localised however).

Project Component/s	» Construction activities associated with the Gas Pipeline.		
Potential Impact	» Impacts on surface water quality		
Activities/Risk Sources	<ul style="list-style-type: none"> » Increased turbidity of water quality. » Deterioration in freshwater ecosystem integrity; and » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species). 		
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise extent of disturbed areas. » Minimise activity within disturbed areas. » Keep the project footprint as small as possible. 		
Mitigation: Action/Control	Responsibility	Timeframe	
Existing access roads to be used as far as possible. Limit the extent of the construction servitude to as small an area as possible.	Developer and Contractor	Construction	
Ideally the construction disturbance footprint should be kept to an area no wider than 5 m.	Developer and Contractor	Construction	
All material stockpiles (other than soils removed during trenching) and construction camps should be located outside wetland areas.	Contractor	Construction	
The areas where vegetation is destroyed and disturbed will however need to be monitored against invasion by alien vegetation and, if encountered, will need to be removed.	ECO and Contractor	Construction	
If natural re-vegetation is unsuccessful, seeding and planting of the area will need to be implemented.	ECO and Contractor	Construction	
Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground pipeline has been completed.	ECO and Contractor	Construction	
There should be reduced activity at the site after large rainfall events when the soils are wet.	Developer and Contractor	Construction	

No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.	Developer and Contractor	Construction
Institute environmental best practice guidelines as per the DWA Integrated Environmental Management Series for Construction Activities.	EO and Contractor	Construction
Implement appropriate measures to ensure strict use and management of all hazardous materials used on site.	EO and Contractor	Construction
All soil contaminated due to leaks or spills should be remediated on site. If this is not possible, such contaminated soils must be disposed of in a suitable waste facility.	EO and Contractor	Construction
No vehicles to refuel within watercourses/ riparian vegetation.	Developer and Contractor	Construction
Waste should be stored on site in clearly marked containers in a demarcated area. All waste material should be removed at the end of every working day to designated waste facilities at the main construction camp/suitable waste disposal facility. All waste must be disposed of offsite.	Developer and Contractor	Construction
All construction activities occurring directly within wetland habitats (Wetland 1, 2 and 5) to take place within the dry season as far as reasonable possible.	Developer and Contractor	Construction
Regular monitoring for erosion. <ul style="list-style-type: none"> Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas. Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary. Closure and rehabilitation of the disturbed areas (control stations and rig set-up) should commence as soon as the laying of underground pipeline has been completed. Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain. 	EO and Contractor	Construction
The following mitigation measures are specific to certain wetlands:		
For Wetland 1, 2 and 5 (HDD): <ul style="list-style-type: none"> All construction activities occurring directly within wetland habitats (Wetland 1, 2 and 5) to take place within the dry season. The remaining construction activities should be aimed to take place within the dry season as far as reasonably possible. Regular monitoring should be conducted along the drilling route for potential frack-outs. Every effort must be made to avoid the release of drilling fluid into the wetlands. Where drilling fluid is observed at the surface, the "spill" should immediately be contained / recovered. 	Developer and Contractor and ECO	Construction

<ul style="list-style-type: none"> • Once excess drilling mud have been removed, the area will be seeded and/or replanted using species similar to those in the adjacent area, or allowed to re-grow from existing vegetation. • Revegetated areas will be monitored twice per year for two years subsequent to frack-out to confirm revegetation is successful. • Used drilling liquid should be contained in a settling pond or similar structure, from where the fluid can either be re-used or removed from site. • The drilling rig should be placed on a plastic liner in order to avoid any potential soil contamination with hydrocarbon spillage or other associated pollutants. • All activities must be restricted to the raised portion of the road reserve (as close as possible to the existing road). • No activities or movement of any construction vehicles within the natural wetland surface (below the raised road reserve). • The natural surface of the inundated and permanent saturated zone the wetland, including a 10m buffer should be considered as a NO-GO Zone • A spill kit should always be on-site. • A regulatory approved contingency plan (frack-out) should be in place which should consider the possibility of frack-out or other emergencies, and the response actions that should be considered. • Large spills should be pumped out of the wetland into a contained area as soon as possible and the remaining fluid should be dispersed with hoses. • Smothering of vegetation should also be avoided. 		
<p><u>For Wetland 5 (HDD):</u></p> <ul style="list-style-type: none"> • All activities and disturbances should occur outside of the delineated wetland boundary (including a 10m buffer area). Limit the extent of the construction servitude to as small an area as possible. 	<p>Developer and Contractor</p>	<p>Construction</p>
<p><u>For Wetland 4 and partially 1 and 2 (Trenching):</u></p> <ul style="list-style-type: none"> • Construction activities should be aimed to take place within the dry season as far as reasonably possible; • All activities must be restricted to the raised portion of the road reserve (as close as possible to the existing road). • Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench; • No activities or movement of any construction vehicles within the natural wetland surface (below the raised road reserve). • Wetland areas other than the immediate areas of crossing are to be demarcated as no-go areas for vehicles and construction personnel. • Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will 	<p>Developer and Contractor and ECO</p>	<p>Construction</p>

<p>maximise opportunity for re-vegetation of disturbed areas).</p> <ul style="list-style-type: none"> Excavation of the trench, for the laying of the pipeline, should only take place immediately before placement of the pipeline (ideally the trench should not remain open for longer than 7 days). Concentration and accumulation of flows along the servitude should be prevented by regularly providing for surface runoff to flow into the adjacent grassland rather than along the construction servitude and into the wetlands. 		
<p><u>For Wetland 6 and 9 (Trenching outside of wetland boundary):</u></p> <ul style="list-style-type: none"> All activities restricted, as far as possible, within the elevated road reserve. Wetlands located in close proximity to the proposed pipeline route should be regarded and demarcated as no-go areas for vehicles and construction personnel. Excavated soils from the , should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench. Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity for re-vegetation of disturbed areas). Excavation of the trench, for the laying of the pipeline, should only take place immediately before placement of the pipeline (ideally the trench should not remain open for longer than 7 days). 	<p>Developer and Contractor and ECO</p>	<p>Construction</p>
<p>Performance Indicator</p>	<ul style="list-style-type: none"> » Limited impacts on water quality. » Limited sedimentation » Limited destruction of habitat and fauna 	
<p>Monitoring</p>	<ul style="list-style-type: none"> » Acceptable state of excavations, as determined by the EO. » Weekly monitoring by the ECO where activities directly within wetlands. » Monthly monitoring by the ECO where activities are near wetlands. » An incident reporting system will record non-conformances. » On-going visual assessment of compliance by Contractor and ECO. 	

OBJECTIVE 9: Protection of heritage resources

Activities resulting from the construction phase could lead to impacts on heritage sites identified.

<p>Project component/s</p>	<ul style="list-style-type: none"> » Gas pipeline » Associated infrastructure
<p>Potential Impact</p>	<ul style="list-style-type: none"> » Heritage objects or artefacts found on site are inappropriately managed or destroyed.
<p>Activity/risk source</p>	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or installation of infrastructure. » Mobile construction equipment movement on site. » Pipe line and access road construction activities.

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
Heritage site EXIGO-NGP-HP01: Regular examination of trenches and excavations.	Contractor and ECO	Pre-construction, Construction
Heritage site EXIGO-NGP-HP01: The site is older than 60 years and generally protected under the NHRA. Application for an alteration permit should be made with relevant heritage authorities (SAHRA, SAHRA Built Environment) should the site be alteration at any stage.		
Burial site EXIGO-NGP-BP01: Implement a heritage conservation buffer of at least 10m from the nearest graves in the cemetery. Implement a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities but where unfeasible, erect a temporary construction barricade along areas where construction might encroach on the 3m buffer.	Contractor and ECO	Pre-construction, Construction
Burial site EXIGO-NGP-BP01: The project site in the vicinity of this receptor should be monitored bi-weekly by the heritage consultant or an ECO familiar with the heritage occurrences of the site: regular examination of trenches and excavations and site clearing in order to detect and preserve previously undocumented heritage receptors.	ECO	Pre-construction, Construction
Burial site EXIGO-NGP-BP02: Implement a heritage conservation buffer of 50m around the graves / cemetery. If possible, fence burial place and apply access control. Implement a site management plan detailing strict site management conservation measures.	Contractor and ECO	Pre-construction, Construction
Burial site EXIGO-NGP-BP02: The project site in the vicinity of this receptor should be monitored on a frequent basis by the heritage consultant of an ECO familiar with the heritage occurrences of the site: regular examination of trenches and excavations and site clearing in order to detect and preserve previously undocumented heritage receptors.	Contractor and ECO	Pre-construction, Construction
A chance find procedure must be developed and implemented in the event that archaeological resources or graves are found.	Contractor Heritage specialist	Pre-construction, Construction
In the event that archaeological resources or graves are discovered during excavations, immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil material that may contain fossils. Inform the site foreman and the EO. EO to inform the developer, the developer contacts the standby archaeologist and/or palaeontologist. EO to describe the occurrence and provide images by email.	Contractor and ECO	Construction
Performance Indicator	» Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance. » All heritage items located are dealt with as per the legislative guidelines.	
Monitoring	» Successful location of sites by person/s monitoring.	

OBJECTIVE 10: 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, 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 EMP 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 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:

- » Details of the 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 should be applied consistently to all activities. Specific areas to be addressed through method statements (pre, during and post construction) may include:

- » Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities 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 of waste).
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » 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.
- » 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 banded 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.

6.4. Awareness and Competence: Construction Phase of the Gas Pipeline

OBJECTIVE 11: 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

6.4.1 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 should provide a translator from their staff for the purpose of translating should this be necessary.

As a minimum, induction training should 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 before the commencement of site establishment and construction on site. The education/awareness programme should 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 on site. Proof of awareness training should 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 should be undertaken by the Contractor's Environmental Officer and should include discussing the developer'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 on site.

6.4.2 Toolbox Talks

Toolbox talks should 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 should 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.

6.4.3. Monitoring Programme: Construction Phase

OBJECTIVE 12: 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). Where this is not clearly dictated, Iliza Gas (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. 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

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.

6.4.4. 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.

6.4.5. 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 the competent authority for their records. This report should 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 competent authority regarding waste related activities.

6.4.6. 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 competent authority.

An environmental internal audit must be conducted and submitted every 3 months and an external audit must be conducted once a year. An annual audit report must be compiled and submitted to the competent authority until the completion of the construction and rehabilitation. 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.

6.4.7. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and must be submitted to the GDARD upon completion of the construction and rehabilitation activities, 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.

CHAPTER 7: MANAGEMENT PROGRAMME: REHABILITATION

Overall Goal: Undertake the rehabilitation measures in a way that:

- » 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 this goal, the following objectives, actions and monitoring requirements are relevant: \

OBJECTIVE 1: 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	<ul style="list-style-type: none"> » Pipeline » Laydown areas » Ancillary building 	
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Temporary construction areas » Temporary access roads/tracks » Other disturbed areas/footprints 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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
All temporary facilities, equipment, and waste materials must be removed from site as soon as construction is completed.	Contractor	Prior to commencement of operation.
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area.
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	Following completion of construction activities in an area
All hardened surfaces within the construction equipment camp area should be ripped, all imported materials removed, and the area must be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs.	Contractor	Following completion of construction activities in an area

Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation.	Contractor	Following completion of construction activities in an area
Where disturbed areas are not to be used during the operation of the proposed pipeline, these areas must be rehabilitated/re-vegetated with appropriate natural indigenous vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist, as applicable. No exotic plants must be used for rehabilitation purposes.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Disturbed areas containing no infrastructure and hard surfaces must be rehabilitated with natural vegetation as soon as possible to avoid the potential of erosion and invasion with alien plants. The area should 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.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may need to 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 should be used in sensitive areas such as areas with steep slopes.	Proponent in consultation with ECO and rehabilitation specialist (if required)	Post-rehabilitation
Weeding: It is anticipated that invasive species and weeds will germinate on rehabilitated soils; these need to be hand-pulled before they are fully established and/or reaching a mature stage where they can regenerate. Where invasive shrubs re-grow, they will have to be eradicated according to the Working for Water specifications	Contractor/ Developer	Construction/ Operation
Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 should be undertaken prior to the operational phase. 	

CHAPTER 8: MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the gas pipeline 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 pipeline in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Minimises impacts on fauna using the site.

An environmental officer (EO) must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr.

8.1 Objectives

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

OBJECTIVE 1: Ensuring Safety – poor maintenance and operational control of pipeline and possible containment breaches or emergency incidents

Poor maintenance and operational control of pipeline could result in possible containment breaches or emergency incident.

Project Component/s	» Areas along the pipeline route.	
Potential Impact	» Containment breaches » Emergency incidents	
Activities/Risk Sources	» Movement of employee vehicles within and around the site.	
Mitigation: Target/Objective	» Ensure that containment breaches and emergency incidents do not occur	
Mitigation: Action/Control	Responsibility	Timeframe
Bi-annual inspections should be conducted as part of leak detection procedures.	O&M Contractor	Operation
Ensure that manholes used in the operational phase for maintenance activities are adequately sealed off to ensure that no unauthorised access is gained to the pipeline.	O&M Contractor	Operation and maintenance
Performance Indicator	» Zero containment breaches and emergency incidents do not occur	
Monitoring	» Monitoring by the Site Manager and O&M contractors	

OBJECTIVE 2 : Control of alien plant species

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	<ul style="list-style-type: none"> » Rehabilitated areas. » Areas along the pipeline route. 	
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat. » 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	<ul style="list-style-type: none"> » Movement of employee vehicles within and around the site. 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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
As the project is contained with the road reserve, an Alien Plant Monitoring and Management Plan must be developed and implemented by the responsible roads agency to form part of their ongoing road maintenance programme. Ongoing control efforts must thus be implemented by the roads agency through the relevant maintenance plan for the road verges.	Regional roads agency	Operation
Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation and habitats for fauna » Limited impacts number of alien plant species 	
Monitoring	<ul style="list-style-type: none"> » Observation of the implementation of the Alien Plant Monitoring and Management Plan by the responsible roads agency 	

OBJECTIVE 3: Minimise altered wetland hydrology due to interception/impoundment/diversion of flows

This refers to the altered wetland hydrology caused by vegetation clearing, disturbance of wetland habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of wetland geomorphological profiles (including stream beds and banks). Possible ecological consequences associated with this impact may include:

- » Reduction in representation and conservation of freshwater ecosystem/habitat types;
- » Reduction in the supply of ecosystem goods & services;
- » Reduction/loss of habitat for aquatic dependent flora & fauna; and
- » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).

Project Component/s	<ul style="list-style-type: none"> » Operation activities associated with the Gas Pipeline. 	
Potential Impact	<ul style="list-style-type: none"> » Impacts on surface water quality 	
Activities/Risk Sources	<ul style="list-style-type: none"> » Increased turbidity of water quality. » Deterioration in freshwater ecosystem integrity; and » Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species). 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise extent of disturbed areas. » Minimise activity within disturbed areas. 	
Mitigation: Action/Control	Responsibility	Timeframe

Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	EO and Contractor	Operation
All bare areas, as a result of the development, should be revegetated with locally occurring species, to bind the soil and limit erosion potential.	EO and Contractor	Operation
Disturbed areas (areas at risk of erosion or already subjected to erosion) should be monitored for erosion problems (twice yearly within the first year of operation) and problem areas should receive follow-up monitoring (single inspection at the end of April the following year) to assess the success of the remediation.	EO and Contractor	Operation
Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.	EO and Contractor	Operation
Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary.	EO and Contractor	Operation
There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.	EO and Contractor	Operation
Regular inspections and maintenance of the pipeline must be undertaken during the operational phase, with any leaks repaired immediately.	Contractor	Operation

OBJECTIVE 4: Protection of heritage resources

Activities resulting from the construction phase could lead to impacts on heritage sites identified.

Project component/s	<ul style="list-style-type: none"> » Gas pipeline » Associated infrastructure 	
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed.	
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or installation of infrastructure. » Mobile construction equipment movement on site. » Pipe line and access road construction activities. 	
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
Heritage site EXIGO-NGP-HP01: Regular examination of trenches and excavations.	Contractor and ECO	Pre-construction, Construction
Heritage site EXIGO-NGP-HP01: The site is older than 60 years and generally protected under the NHRA. Application for an alteration permit should be made with relevant heritage authorities (SAHRA, SAHRA Built Environment) should the site be alteration at any stage.		
Burial site EXIGO-NGP-BP01: Implement a heritage conservation buffer of at least 10m from the nearest graves in the cemetery.	Contractor and ECO	Pre-construction, Construction
Burial site EXIGO-NGP-BP02: Implement a heritage conservation buffer of 50m around the graves / cemetery. If possible, fence burial place and	Contractor and ECO	Pre-construction, Construction

apply access control. Implement a site management plan detailing strict site management conservation measures.			
A chance find procedure must be developed and implemented in the event that archaeological resources or graves are found.		Contractor Heritage specialist	Pre-construction, Construction
Performance Indicator	<ul style="list-style-type: none"> » Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance. » All heritage items located are dealt with as per the legislative guidelines. 		
Monitoring	<ul style="list-style-type: none"> » Successful location of sites by person/s monitoring. 		

OBJECTIVE 5: Enhancement of positive social impacts and mitigation of negative social impacts

During the operation phase of the gas Pipeline, both positive and negative social impacts are expected to occur. Positive social impacts can be enhanced through the application of enhancement measures and negative impacts can be mitigated and the significance reduced through the application of mitigation measures.

Project Component/s	» Operation of the Nigel Gas Pipeline		
Potential Impact	» Loss of opportunities to stimulate production and employment of the local economy		
Activity/Risk Source	» Labour practices employed during operation		
Mitigation: Target/Objective	» Maximise local community employment benefits in the local economy		
Mitigation: Action/Control		Responsibility	Timeframe
Adopt a local employment policy to maximise the opportunities made available to the local labour force.		O&M operator	Operation
Establish vocational training programs for the local labour force to promote the development of skills		O&M operator	Operation
Performance Indicator	<ul style="list-style-type: none"> » Percentage of workers that were employed from local communities » Number of people attending vocational training on an annual basis 		
Monitoring	<ul style="list-style-type: none"> » The O&M operator must keep a record of local recruitments and information on local labour for reporting purposes 		

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

The Nigel Gas Pipeline is expected to have a lifespan of at least 20 years (with routine maintenance). The infrastructure would only be decommissioned and rehabilitated once it has reached the end its economic life. It is most likely that decommissioning activities of the infrastructure of the pipeline considered in the BA process would comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at that time.

The relevant mitigation measures contained under the construction section of this EMP

» **Site Preparation**

Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

» **Disassemble and Remove Infrastructure**

Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

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 City of Ekurhuleni Municipality, as well as the GDARD. 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 storm water management systems.
- » Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

9.2. Approach to the Decommissioning Phase

It is recommended that planning of the decommissioning of the project and rehabilitation of the site should take place well in advance (at least two years) of the planned decommissioning activities. Important factors that need to be taken into consideration are detailed below.

Two possible scenarios for this decommissioning phase are detailed below:

SCENARIO 1: TOTAL DECOMMISSIONING OF THE PIPELINE

If the decision is taken at the end of the project lifespan to totally decommission the pipeline, i.e. make the land available for an alternative land use, the following should take place:

- » Isolation of the pipelines from the main supply network;
- » Disconnect the pipeline, this will entail sealing off any active facilities like the pump station (at the Consol Factory), to prevent any other material or organisms (i.e. fauna species like rodents) from re-entering the decommissioned pipeline;
- » Disconnect the cathodic protection system;
- » Vent all gas from the system at each station;
- » Purge the system with nitrogen to make it safe;
- » Open trench, cut and grout the jacked/drilled road crossing;
- » Segment the pipeline with permanent physical barriers to prevent it from acting as a water conduit. Segmentation plugs are strategically placed along sections of the pipeline;
- » All concrete and imported foreign material must be removed along the pipeline route;
- » Infrastructure that will not be required following the decommissioning of the pipeline must be removed along the pipeline route;
- » All material (pipeline, bolts, components used to the join the pipeline etc.) must be re-used or recycled wherever possible;
- » The competent authority may grant approval to the owner not to remove the landscaping and underground foundations;
- » The areas where vegetation is destroyed and disturbed will however need to be monitored against invasion by alien vegetation and, if encountered, will need to be removed. All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential;
- » Reinststate as much of the eroded area to its pre-disturbed, "natural" levels; and
- » Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.

SCENARIO 2: PARTIAL DECOMMISSIONING OF THE PIPELINE

9.2.1. Identification of structures for post-closure use

Access roads should be assessed in conjunction with the future land users to determine if these could be used. Where not required, these access roads should be decommissioned and rehabilitated.

9.2.2. Removal of infrastructure

All infrastructure must be dismantled and removed. Inert material must be removed from site and disposed of at a suitably registered landfill site. The pipeline components must be removed and recycled where possible or disposed of at a suitably registered landfill site. Hard surfaces must be ripped to a depth of 30cm and vegetated.

9.2.3. Soil rehabilitation

The steps that should be taken during the rehabilitation of soils are as follows:

- » The deposited soils must be ripped to ensure reduced compaction;

- » An acceptable seed bed should be produced by surface tillage;
- » Restore soil fertility;
- » Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- » Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

9.2.4. Establishment of vegetation

The objective is to restore the project site to a self-sustaining cycle, i.e. to realise the re-establishment of the natural nutrient cycle with ecological succession initiated.

The objectives for the re-vegetation of reshaped and top-soiled land are to:

- » Prevent erosion;
- » Restore the land to the agreed land capability;
- » Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- » Restore the biodiversity of the area as far as possible.

9.2.5. Maintenance

Established vegetation requires regular maintenance. If the growth medium consists of low-fertility soils, then regular maintenance will be required until the natural fertility cycle has been restored.

9.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the progress of establishment of desired final ecosystems.

The following items should be monitored continuously:

- » Erosion status;
- » Vegetation species diversity; and
- » Faunal re-colonisation.

APPENDIX A:
PROJECT TEAM CURRICULA VITAE

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 one (21) 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 with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Association 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
Karoshhoek CPV facility on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
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	Building Energy	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
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

Project Name & Location	Client Name	Role
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

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoot, 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 Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoot, 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
Upington Airport 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, Northern Cape	Enel Green Power	Project Manager
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	Windfall 59 Properties	Project Manager

Project Name & Location	Client Name	Role
Cape		
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 Konkoonies 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
Konkoonies II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonies 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
Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
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 Konkoonies II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
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 Lephallale 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
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

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
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP

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

Project Name & Location	Client Name	Role
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

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
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

Project Name & Location	Client Name	Role
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 Tsitikamma 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 Rhebokfontein 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 Lephallale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephallale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephallale, 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

Project Name & Location	Client Name	Role
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 Lephallale, 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 Lephallale, 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 Lephallale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephallale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephallale, 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 & 400 kV 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	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 Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	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
Karoshhoek Grid Integration project as part of the Karoshhoek 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

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
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
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, Western 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	Karoshhoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	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	Karoshhoek 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	Iiso	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
Zero Waste Recovery Plant at Highveld Steel, Mpumalanga	Anglo African Metal	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
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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 Mballi 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 Westonaria, Gauteng	Goldfields	Project Manager & EAP

Project Name & Location	Client Name	Role
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	Karoshhoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gauteng	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
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
Upgrade of the Cooling Water Treatment Facility at the Kriel Power Station, Mpumalanga	Eskom	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
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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	Karoshhoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
S24G and WULA for the Illegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorrer 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 EMP for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP
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

CURRICULUM VITAE OF GIDEON RAATH

Profession :	Environmental and Permitting Consultant
Specialisation:	Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting
Work Experience:	4.5 years' experience in environmental management, National Water Act, Mineral and Petroleum Resources Development Act, ECO and compliance auditing, wetland and ecological specialist reporting

VOCATIONAL EXPERIENCE

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's GIS background includes the management of the City of Cape Town invasive species GIS database, involving the storage, management, recall and quality control off all sightings, clearance visits and known infestations. Further experience include mapping for various consulting projects, boundary verification through ground-truthing and the spatial mapping and delineation component of this MSc research. Gideon has further attended public participation workshops, and has been involved with IAP identification, translation, public meetings and engagement for a variety of projects, mainly within the Afrikaans speaking Northern Cape. Gideon is interested in invasion ecology, treatment of groundwater pollution through phytoremediation, botanical and wetland specialist studies, GIS application for ecology and environmental management, and the EIA processes in general.

SKILLS BASE AND CORE COMPETENCIES

- Environmental Management
- GIS data manipulation, storage, management and mapping
- EIA Impact Assessments and Basic Assessment
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Mining Rights, Mining Permits, Prospecting Rights (and renewal) applications (MPRDA & NEMA)
- Public and Stakeholder Engagement (NEMA)
- Ecological/Botanical Specialist Studies

- Wetland Delineation, Functional and Impact Assessment studies
- Water Use Licence Applications (NWA)
- General Authorisations (NWA)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- M.Sc. Geography and Environmental Science (2014), Stellenbosch University (2014)
- B.Sc. (Hons) Ecology, Environment and Conservation (Cum Laude), University of the Witwatersrand (2011)
- B.Sc. Life and Environmental Sciences, University of Johannesburg (2010)

Short Courses:

- GroundTruth SASS5 competency course, GroundTruth Aquatic Consulting (2017)
- DWS 21C&I GA training workshop, Department of Water and Sanitation (2016)
- IAIAAsa Public Participation Process Workshop, IAIA South Africa (2016)
- EIA Theory and application, EOH Coastal and Environmental Services (2015)
- Water Safety Training, City of Cape Town Environmental Resources Department (2014)
- Herbicide safety and application for weed control, City of Cape Town Environmental Resources Department (2014)
- Snake awareness training, City of Cape Town Environmental Resources Department (2014)
- Habitable Planet Workshop, Applied Centre for Climate & Earth Systems Science, Cape Town (2011)

Professional Society Affiliations:

- Golden Key International Honour Society – University of the Witwatersrand Chapter
- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 117178)
- IAIAAsa (Membership No.: 3619)

Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

EMPLOYMENT

Date	Company	Roles and Responsibilities
October 2018 - Current:	Savannah Environmental (Pty) Ltd	<p>Environmental and Permitting Consultant</p> <p><u>Tasks include:</u> Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management.</p>

Date	Company	Roles and Responsibilities
February 2015 – September 2018	EOH Coastal and Environmental Services (Pty) Ltd	Senior Environmental Consultant <u>Tasks included:</u> Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations.
March 2014 – February 2015	Invasive Species Unit (ISU), Environmental Resources Management Department (ERMD), City of Cape Town	Professional Officer <u>Tasks included:</u> Managed the Monitoring & Evaluation project portfolio, entailing the establishment of an invasive species monitoring & evaluation system for the ISU, as well as GIS database management, quality assurance and reporting thereof. Position required managing a small staff compliment (dealing directly with GIS database management), managing time and budgets for the monitoring division, conducting monitoring trials and research, writing species management plans as well as handling the GIS database, quality control, verification and integrity for the ISU.
January 2012 – March 2014	University of Stellenbosch	Departmental Assistant <u>Tasks included:</u> Technical editing of academic reports. Formatting of PhD and MSc reports on a weekly basis, with short turnaround time and good quality feedback.
January 2011 – January 2012	University of the Witwatersrand	Departmental Assistant <u>Tasks included:</u> Responsible for practical tutorials and marking of 1st year medical students. Included zoology and botany.
January 2006 – November 2010 (part time)	Codeon Networking CC	Co-founder and web developer <u>Tasks included:</u> Small business owner, responsible for all facets of the business. Self-taught HTML, CSS, PHP and MySQL. Won and produced two medium enterprise websites serving the gaming community. Websites required user profiles & permissions, CMS system and automated payment options as functionality. Development

Date	Company	Roles and Responsibilities
		and maintenance of a user database and account management system.

PROJECT EXPERIENCE

Project experience includes project management, EIA, BA and EMPr documentation development, integrated water use license applications, general authorisations, specialist botanical and ecological impact assessments, specialist wetland delineation and impact assessments, GIS applications and mapping, compliance auditing and monitoring, vegetation rehabilitation and monitoring plans, integrated waste management plans and waste licencing, mining right & permits, as well as prospecting rights applications.

Industry experience includes the waste sector (IWMP's and waste licencing), road and rail infrastructure (BAR, S&EIR, WUL/GA, Waste Licence), ports and harbours (management plans), private sector clients across varying industries (various permits), mining sector (BAR, S&EIR, mining permits and rights, prospecting rights), conservation sector (biodiversity plans), renewable energy industry (BAR, S&EIR) as well as the gas and oil industry (biodiversity reports).

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant
G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant

Amendments

Project Name & Location	Client Name	Role
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Mosselbay Energy EA Amendment, Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant
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GAS PROJECTS

Screening Studies

Project Name & Location	Client Name	Role
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant
Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL material sourcing BAR (DMR), Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 Borrow Pit authorisation, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant

Rehabilitation Studies

Project Name & Location	Client Name	Role
Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist
Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant
Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,
SANRAL Caledon N2 Section 3 road upgrade ECO Audits and Reporting, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, ECO

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

Project Name & Location	Client Name	Role
VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant
Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)**Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
S&EIR authorisation for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL Masekwaspoort N1 Road Upgrade BA, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment, Polokwane, Limpopo Province	SANRAL SOC Ltd & KBK Engineers	Environmental consultant
Boshoek Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 road upgrade Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works development BAR, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction Monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, ECO

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

Project Name & Location	Client Name	Role
Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade and quarrying, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Masekwaspoort N1 road upgrade water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
Boshoek Loop Rail Upgrade water use licence application, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
SANRAL Bierspruit R510 road water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Aquatic specialist, Public Participation
SANRAL Caledon N2 Section 3 road upgrade water use licence and specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, Public Participation

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Scoping and EIR authorisation, Water Use Licence, for the Ganspan tourism facility development, Jan Kempdorp, Northern Cape	Frances Baard Local Municipality	Project Manager, Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
Basic Assessment 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
Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation

Screening Studies

Project Name & Location	Client Name	Role
Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist
DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	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

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

Project Name & Location	Client Name	Role
Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist
Hope Village township development water use licence, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation
Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant
PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Engineering	Project Manager, Environmental consultant
PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Engineering	Environmental consultant
Corner Berg and Drooge Street township development water use licence application, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Corner Kort and Bree Street township development water use licence, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Bloekombos (Kraaifontein) hospital water use licence application, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist

SPECIALIST STUDIES

Project Name & Location	Client Name	Role
Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province	Transnet SOC Ltd	Wetland specialist
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Botanical specialist
SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Ecological specialist
Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng	Riverside Community Church	Ecological specialist
Barberton IAPS Waste Water Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Aquatic specialist
Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment	Wijnberg Trust	Aquatic specialist
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Ecological specialist
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	GIS specialist
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Faunal specialist (assistant)
Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Wetland specialist Botanical specialist

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:	21 years' experience as a Public Participation Practitioner and Stakeholder Consultant

VOCATIONAL EXPERIENCE

Over the past 21 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 projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation 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.

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:

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

Professional Society Affiliations:

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

EMPLOYMENT

Date	Company	Roles and Responsibilities
<p>November 2018 – current</p>	<p>Savannah Environmental (Pty) Ltd</p>	<p>Public Participation and Social Consultant</p> <p><u>Tasks include:</u></p> <p><i>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.</i></p> <p><i>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.</i></p>
<p>2016 – October 2018</p>	<p>Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)</p>	<p>Independent Consultant</p> <p>Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:</p> <p><u>Tasks include:</u></p> <p><i>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.</i></p> <p><i>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project</i></p>

		<p>affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved</p> <p><u>Clients:</u> SiVEST Environmental, Savannah Environmental, Baagi Environmental; Royal Haskoning DHV (previously SSI)</p>
2013 - 2016	<p>Zitholele Consulting</p> <p>Contact person: Dr Mathys Vosloo Contact number: 011 207 2060</p>	<p>Senior Public Participation Practitioner and Project Manager</p> <p><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.</p>
2011 - 2013	<p>Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)</p>	<p>Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements</p> <p><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.</p> <p>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</p> <p><u>Clients:</u> Bohlweki Environmental, Bembani Sustainability (Pty) Ltd; Naledzi Environmental</p>
2007 – 2011	<p>SiVEST SA (Pty) Ltd</p> <p>Contact person: Andrea Gibb Contact number: 011 798 0600</p>	<p>Unit Manager: Public Participation Practitioner</p> <p><u>Tasks included:</u> Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation</p>

		tasks as outlined as above and including financial management of public participation processes.
2005 – 2006	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	<p>Independent Consultant Public Participation and Stakeholder Engagement Practitioner</p> <p><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.</p> <p>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.</p> <p><u>Clients:</u> Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)</p>
1997 - 2004	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	<p>Independent Consultant: Public Participation Practitioner.</p> <p><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.</p> <p>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</p>

		<p>information communicated to and consultation with all level of stakeholders involved.</p> <p><u>Clients:</u> Greyling Liaison (currently Golder Associates); Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental</p>
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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
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	IL Energy EAP: Savannah Environmental	Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
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	

Project Name & Location	Client Name	Role
<p>Tlitseng PV, including Substations & Power Lines, Lichtenburg, North West Province</p> <p>Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province</p> <p>Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province</p>	<p>BioTherm Energy EAP: SiVEST</p>	<p>Public Participation, Landowner and Community Consultation</p>
<p>Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province</p> <p>De Aar Solar Energy Facility, De Aar, Northern Cape Province</p> <p>Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province</p> <p>Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province</p> <p>Platsjambok East PV, Prieska, Northern Cape Province</p>	<p>Surya Power EAP: SiVEST</p> <p>South Africa Mainstream Renewable Power Developments EAP: SiVEST</p>	<p>Public Participation, Landowner and Community Consultation</p> <p>Public Participation, Landowner and Community Consultation</p>
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
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Basic Assessments and Environmental Management Programmes – Located within the Renewable Energy Development Zones (REDZ)

Project Name & Location	Client Name	Role
Moeding Solar PV Solar Energy Facility, Vryburg, North West Province	Kabi Solar EAP: Savannah Environmental	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 EAP: Savannah Environmental	

RENEWABLE POWER GENERATION PROJECTS: 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 – Located within the Renewable Energy Development Zones (REDZ)

Project Name & Location	Client Name	Role
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		

Environmental Authorisation Amendments

Project Name & Location	Client Name	Role
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Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	South Africa Mainstream Renewable Power Developments EAP: SiVEST	Public Participation
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RENEWABLE POWER GENERATION PROJECTS: 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	Public Participation

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
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		
Mookodi Integration Project, North-West Province		Public Participation,
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	

Facilitation

Project Name & Location	Client Name	Meeting Type
Bloemfontein Strengthening Project, Free State Province	Eskom Holdings EAP: Baagi Environmental	Public Meetings
Moidraai-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		Public Meetings

Basic Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
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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		Public Participation, Landowner and Community Consultation
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	Eskom Holdings EAP: Zitholele	Public Participation, Landowner and Community Consultation
Vaalbank 132Kv Power Line, Free State Province		Public Participation, Landowner and Community Consultation
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		Public Participation, Landowner and Community Consultation
Ndumo-Geziza 132kV Power Line, KwaZulu-Natal Province		Public Participation, Landowner and Community Consultation

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

CONVENTIONAL POWER GENERATION PROJECTS (COAL, GAS AND ASSOCIATED INFRASTRUCTURE)

Stakeholder Engagement

Project Name & Location	Client Name	Role
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	Department of Water and Sanitation	Secretarial Services
Orange River Bulk Water Supply System	Golder Associates	
Levuvu-Letaba Resources Quality Objectives		

Facilitation

Project Name & Location	Client Name	Meeting Type
Thabametsi IPP Power Station, Limpopo Province	Thabametsi Power Company EAP: Savannah Environmental	Focus Group Meeting & Public Meeting

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Richards Bay Combined Cycle Power Plant, Richards Bay, Kwa-Zulu Natal Province (Impact Phase)	Eskom Holdings EAP: Savannah Environmental	Public Participation
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	Public Participation, Landowner and Community Consultation
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		Public Participation, Landowner and Community Consultation
Hendrina Ash Dam Expansion, Mpumalanga Province		Public Participation, Landowner and Community Consultation

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

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	Department of Water and Sanitation Golder Associates	Secretarial Services
Levuvu-Letaba Resources Quality Objectives	Department of Water and Sanitation Golder Associates	Secretarial Services
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	Samancor Chrome (Pty) Ltd EAP: Environmental Science Associates	Public Meeting
SANRAL N4 Toll Highway Project (2 nd Phase), Gauteng & North West Provinces	Department of Transport EAP:	Public Meetings

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	Transnet EAP: Bohlweki Environmental	Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
Realignment of the Bulshoek Dam Weir near Klaver and the Doring River Weir near Clanwilliam, Western Cape Province	Dept of Water and Sanitation EAP: Zitholele	Public Participation

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

<i>Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe</i>	<i>Applicant: Green Fuel EAP: SiVEST</i>	<i>Public Participation & Community Consultation</i>
<i>BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga</i>	<i>BHP Billiton Group EAP: Jones & Wagener</i>	<i>Public Participation</i>



CURRICULUM VITAE OF HERMIEN SLABBERT

Profession : Environmental Consultant

Specialisation: Environmental Permitting, Project Management, Environmental Impact Assessments, Geographical Information Systems (GIS), Project administration

Work Experience: 2 years of experience in renewable energy

VOCATIONAL EXPERIENCE

Hermien Slabbert has two years of experience in the renewable energy sector, specifically relating to Solar Photovoltaic projects. She has experience in project management as well as environmental permitting.

SKILLS BASE AND CORE COMPETENCIES

- Project management
- Environmental Permitting
- Administrative tasks
- GIS Mapping

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom
- B.Sc. Degree, Geography and Geology (2013), North-West University, Potchefstroom

Courses:

- Environmental Law (2017), Centre for Environmental Management, Johannesburg
- Occupational Health and Safety law (2018), Centre for Environmental Management, Johannesburg

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2019 – current	Savannah Environmental (Pty) Ltd	<p>Trainee Environmental Consultant</p> <p>Tasks include: Environmental Impact Assessment Reports, Basic Assessments and Environmental management programmes; Specialist management and the Process of EIA Applications.</p> <p>GIS (utilising ArcGIS)</p> <p>Tasks include: Analysis and manipulation of data and compilation of maps.</p>
January 2017 – October 2017	FedGroup Holdings (Pty) Ltd	<p>Project coordinator</p> <p>Tasks include:</p> <p>Project coordination, project finance, financial modelling, project proposals</p>
August 2015- December 2016	Subsolar Energy (Pty) Ltd	<p>Project Assistant</p> <p>Tasks include:</p> <p>Environmental Permitting, Specialist management, Project management, Site selection</p>

PROJECT EXPERIENCE**RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES****Part 1 Amendment Applications**

Project Name & Location	Client Name	Role
Rhebokfontein WEF, Western Cape Province	Moyeng Energy	EAP
Dorper WEF, Eastern Cape Province	Dorper Wind Farm	EAP
West Coast One WEF, Western Cape Province	Aurora Wind	EAP

Part 2 Amendment Applications

Project Name & Location	Client Name	Role
Great Karoo WEF, Northern Cape Province	African Clean Energy Developments	EAP
Gunstfontein WEF, Northern Cape Province	African Clean Energy Developments	EAP

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES**Project Management**

Project Name & Location	Client Name	Role
Gamma SEF, North West Province	Subsolar	Project Manager
Khubu SEF, North West Province	Subsolar	Project Manager
Boitshoko SEF, Northern Cape Province	Subsolar	Project Manager
Camel Thorn SEF, Northern Cape Province	Subsolar	Project Manager
Beta SEF, Free state Province	Subsolar	Project Manager

Oryx SEF, Free state Province	Subsolar	Project Manager
Kappa SEF, North West Province	Subsolar	Project Manager
Delta SEF, North West Province	Subsolar	Project Manager

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
Steynsrus PV 1, Free state Province	Cronimet Power Solutions	GIS Consultant
Steynsrus PV 2, Free state Province	Cronimet Power Solutions	GIS Consultant
Heuningspruit PV 1, Free state Province	Cronimet Power Solutions	GIS Consultant
Aggeneys PV 1, Northern Cape Province	ABO Wind	GIS Consultant
Aggeneys PV 2, Northern Cape Province	ABO Wind	GIS Consultant
Sirius PV3, Northern Cape Province	Sola future	GIS Consultant
Sirius PV4, Northern Cape Province	Sola future	GIS Consultant

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

Project Name & Location	Client Name	Role
Gamma SEF, North West Province	Subsolar	Project Manager
Camel Thorn SEF, Northern Cape Province	Subsolar	Project Manager
Boitshoko SEF, Northern Cape Province	Subsolar	Project Manager
Khubu SEF, North West Province	Subsolar	Project Manager

GAS PROJECTS

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
Richards Bay Combined Cycle Power Plant (CCPP) power plant, KwaZulu-Natal (EIA phase)	Eskom	GIS Consultant

TRANSPORT SECTOR PROJECTS

Basic Assessment

Project Name & Location	Client Name	Role
Dwarsrug Access Road, Northern Cape Province	Mainstream Renewable Energy Developments	EAP

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
Dwarsrug Access Road, Northern Cape Province	Mainstream Renewable Energy Developments	GIS Consultant

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

Basic Assessments

Project Name & Location	Client Name	Role
Nigel gas transmission pipeline, Gauteng Province	Energy Group	EAP

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
Nigel Gas Transmission Pipeline, Gauteng Province	Energy Group	GIS Consultant

<i>Wilmar Oil Pipeline</i>	<i>Wilmar Processing</i>	<i>GIS Consultant</i>
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GRID INFRASTRUCTURE PROJECTS

Geographical Information Systems (GIS)

Project Name & Location	Client Name	Role
<i>Bloemhoek 1 Power Line, Northern Cape Province</i>	<i>ABO Wind</i>	<i>GIS Consultant</i>
<i>Bloemhoek 2 Power Line, Northern Cape Province</i>	<i>ABO Wind</i>	<i>GIS Consultant</i>

APPENDIX B:

GRIEVANCE MECHANISM FOR COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

PURPOSE

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

- » Provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting.
- » Builds trust as an integral component of broader community relations activities.
- » Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time consuming legal process.

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

- » Local landowners, communities and authorities must be informed in writing by the Project Company of the grievance mechanism and the process by which grievances can be brought to the attention of the Project Company through its designated representative.
- » A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- » The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).
- » Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- » The meeting should be chaired by the company representative appointed to address grievances. The Project Company must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Project Company.
- » Draft copies of the minutes must be made available to the Complainant and the proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- » In the event that the parties agree to appoint a mediator, the Project Company will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Project Company, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Project Company. The Project Company must provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of the dispute not being resolved, the mediator must prepare a draft report that summarises the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- » The draft report must be made available to the Complainant and the Project Company for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

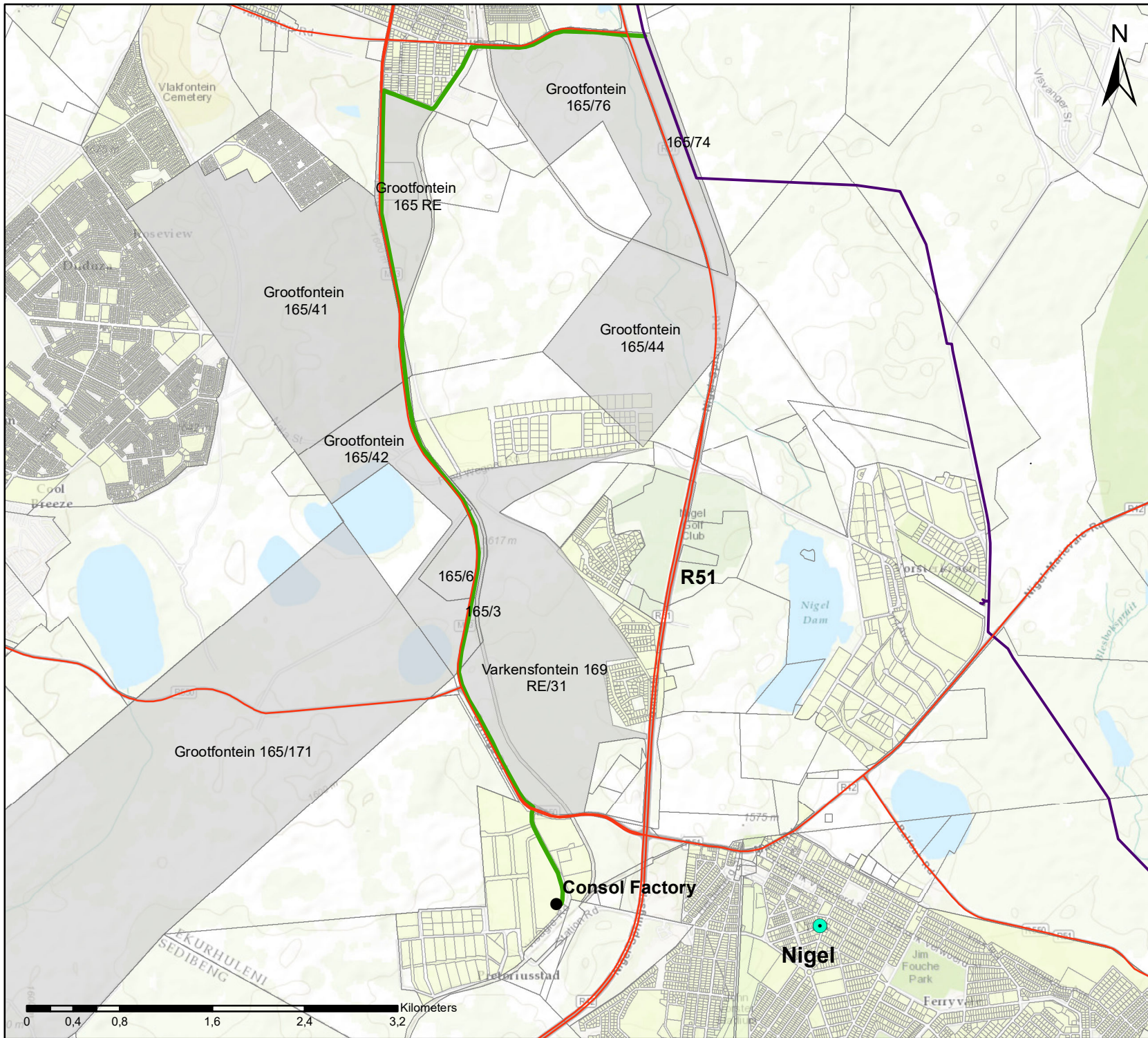
- » Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.

- » Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.
- » Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the proponent, either party may be of the opinion that legal action may be the most appropriate option.

APPENDIX C:

A3 LAYOUT AND SENSITIVITY MAPS



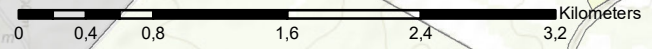
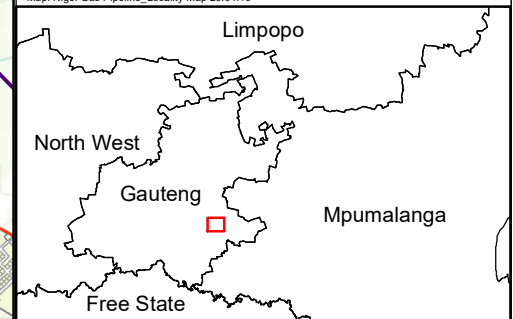
Gas Transmission Pipeline, Nigel, Gauteng Province

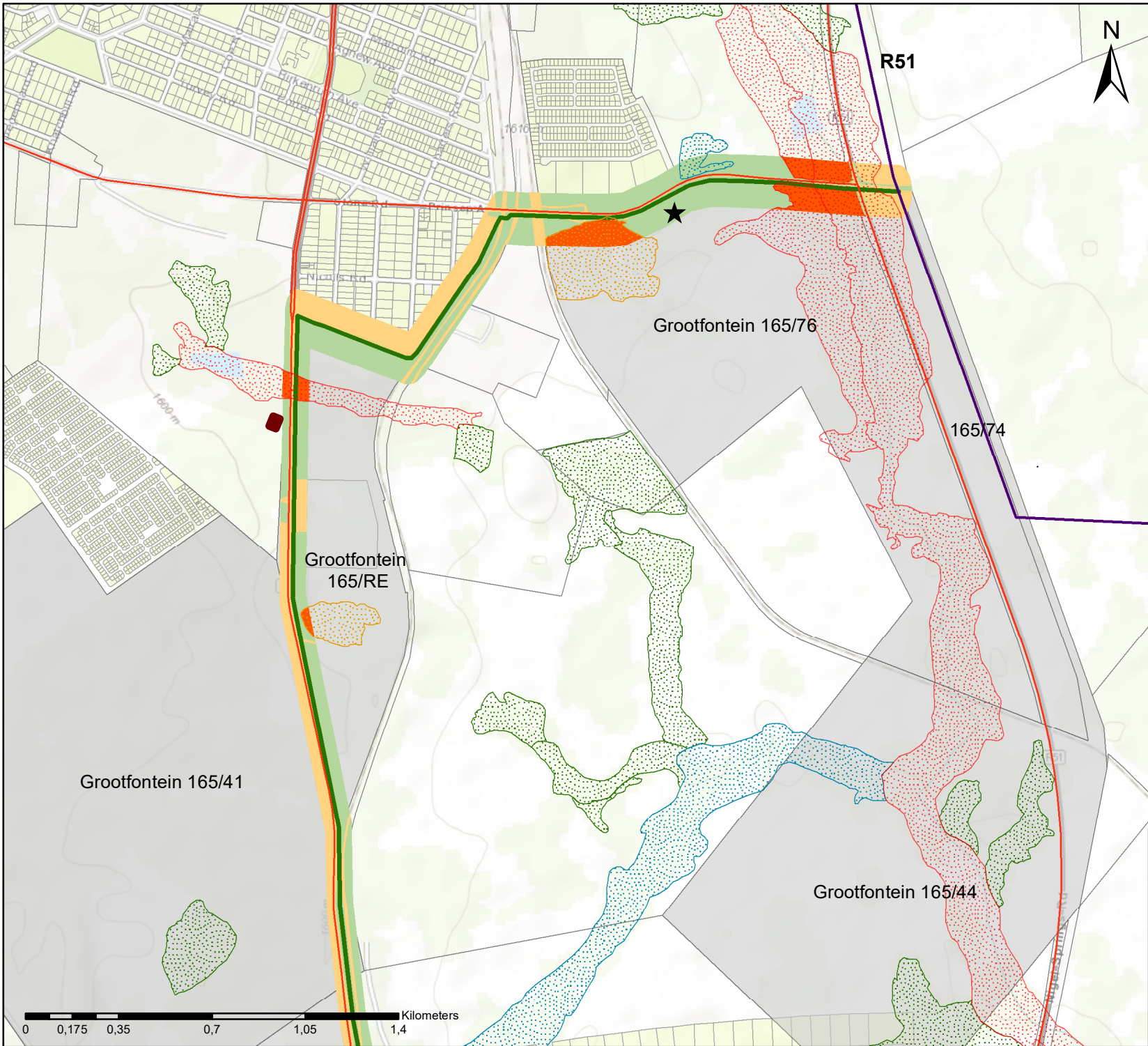
Locality Map

- Legend**
- Nigel
 - Consol Factory
 - Main Road
 - Existing Gas Transmission Pipeline
 - Pipeline Route C
 - Affected Farm Portions
 - Erf
 - Farm Portion

savannah
environmental

Scale:
Projection: LQ29 WGS_1984
Map: Nigel Gas Pipeline_Locality Map 29.04.19





Gas Transmission Pipeline, Nigel, Gauteng Province

Environmental Sensitivity Map: Section 1



Legend

- Main Road
- Existing Gas Transmission Pipeline
- Pipeline Route C
- Affected Farm Portions
- Erf
- Farm Portion

Environmental Sensitivities

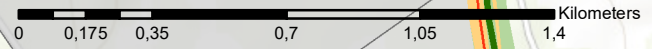
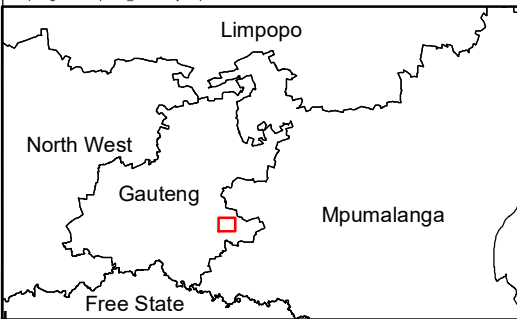
- Heritage Site (Historical Period Settlement: NGP-HP01)
- Heritage Site (Burial Site: NGP-BP02)
- Wetland (High Sensitivity)
- Wetland (Moderate Sensitivity)
- Wetland (Low Sensitivity)
- Wetland (Very Low Sensitivity)

Ecological Sensitivities

- HIGH
- LOW
- NEGLIGIBLE
















Scale: 1
 Projection: LO29 WGS_1984
 Map: Nigel Gas Pipeline_Sensitivity Map 05.05.19



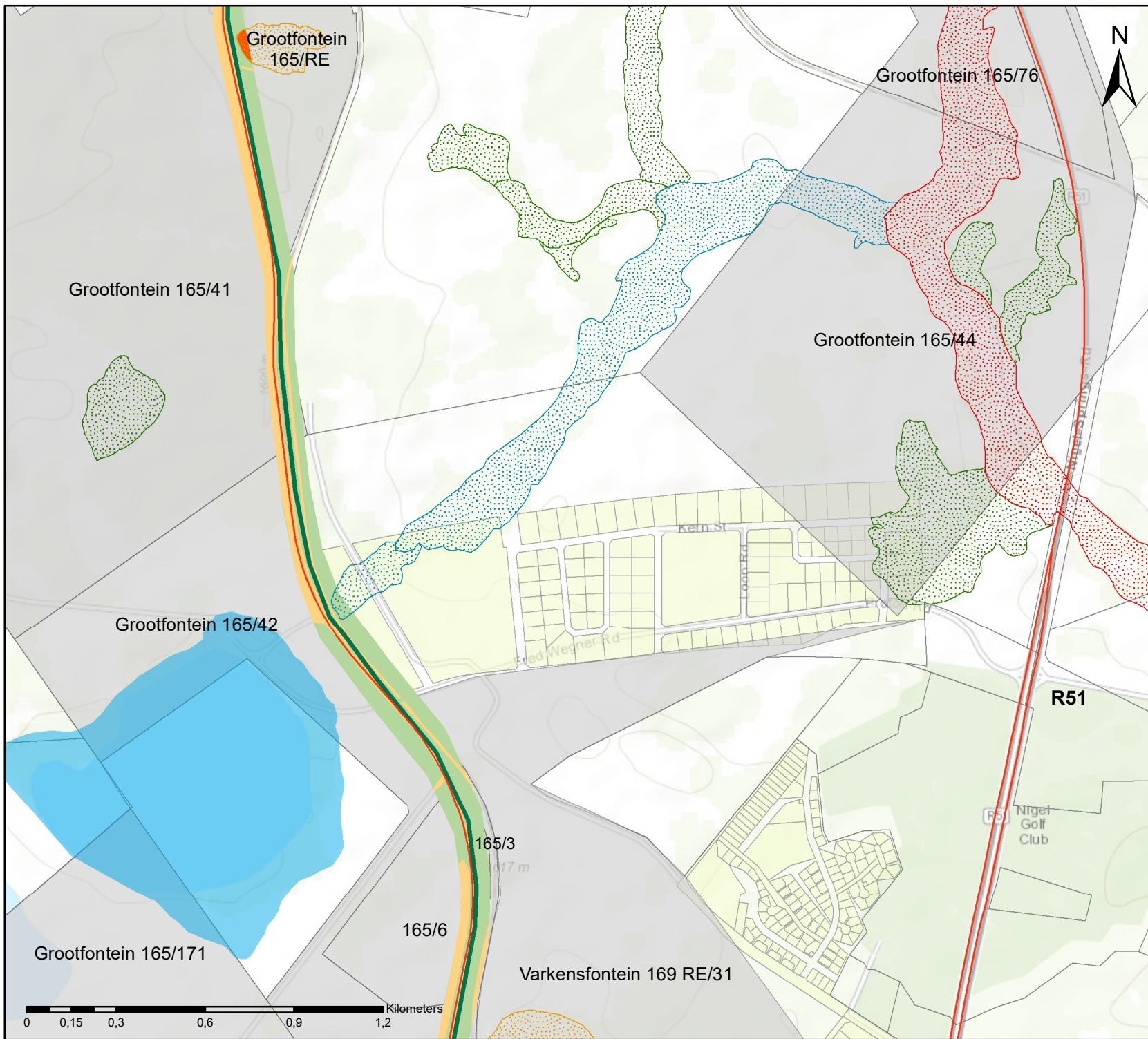
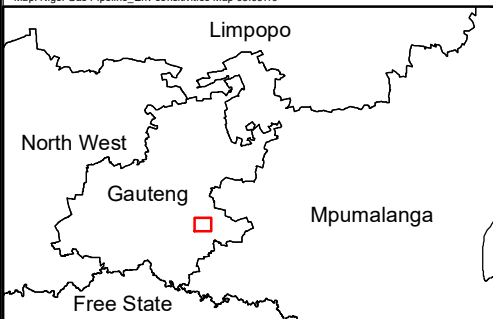
Gas Transmission Pipeline, Nigel, Gauteng Province

Environmental Sensitivity Map: Section 2

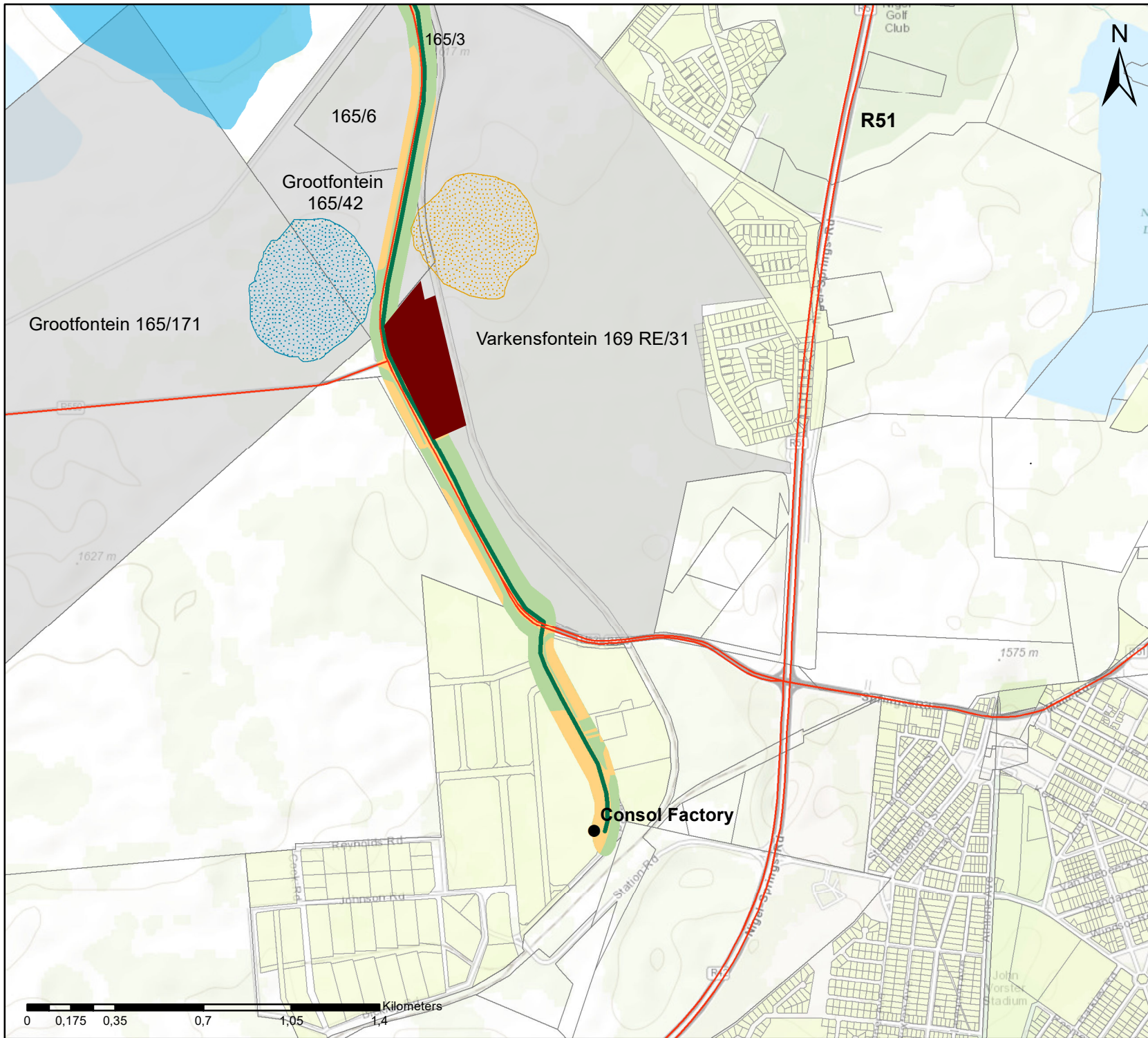
Legend

-  Main Road
 -  Pipeline Route C
 -  Affected Farm Portions
 -  Erf
 -  Farm Portion
- ### Environmental Sensitivities
-  Wetland (High Sensitivity)
 -  Wetland (Moderate Sensitivity)
 -  Wetland (Low Sensitivity)
 -  Wetland (Very Low Sensitivity)
 -  Catchment Basin
- ### Ecological Sensitivities
-  HIGH
 -  LOW
 -  NEGLIGIBLE

Scale:
 Projection: LQ29 WGS_1984
 Map: Nigel Gas Pipeline_Env sensitivities Map 05.05.19



0 0,15 0,3 0,6 0,9 1,2 Kilometers



Gas Transmission Pipeline, Nigel, Gauteng Province

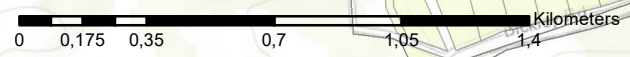
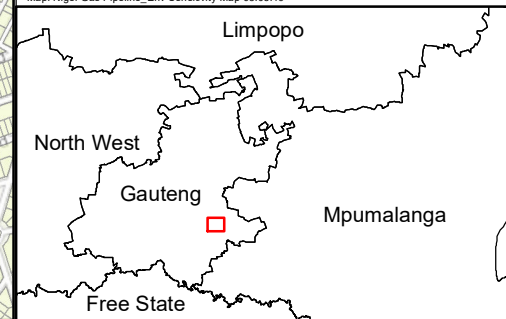
Environmental Sensitivity Map:
Section 3

Legend

- Consol Factory
 - Main Road
 - Pipeline Route C
 - Affected Farm Portions
 - Erf
 - Farm Portion
- Environmental Sensitivities**
- Heritage Site (Burial Site: NGP-BP01)
 - Wetland (Moderate Sensitivity)
 - Wetland (Low Sensitivity)
 - Catchment Basin
- Ecological Sensitivities**
- HIGH
 - LOW
 - NEGLIGIBLE



Scale:
Projection: LQ29 WGS_1984
Map: Nigel Gas Pipeline_Env Sensitivity Map 05.05.19



APPENDIX D:
ALIEN PLANT MANAGEMENT PLAN

ALIEN PLANT MANAGEMENT PLAN

1. PURPOSE

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the construction of the Nigel Gas Pipeline. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal & encroachment.
- Develop and implement a monitoring and control programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

2. RELEVANT ASPECTS OF THE SITE

The disturbance created during the construction phase of the project would leave the site vulnerable to invasion by alien plant species, which would impact diversity and ecological processes within the area. Forty-three (43) invasive species were observed within the project area. Alien plant species currently present in the study area include the following:

Common Name	Taxon name	NEMBA Category Listing (2016)	CARA Listing (1983)
Bailey's wattle	<i>Acacia baileyana</i>	3	3
Green wattle	<i>Acacia decurrens</i>	2	2
Black wattle	<i>Acacia mearnsii</i>	2	2
Century plant	<i>Agave americana</i>	Not listed in Gauteng	Not listed
Sisal	<i>Agave sisalana</i>	2	2
Khaki burr	<i>Alternanthera pungens</i>	Not listed	Not listed
Mexican poppy	<i>Argemone mexicana</i>	Not listed	1
Black jack	<i>Bidens pilosa</i>	Not listed	Not listed
Pom Pom weed	<i>Campuloclinium macrocephalum</i>	1b	1
Indian Shot	<i>Canna indica</i>	Not listed	1
Balloon vine	<i>Cardiospermum grandiflorum</i>	Not listed	1
Spear thistle	<i>Cirsium vulgare</i>	1b	1
Pampas grass	<i>Cortaderia selloana</i>	1b	1
Cosmos	<i>Cosmos bipinnatus</i>	Not listed	Not listed
Large thorn apple	<i>Datura ferox</i>	Not listed	1
Downy thorn apple	<i>Datura stramonium</i>	Not listed	1
River Red Gum	<i>Eucalyptus camaldulensis</i>	Category 1b in Fynbos, Grassland, Savanna, Albany Thicket, Forest and Indian Ocean Coastal Belt	2
Sugar gum	<i>Eucalyptus cladocalyx</i>		2
Rose gum	<i>Eucalyptus grandis</i>		2

Common Name	Taxon name	NEMBA Category Listing (2016)	CARA Listing (1983)
		biomes, but- (ii) Not listed within cultivated land that is at least 50 metres away from untransformed land, but excluding within any area in (a) above. (iii) Not listed within 50 metres of the main house on a farm, but excluding in (a) above. (iv) Not listed in urban areas for trees with a diameter of more than 400 mm at 1000 mm height at the time of publishing of this Notice, but excluding in (a) above.	
Blue morning glory	<i>Ipomoea indica</i>	1b	3 in Gauteng
Common morning glory	<i>Ipomoea purpurea</i>	1b	3
Syringa Tree	<i>Melia azedarach</i>	Not listed	3
Prickly pear	<i>Opuntia ficus indica</i>	1b	1
Common prickly pear	<i>Opuntia stricta</i>	1b	1
Kikuyu	<i>Pennisetum clandestinum</i>	a. 1b in Protected Areas and wetlands in which it does not already occur. b. Not listed elsewhere.	Not listed
Cluster pine	<i>Pinus pinaster</i>	b. 1b elsewhere (i.e. where not in plantations or windrows)	2
Grey poplar	<i>Populus × canescens</i>	2	2
English Oak	<i>Quercus robur</i>	Not listed	Not listed
Silver-leaved nightshade	<i>Solanum elaeagnifolium</i>	1b	1
Apple of Sodom	<i>Solanum linnaeanum</i>	Not listed	Not listed
Common sowthistle	<i>Sonchus oleraceus</i>	Not listed	Not listed
Johnson grass	<i>Sorghum halepense</i>	Not listed	2
Khakibush	<i>Tagetes minuta</i>	Not listed	Not listed
Tipuana tree	<i>Tipuana tipu</i>	3	3
Purple Top	<i>Verbena bonariensis</i>	1b	Not listed
Brazilian verbain	<i>Verbena brasiliensis</i>	1b	Not listed
Veined verbena	<i>Verbena rigida</i>	1b	Not listed
Horseweed	<i>Conyza bonariensis</i>	Not listed	Not listed
Knoppiesvermeer bos	<i>Geigeria burkei</i>	Not listed	Not listed
Watercress	<i>Nasturtium officinale</i>	2	2

Common Name	Taxon name	NEMBA Category Listing (2016)	CARA Listing (1983)
Snake-root	<i>Persicaria serrulata</i>	Not listed	Not listed
Broadleaf plantain	<i>Plantago major</i>	Not listed	Not listed
Slangbos	<i>Seriphium plumosum</i>	Not listed	Not listed

3. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act, 198 alien species were listed as declared weeds and invaders and ascribed to one of the following categories:

- » Category 1: Prohibited and must be controlled.
- » Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
- » Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- » Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- » Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- » Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.
- » Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM:BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

A prevention policy should be considered and established for construction, including regular surveys/monitoring for invasive alien plants during the construction phase, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

A monitoring plan should be developed which are designed to identify Invasive Alien Plant Species shortly after they establish in the project area. 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 throughout the construction phase.

When new Invasive Alien Plant Species are recorded on site, 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 be established on site.

4.2. Containment and control

If any alien invasive plants 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 become uncontrollable. Effective control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

4.3. General Clearing & Guiding Principles

Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses. All clearing

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

» **Clearing Methods**

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance of the soil should be kept to a minimum, as earthworks commonly allow for increased germination of previously dormant invasive species' seeds.

Fire should not be used for alien control or vegetation management at the site, as certain species, in particular invasive *Acacia* species have fire-adapted reproduction strategies and are commonly promoted through the use of fire. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website. <http://www.dwaf.gov.za/wfw/Control/>

» **Mechanical control**

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice (such as invasive *Eucalyptus* and *Acacia* species commonly found on site), need to have the cut stumps or coppiced growth treated with herbicides immediately following the mechanical treatment (within a matter of minutes – to allow for systemic uptake of the control agents). Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- * Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve effective control.
- * All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- * Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- * To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- * Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- * The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- * Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- * Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- * South African Bureau of Standards, Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to “acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container”.

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, forestry and Fisheries.

» **Biological control**

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) must be contacted.

4.4. General management practices

The following general management practices should be encouraged:

- » Establish an ongoing monitoring programme for the construction phase to detect and locate any alien species that may become established and identify the problem species.
- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site during construction and operation.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed. Earthworks should be limited as far as possible, and soil obtained for construction should ideally be sourced from local suppliers (reducing the distances between source and use, and thus limiting the potential for novel species introduction across longer distances).
- » Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.
- » The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely

to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.

- » Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- » Some alien species are best individually pulled by hand and in the case of Opuntia (Prickly pear) removed from the site.
- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken once immediately prior to construction, and monthly for the duration of the construction phase. All aliens identified during these surveys should then be cleared using appropriate means.

4.5. Monitoring

In order to monitor the impact of clearing activities, follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide and assessment of the magnitude of alien invasion on site as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

- » Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.
- » Simple records must be kept of control operations/efforts, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
- » It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring should be implemented to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	Monthly to coincide with surveys

Document & record alien control measures implemented	Record of clearing activities	Monthly to coincide with surveys
Review & evaluation of control success rate	Decline in documented alien abundance over time	Every three months for the duration of the construction phase
During the operational phase of the project, alien plant management will become the responsibility of the regional roads agency.		

APPENDIX E:
STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

1. PURPOSE

It is widely recognised that developments impact negatively on drainage systems. By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding.

This Stormwater Management Plan addresses the management of stormwater runoff from the development site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of storm water management measures and infrastructure are:

- » Annual average rainfall;
- » Rainfall intensities;
- » Soil and vegetation cover;
- » Topography and slope gradients; and
- » Placing of infrastructure and infrastructure design.

The objective of the plan is to provide measures to address runoff from disturbed portions of the site, such that they:

- » do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
- » do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development.
- » do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

This storm water management plan must be updated and refined once the construction/ civil engineering plans have been finalised.

2. RELEVANT ASPECTS OF THE SITE

The region for the gas pipeline project site can be described as flat to slightly undulating plains and low hills supporting short dense grasslands. The catchment is situated at elevations of between 1 541m and 1 670m above sea level. The lowest portion of the basin/catchment comprises an extensive valley-bottom wetland system draining water in a south-eastern direction into the Nigel Dam. Most of the surface flow/drainage within the basin occurs into this system, either as "contained" flows within tributary wetlands (primary source) or as surface runoff and later sub-surface flow. The southernmost point of the proposed gas pipeline route is situated less than 3km north of the Blesbokspruit River.

Nine wetlands were identified during the wetland assessment. Six (6) wetland units rated as being at Moderate to High ecological importance and sensitivity, with the remainder being rated low ecological importance and sensitivity. These wetlands can be divided into three (3) wetland types namely; Channelled Valley-Bottom, Seeps and Depression wetlands. Four low significance impacts and one medium significance impacts were identified for the construction and operation phases. These impacts were all of low significance after mitigation measures.

3. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various stormwater management principles should be considered including:

- » Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- » Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- » Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- » Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- » Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- » Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
- » Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- » Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.

- » Preferably all rivers and drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

A Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Project Manager or Construction Manager. This should include erosion control measures. Requirements for project design include:

- » Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures.
- » The location, area/extent (m²/ha) and specifications of all temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
- » Procedures for storm water flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- » An onsite Project Manager/Construction manager is responsible for ensuring implementation of the erosion control measures on site during the construction period.
- » The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, a Stormwater Control Method Statement must be prepared to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, as indicated in the Stormwater Control Method Statement shall ensure that no construction work takes place before the stormwater control measures are in place.