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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

Prepared for:
City of Cape Town Metropolitan Municipality and GreenCape

DEA Reference Number: 14/12/16/3/3/2/981

March 2017

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report details

Title:	**Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Cape Farm 1183-4-1, Western Cape – DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT**
Purpose of this report:	This Draft Environmental Impact Assessment Report forms part of a series of reports and information sources that are being provided during the Environmental Impact Assessment (EIA) process for the proposed Atlantis Gas-to-Power Project, Western Cape. In accordance with the EIA Regulations, the purpose of the Scoping Report is to: • Provide a description of the proposed project, including a sufficient level of detail to enable stakeholders to raise issues and concerns; • Describe the local planning context and environment within which the project is proposed, to assist further in identifying issues and concerns; • Provide an overview of the process being followed in the Scoping Phase, in particular the public participation process, as well as present the Plan of Study for EIA that would be followed in the subsequent EIA phase; and • Present the issues and concerns identified to date from the stakeholder engagement process, together with an explanation of how these issues will be addressed through the EIA process.
Prepared for:	**City of Cape Town Metropolitan Municipality and GreenCape**
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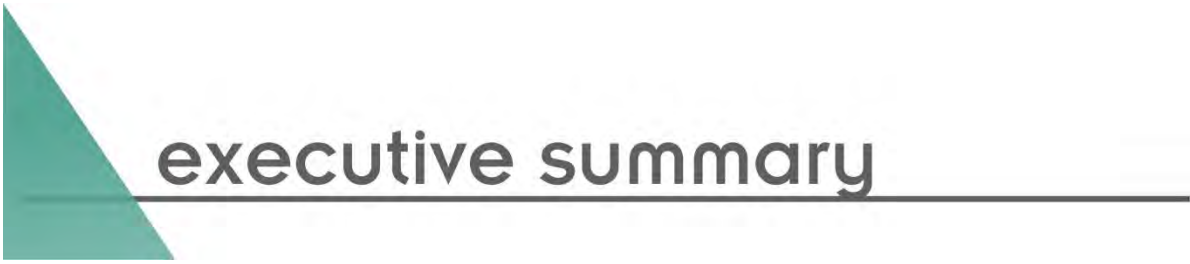

Project Overview

The City of Cape Town (CoCT) and GreenCape have been investigating the feasibility of developing a gas-to-power project within the Atlantis Special Development Zone (SEZ) on portions 1 and Portion 4 of Cape Farm 1183, situated in the Atlantis Industrial area, near Cape Town. The project is referred to as the Atlantis Gas-to-power Project.

The project is located in the Atlantis Industrial Area, within the City of Cape Town Metropolitan Municipality in the Western Cape Province, approximately 40 km north of Cape Town. A combined cycle gas turbine (CCGT) plant uses a cycle configuration of combustion turbines, heat recovery steam generators (HRSG), and steam turbines, to generate electricity. The project will ultimately consist of the following components:

Gas engine, open cycle or combined cycle gas turbine power plant, to generate electricity by burning natural gas, consisting of:

- Combustion/engine turbines located in power blocks and producing up to a maximum of 1500 MW
- Heat recovery steam generators with associated chimneys
- Electrical generator
- Administration buildings.
- Gas pipelines for the reticulation of natural gas on site (not transmission to site).
- Transmission lines for evacuation of power.

Need for the Project

South Africa is an energy intensive country, largely as a result of our historic economic focus on energy intensive industries such as mining and primary metal processing. With current energy and electricity demands projected to continue increasing, new investments in electricity generation capacity are required. Future increases in electricity demand are particularly expected for the regions around the Western Cape. In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) will be developed by the Department of Energy and will set out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. The introduction of private sector generation has multiple benefits and will contribute greatly to the diversification of both the supply and nature of energy production and enable the benchmarking of performance and pricing.

Liqified Natural Gas (LNG) has a significantly lower emission profile than coal fired power, in addition this green technology can provide balancing power for an increased roll out of renewable energy. If this project is successful, a key off-taker of LNG will allow a regional gas economy to develop around it, unlocking more fuel switching opportunities and a significantly lower emissions path for South Africa.

Project Description

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase.

Linked to enhancing energy production within South Africa, the Atlantis gas-to-power facility proposed by The City of Cape Town will cover an approximate area of 38.65 hectares (ha).

Two technology options are currently under consideration for this project, namely, gas turbines or gas reciprocating engines. A combined cycle gas turbine (CCGT) plant uses a cycle configuration of combustion turbines, heat recovery steam generators (HRSG), and steam turbines, to generate electricity. A gas engine plant may operate in either simple cycle mode (OCGE) or combined cycle mode (CCGE) whereby the plant will consist of a series of gas engines and heat recovery steam generators (HRSG) with steam turbines to generate electricity. The proposed project will make use of either Open Cycle Gas Turbine (OCGT); Combined Cycle Gas Turbine (CCGT); Open Cycle Gas Engine (OCGE) or Combined Cycle Gas Engine (CCGE) technology to generate electricity from natural gas. The Applicant is proposing to develop a facility with a possible maximum installed capacity of 1500 MW.

The project will ultimately consist of the following components:

A gas power plant, to generate electricity by burning natural gas, consisting of:

- A Gas Turbine or Gas Engine hall;
    - Up to 4 Combustion turbine and generator sets producing approximately 400 MW each (max 1500 MW) or multiple Combustion engine and generator sets producing approximately 20 MW each (max 800 MW).
- Heat recovery steam generators;
- Dry cooling radiator systems; and
- Building Infrastructure:
    - Offices;
    - Operational and maintenance control centre;
    - Warehouse/workshop;
    - Ablution facilities;
    - On-site substation building; and
    - Guard House.
- Associated Infrastructure
    - Associated electrical infrastructure at the Eskom Substation/connection points (including but not limited to transmissions lines to the substation)
    - Gas pipelines for the reticulation of natural gas on site (not transmission to site)
    - Access roads;
    - Internal roads;
    - Fencing;
    - Maintenance and cleaning area;
    - Stormwater channels;
    - Water pipelines; and
    - Temporary work area during the construction phase (i.e. laydown area).

Need for an Environmental Impact Assessment

As noted above, in terms of the EIA Regulations promulgated under Chapter 5 of the NEMA published in GN R982, R983, R984 and R985 on 4 December 2014 and enforced on 8 December 2014, a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 2 listed in GN R984 (Listing Notice 2):

"*2. The development or development and related operation of facilities or structures, including associated structures and infrastructure, for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more, excluding where such development for photovoltaic installations occurs within an urban edge.*"

Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed project requires authorisation from the National DEA, acting in consultation with other spheres of government.

The purpose of the EIA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The Environmental Assessment therefore needs to show the Competent Authority, the DEA; and the project proponent, City of Cape Town, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

Approach to the EIA Process

The Applications for EA for the Scoping and EIA Project were submitted to the DEA via courier on 19 October 2016, together with the Scoping Report for comment. The DEA acknowledged receipt of the Scoping Report and Application for EA on 26 October 2016 via email. A DEA EIA Reference Number was assigned to the Scoping and EIA Project, as noted above.

The Scoping Report was made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 19 October 2016 to 30 November 2016.

The comments received from stakeholders during the 30-day review were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in January 2017, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 22 of the 2014 NEMA EIA Regulations. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 1 February 2017, which enabled the commencement of the impact assessment phase.

The EIA Report is now being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making. The EIA Report is available at the Avondale Public Library. An electronic version of this report is also available on the following project website: https://www.csir.co.za/environmental-impact-assessment. Written notifications, hard copies and/or CDs containing the document were sent to key stakeholders, including authorities.

The results of the specialist studies and other relevant project information are summarised and integrated into the EIA Report. Part B of this EIA Report includes an Environmental Management Programme (EMPr). The EMPr is based on the recommendations made by specialists for design, construction, operation and decommissioning of the proposed project.

IMPACT ASSESSMENT AND MANAGEMENT ACTIONS

This section provides a summary of the main impacts identified and assessed by the specialists in the EIA Report. The significant impacts and corresponding impact significance ratings before and after mitigation and the key associated mitigation and management measures are summarised in this section. *Note: Please see Chapter 6 for the full impact assessment.*

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
Ecological/Biodiversity Impact Assessment	**Construction Phase:** • Habitat loss • Species loss • Loss of ecological processes • Soil erosion • Spread of alien plants **Operational Phase:** • Fencing out potential grazers and fauna • Proliferation of aliens **Decommissioning Phase:** • Damage of vegetation and habitat types	**Pre-Construction and Construction Phases:** ▪ Only acceptable mitigation measure is the Biodiversity Offset which is in place for the entire Atlantis SEZ (Appendix R). ▪ An initial pre-construction clearance of all exotic vegetation on site should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase and may be incorporated into an exotic weed control plan for the site. **Operational Phase:** ▪ Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the electric fence (i.e. tortoise). ▪ Adopt "dry" cleaning methods, such as dusting and sweeping the site before washing down. **Decommissioning Phase:** ▪ Conduct monitoring of the land conditions and redress of exotic weeds found present on site.	Negative: High	Negative: Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
Risk Impact Assessment	**Operational Phase:** • Loss of containment of diesel, LNG, hydrogen, ammonia and chlorine resulting in the formation of combustible liquids/gases/toxic clouds that could result in a explosion/fire which could destroy assets as well as injuring or killing people.	**Operational Phase:** • Proper engineering designs and layouts to minimise off-site impacts. • Spill containment is a legal requirement.	Negative: Moderate	Negative: Low
Heritage Impact Assessment (Archaeology and Palaeontology)	**Construction Phase** ▪ Damage to or destruction of archaeological and palaeontological resources. ▪ Alteration of cultural landscape and sense of place. **Operational Phase:** ▪ Impacts to the cultural and natural landscape. **Decommissioning Phase:** • Alteration of the cultural and natural landscape	**Construction Phase:** ▪ The construction team should be informed of the possibility of encountering graves and should be encouraged to report any suspicious-looking stone features prior to disturbance; ▪ The potential grave should be avoided with a buffer of at least 5 m or else tested and, if necessary, exhumed prior to construction; ▪ The built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and ▪ If any paleo/archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.	Negative: Low	Negative: Very Low
Air Quality Impact Assessment	**Construction Phase:** ▪ Increase in traffic generation. ▪ Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction	**Construction and Decommissioning Phases:** • Loads on vehicles carrying dusty construction materials should be covered • Loading and unloading bulk construction	Negative: Low	Negative: Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
	equipment. **Operational Phase:** ▪ Air Emissions to the receiving environment as a result of the 1500 MW CCGT operation (gas-to-power) ▪ SO_2 ▪ NO_2 ▪ PM_{10} ▪ Benzene ▪ CO **Decommissioning Phase:** • Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment.	should be in areas protected from the wind on in calm conditions • Vehicles carrying dusty materials should be cleaned before leaving the site • Limit access to construction site to construction vehicles only • Impose vehicle speed restrictions on the construction site • Maintain high moisture content on exposed surface and roads by spraying with water • Maintenance programme for construction vehicles to ensure optimum performance reduced emissions **Operational Phase:** • No mitigation measures proposed by the specialist for operations. • Abide by National Ambient Air Quality Standards (NAAQS) (GN 1210 of 24 Dec 2009 and GN 486 of 29 June 2012).		
Avifauna Impact Assessment	**Construction and Decommissioning Phases:** • Displacement of Red List species as a result of habitat loss or transformation • Construction of facility: Displacement of Red List species as a result of disturbance	**Construction and Decommissioning Phases:** • Construction activity should be restricted to the immediate footprint of the infrastructure. • Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of Red List species. • Measures to control noise should be applied	Negative: Moderate	Negative: Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
	Operational Phase • Mortality of Red List species due to collision with power line earth wire/conductor	according to current best practice in the industry. • An avifaunal walk-through of the final power line route must be conducted to identify Red List species that may be breeding within the power line corridor to ensure that the impacts to breeding species (if any) are adequately managed **Operational Phase** • High risk sections of power line must be identified by a qualified avifaunal specialist during the walk-through phase of the project, once the alignment has been finalized. If power line marking is required, bird flight diverters must be installed on according to Eskom guidelines (APPENDIX 2 of the specialist study).		
Noise Impact Assessment	**Construction and Decommissioning Phases:** • Noise emissions resulting from construction and decommissioning activities. **Operational Phase** • Noise emissions resulting from the operational activities	**Construction and Decommissioning Phases:** • Ensuring that all operators of construction equipment receive proper training in the use of the equipment and that the equipment is serviced regularly. • All blasting and piling driving, if required, should only occur during the day. • All reverse noise emitting warning devices on mobile vehicles should be set as low as possible. • An environmental noise monitoring survey should be conducted during the construction	Negative: Low	Negative: Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
		phase to assess the impact and recommend further actions if required. **<u>Operational Phase</u>** • All buildings should be designed to acoustically contain as much of the noise emissions as possible. • Ensuring that all equipment that produces a high noise impact is placed inside buildings that have been designed to reduce noise emissions. • All buildings containing high noise emissions should be housed in buildings that have solid walls (at least 200mm thick) of at least a sound reduction index (Rw) of Rw55-60. • All ventilation outlets are properly attenuated. • All air intakes are fitted with attenuators • All exhaust stacks are fitted with attenuators • All access doors to the high noise buildings are kept closed when not in use.		

Overall Evaluation by the Environmental Assessment Practitioner

Based on the findings of the specialist studies, which all recommend that the proposed project can proceed and should be authorised by the DEA, the proposed project is considered to have an overall low negative environmental impact and an overall moderate positive socio-economic impact (with the implementation of respective mitigation and enhancement measures).

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures and monitoring requirements. These measures will be undertaken to promote conservation by avoiding unacceptable impacts to the receiving environment and through appropriate monitoring and management plans included in the EMPr (Part B of the EIA Report).

The outcomes of this project therefore succeeds in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in Atlantis SEZ. The findings of this EIA show that all natural resources will be used in a sustainable manner, while the benefits from the project will promote justifiable economic and social development.

Taking into consideration the findings of the EIA Process and given the national and provincial strategic requirements for infrastructure development and energy generation, it is the opinion of the EAP that the project benefits outweigh the costs and that the project will make a positive contribution to steering South Africa on a pathway towards adequate energy provision for the future. Provided that the specified mitigation measures are applied effectively, it is recommended that the project receive EA in terms of the 2014 EIA Regulations promulgated under the NEMA.

glossary

AEL	Air Emissions License
ADT	Average Daily Traffic
AGIS	Agricultural Geo-Referenced Information System
BGIS	Biodiversity Geographic Information System
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
CCGT	Closed Combined Gas Turbine
CoCT	City of Cape Town
CSIR	Council for Scientific and Industrial Research
DAFF	National Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DMR	National Department of Minerals Resources
DOE	Department Of Energy
DOT	National Department of Transport
DSR	Draft Scoping Report
DWA	National Department of Water Affairs
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Protection Areas
FSR	Final Scoping Report
GA	General Authorization
GG	Government Gazette
GIS	Geographical Information Systems
GN R	Government Notice Regulation
HWC	Heritage Western Cape
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan

kWh	Kilowatt Hours
MW	Megawatts
NBA	South African National Parks
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Protected Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NPAES	National Protected Expansion Strategy
NWA	National Water Act (Act No. 36 of 1998)
PES	Present Ecological State
PPA	Power Purchasing Agreement
S&EIR	Scoping and Environmental Impact Reporting
SABAP2	South African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SEZ	Special Economic Zone
TDS	Total Dissolved Solids
ToR	Terms of Reference
WASA	Wind Atlas of South Africa
WMA	Water Management Area
WULA	Water Use License Application

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 1:

Introduction

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1. INTRODUCTION

The City of Cape Town (CoCT): Property Management Department in collaboration with GreenCape is proposing to develop a Gas-to-Power facility and associated electrical infrastructure in the Atlantis Special Economic Zone (SEZ) on portions 1 and portion 4 of Cape Farm 1183, now known as Erf 277, in the Atlantis Industrial Area approximately 40 km north of Cape Town. Figure 1.1 below shows the overall locality of the proposed 1500 MW Atlantis Gas-to-Power facility and associated alternatives considered in the Scoping Phase.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 38282 and Government Notice (GN) R982, R983, R984 and R985 on 8 December 2014, a full Scoping and Environmental Impact Assessment (EIA) Process is required for the construction of the proposed Atlantis Gas-to-Power facility. The Applicant has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the EIA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activity.

1.1. PROJECT APPLICANT AND PROJECT OVERVIEW

South Africa is an energy intensive country, largely as a result of our historic economic focus on energy intensive industries such as mining and primary metal processing. With current energy and electricity demands projected to continue increasing, new investments in electricity generation capacity are required. Future increases in electricity demand are particularly expected for the regions around the Western Cape. In terms of the New Generation Regulations, the Integrated Resource Plan (IRP), developed in March 2011, by the Department of Energy set out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. The introduction of private sector generation, as proposed in the Electricity Regulation Act (Act no. 4 of 2006), has multiple benefits and will contribute greatly to the diversification of both the supply and nature of energy production and enable the benchmarking of performance and pricing.

GreenCape is a sector development agency established by the CoCT and Western Cape Provincial Government with the task of unlocking and unblocking opportunities in the Green Economy.

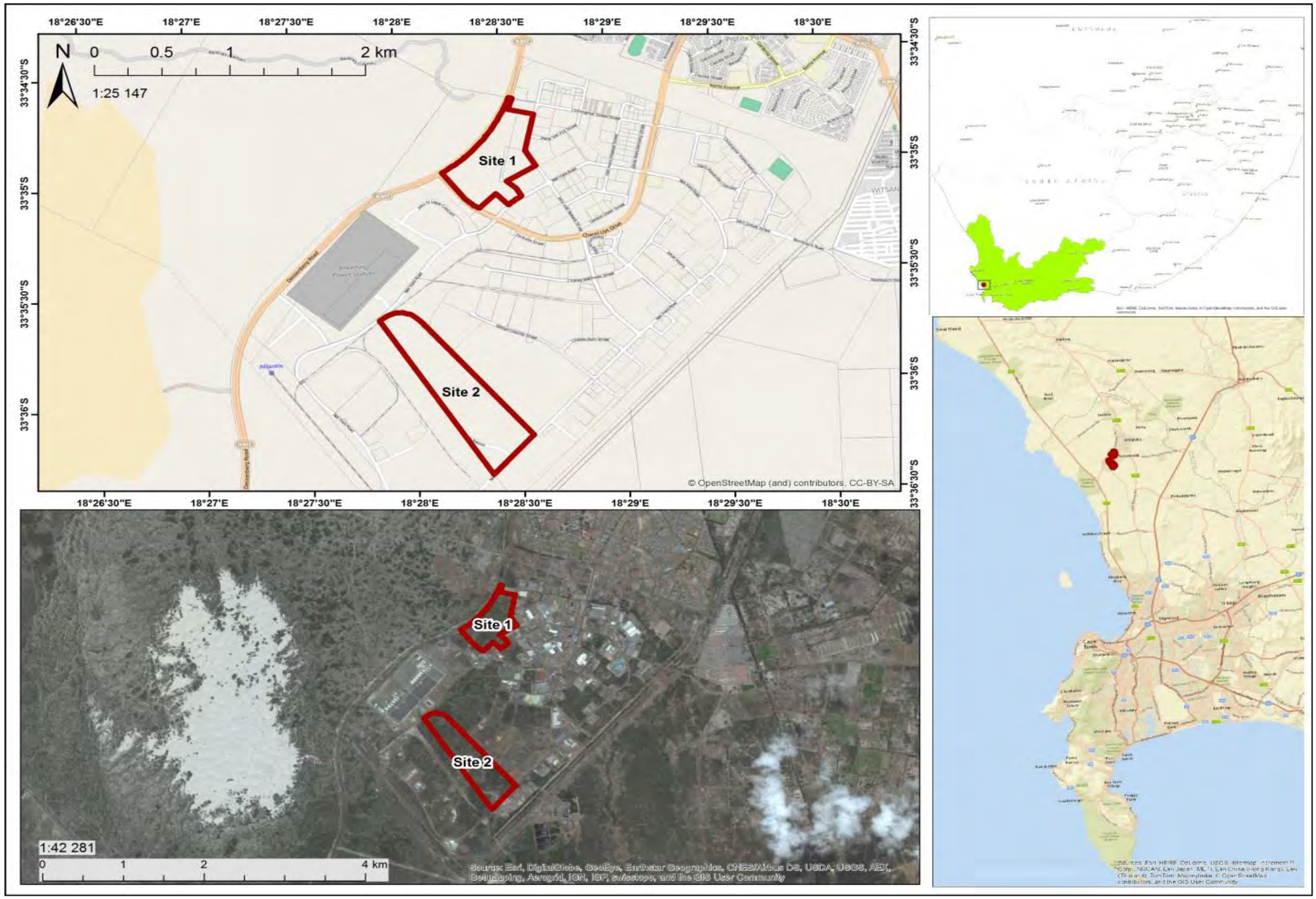

Figure 1.1: **Locality of the Atlantis gas-to-power site where the development is proposed (site 2 – Erf 277)**

GreenCape has been appointed as the project management office for the proposed special economic zone (SEZ) in Atlantis with the land owner and applicant for the proposed project being the City of Cape Town Metropolitan Municipality: Property Management Department (hereafter referred to as City of Cape Town). Special Economic Zones are geographically designated area of a country set aside for targeted industrial or economic activities which are supported through special arrangements and measures that often are not available to the rest of the country. It is expected that following the Department of Energy's request for information (RFI) from potential developers of natural gas projects and subsequent request for proposals for gas-to-power projects, it will play a significant role in South Africa's power generation mix. Special Economic Zones in South Africa, such as the Atlantis area, have the ability to accelerate the rate of industrial development and agglomeration and are a platform for guiding the deployment of other tools such as incentives, skills development and infrastructure development.

The preferred site (i.e. Site 2) for the proposed Atlantis Gas-to-Power project includes approximately 38.65 ha of land, however the proposed gas-to-power facility and associated infrastructure only requires a development area of approximately 32 ha (as shown in Chapter 2 of this Draft EIR). The larger than required surface area has been proposed during this phase of the project to ensure that should development constraints be present, the footprint can be reduced without the project being compromised. The applicant obtained an environmental authorisation from DEA&DP (Western Cape) on 16 April 2013 (DEA&DP reference 16/3/1/1/A1/2/3036/12) for the proposed development of a green technology manufacturing facility on Portions 1 and Portion 4 of Cape Farm No. 1183, Atlantis. A copy of the previous environmental authorisation obtained is included in Appendix S of the DEIR.

A combined cycle gas turbine (CCGT) plant using a cycle configuration of combustion turbines, heat recovery steam generators (HRSG), and steam turbines, to generate electricity. The project will ultimately consist of the following components:

- A combined cycle gas turbine (CCGT) power plant, to generate electricity by burning natural gas, consisting of:
  - Combustion turbines located in power blocks and producing up to a maximum of 1500 MW;
  - Heat recovery steam generators with associated chimneys;
  - Electrical generator; and
  - Administration buildings.

- Associated infrastructure
  - Gas pipelines for the transmission, distribution and reticulation of natural gas on site
  - Electricity transmission lines to transmit electricity into the national grid.

A detailed project description (based on the conceptual design) is provided in Chapter 2 of this Scoping Report.

1.2. PROJECT MOTIVATION (INCLUDING NEED AND DESIRABILITY)

At a national level, South Africa is facing significant electricity shortages as well as water scarcity. The proposed project aims to supply additional electricity to the national grid, without intensive use of water, while also being approximately 40% less CO_2 intensive than conventional coal fired electricity generation. Importantly, with the proposed maximum project generation at 1500 MW, the project will reduce the risk of rolling electricity blackouts. The benefit of the proposed facility and its location and contribution to the greater Atlantis SEZ will furthermore allow for the increased focus on the development of desired industrial capabilities, "host regions" for development, and comprehensive planning and design to accommodate the diverse regional development needs and contexts.

Gas-to-power generation has increased significantly in the past few years, with gas overtaking coal as the main energy source in some countries. Electricity generation from natural gas offers greater efficiency and lower CO_2 emissions than coal, as well as other operational advantages such as compact generators and

lower water use. Furthermore, the natural gas discoveries in southern Africa have increased the potential for gas-to-power generation in this country and it is likely that development of gas powered sector will accelerate in the near future.

There are several advantages of Gas-to-Power for the Western Cape and South African energy supply:

- A gas power plant is far less complex than a coal fired power plant and hence has shorter construction times, which is crucial in addressing South Africa's current short-term electricity demands. As a regional example, the Eskom Ankerlig Power Plant (neighbouring the proposed facility in the Atlantis SEZ) was constructed in less than two years (coal fired power plants takes on average 6 years to complete). In addition, the need to follow demand growth closely favours equipment with short construction periods, standard off-the-shelf designs are the norm for gas power stations; accordingly rapid upscaling of gas turbines or engines is much easier than for coal fired plants.

- In terms of environmental impacts, a gas powered plant has approximately 40% less CO_2 emissions per unit of power than coal, due partly to greater efficiency, but mainly due to the hydrogen content. Rapid start-up, ramp-up and ramp-down times enable gas power systems to follow variable and rapidly changing generation patterns of renewable energy sources.

- New gas field discoveries on the east and west coasts of Southern Africa, as well as the development of stranded reserves, have opened the possibility of increased imports of gas, either via pipeline or in the form of liquefied natural gas (LNG). Proposed construction of a gas fired power station in Namibia (Kudu gas-to-power) has sparked development of the previously stranded gas fields in the area, with the possibility of gas import into South Africa.

- Gas fired power plants are the first choice to balance the variability of renewables and co-location of gas-to-power and renewable energy (RE) would seem to be a logical step, and may provide leverage for the development of shale gas power. Co-location of Gas power plants with RE seems to be a logical conclusion.

In terms of the gas pipeline (not being assessed in this EIA), please see **Appendix O page 47** for important information regarding he pipeline from DEA&DP. Additional information regarding the project contextualisation is provided in Chapters 2 and 5 of this EIA report

1.2.1. Need and Desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Draft guidelines on Need and Desirability were published in the Government Gazette of 5 October 2012, for comment. These draft guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. In addition, the Western Cape Department of Environmental Affairs and Development Planning (DEADP) also published a Guideline on Need and Desirability in 2010. The DEADP Guideline (2013) states that the essential aim of investigating the need and desirability of a proposed project revolves around determining suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity?). DEADP describes need and desirability as components of the "wise use of land", where need refers to time, and desirability to place. In other words, need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. Table 1.1 includes a list of questions based on the DEADP 2013 Guideline to determine the need and desirability of the proposed project.

Table 1.1: DEADP list of 14 questions to determine the "Need and Desirability" of the proposed project

NEED
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP). **Answer:** Yes **Justification:** The purpose of the Western Cape's Provincial Spatial Development Framework (PSDF) is to: • Be the spatial expression of the Provincial Growth and Development Strategy (PGDS). • Guide (metropolitan, district and local) municipal integrated development plans (IDPs) and • spatial development frameworks (SDFs) and provincial and municipal framework plans (ie. sub- • SDF spatial plans). • Help prioritise and align investment and infrastructure plans of other provincial departments, as well as national departments' and parastatals' plans and programmes in the Province. • Provide clear signals to the private sector about desired development directions. • Increase predictability in the development environment, for example by establishing no-go, conditional and "go" areas for development and redress the spatial legacy of apartheid. The establishment of a gas-to-power facility and SEZ in Atlantis will promote the area for further investment, stimulate and contribute towards the economy as well as created a number of much needed blue-collar jobs within the area. These goals/ outcomes that will result from the proposed development are in line with the 5 year plan for the municipality. In addition the proposed facility is in line with Spatial Development Objective (1) of the Blaauwberg District Plan (2012) which relates to the promotion of infill industrial development.
2. Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time? Answer: Yes Justification: Developments such as the Atlantis gas-to-power facility have been stipulated in the CoCT's IDP 5 year plan. In addition, the biodiversity offset put in place by the CoCT allows for immediate development to happen in this area with a significantly reduced ecosystem cost. There are also a number of positive socio-economic benefits will result as a direct and indirect effect of this activity. The most notable being: • Job Creation. • Growth of the local, regional and provincial economies. • Diversity in the manufacturing industry through the investment in the energy sector.
3. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate). Answer: Yes Justification: Atlantis has been identified as a development priority by National, Provincial and Regional government. Historically, Atlantis was a decentralised zone for manufacturing. The proposed activity within the Atlantis Industrial Area will therefore benefit from the SEZ. The proposed site in Atlantis will be a priority area through which the path will be laid for future investments. The socio-economic benefits associated with the proposed development will have significant positive long-term benefits for Atlantis and the Western Cape.

4. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?

Answer: Partially

Justification: There are strict guidelines set out by the Atlantis Water Resource Management Scheme concerning the disposal of stormwater and effluent from sites within the Atlantis Industrial Zone. The purpose of these guideline is to ensure quality of potential waste water (stormwater and effluent), which is used to artificially recharge the Atlantis Aquifer, is of a quality which minimise contamination of ground water resource used as potable watersupply for the Atlantis district, alternatively to dispose of unsuitable effluent to prevent contamination of the ground water.

Potable Water: The site is serviced from a 150 mm diameter pressurised pipe-line located along the western boundary of the site. The municipal pipeline provides for both domestic and fire-fighting requirements. Pressure within the pipeline is maintained between 7 to 9 bars, should water be required at higher pressure then booster pumps will have to be installed by the developer.

Stormwater: The pipe network in the adjacent municipal roads is designed to take the predevelopment 1:2 year recurrence interval storm run-off for low traffic volumes areas to 1:10 year recurrence interval storm run-off for prime commercial developments. The balance of the run-off is conveyed within defined overland flow routes utilising streets to discharge into green belts comprising parks and playing fields where flood peak attenuation techniques are applied in accordance with the CoCT's Management of Urban Storm Water Impacts Policy" document.

Electrical: The City of Cape Town is the supplier of electricity to the Atlantis Industrial area. Currently the power supply network capacity in the area is limited. The municipality indicates they could provide up to 2MVA to the site. Anything larger than 2 MVA can be accommodated, but with significant implications to their network.

5. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?

Answer: No

Justification: There is no anticipated negative impact on municipal infrastructure planning (no clash of priority, and/or placement) as additional infrastructure required to maintain the proposed facility would be provided and maintained by the Applicant. The activity is furthermore proposed on industrial land with little existing and planned infrastructure.

6. Is this project part of a national programme to address an issue of national concern or importance?

Answer: Yes

Justification: South Africa is an energy intensive country, largely as a result of our historic economic focus on energy intensive industries such as mining and primary metal processing. With current energy and electricity demands projected to continue increasing, new investments in electricity generation capacity are required. Future increases in electricity demand are particularly expected for the regions around the Western Cape. In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) that has been developed in 2011 by the Department of Energy and sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. The introduction of private sector generation has multiple benefits and will contribute greatly to the diversification of both the supply and nature of energy production and enable the benchmarking

of performance and pricing.

LNG has a significantly lower emission profile than coal fired power, in addition this technology can provide balancing power for an increased roll out of renewable energy. If this project is successful, a key off-taker of LNG will allow a regional gas economy to develop around it, unlocking more fuel switching opportunities and a significantly lower emissions path for South Africa.

DESIRABILITY

7. Is the development the best practicable environmental option for this land/site?

Answer: Yes (based on previous EA)

Justification: It would be premature to decide on the environmental practicability of the proposed development prior to the completion of the impact assessment phase of this EIA Process, however, based on current information and specialist studies that have already been conducted on site, the location factors favour this land use for a number of reasons e.g.:

- The site is already zoned 'General Industrial' and is located inside the Atlantis Industrial Area (within the Urban Edge).
- Atlantis is considered a national, provincial and regional priority area for readdressing the eras of apartheid through encouraging investment in the area and, as a result, creating jobs and contributing towards the local economy.
- The size of the land is appropriate in that they are large enough for the types of industries proposed
- The road network in the area is also much more appropriate for transporting abnormal loads rather than navigating city traffic and passes.
- Easy, quick access onto the N7 allowing easier access to port facilities along the West Coast.
- The proposed development is in line with all the planning policies for the CoCT and the greater WC province.

8. Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities?

Answer: No

Justification: The proposed activity does not compromise any of the objectives set within the Municipality Draft IDP. The proposed project will also be supportive of the IDP's objective of creating more job opportunities. The proposed facility will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA). However, as noted above, employment opportunities will be temporary during the construction phase and long-term during the operational phase as the plant is expected to be operational for 20 years.

Objective 1.1 of the IDP is to "create an enabling environment to attract investment that generates economic growth and job opportunities. There is considerable space for investment and growth, now and into the future IN THE Atlantis SEZ. The City plays a pivotal role in creating demand for these services through its programmes, projects and procurement systems, as well as through the use of energy in its own operations. The City aims to promote small-scale embedded power generation in Cape Town as well as to ensure that it benefits from regional and national-scale projects where suitable. The City faces skills development challenges, and requires significant investment, land release and buy-in from various stakeholders. There are opportunities for sustainable industries (such as solar water heater, photovoltaic and wind turbine manufacturers), who's services and products will be required for many years. This can result in job creation and skills development from new businesses."

9. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?

Answer: To be confirmed during the EIA Phase.

Justification: It is not expected that the approval of the proposed project would compromise the integrity of the existing environmental management priorities for the area and the The City of Cape Town's EMF (Blaauwberg District Plan as adopted on 26 August 2013, PN. 297/2013, 13 September 2013). However, this will be determined during the EIA Phase of the proposed project. Furthermore, the proposed project will require mitigation of potential negative environmental impacts during the construction, operational and potential decommissioning phases. To this end, an Environmental Management Programme (EMPr) will be compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced.

10. Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context)

Answer: Yes

Justification: The site is zoned 'General Industrial' and is located in the Atlantis Industrial Area. An industrial development will therefore be in line with the existing land use rights of the property. As a result of the dire socio-economic needs of the Atlantis community the establishment of jobs and the contribution towards the growth of the economy would be highly desirable. The site is also in close proximity to the Ankerlig Power Station, gas pipelines and substations which make it ideal for this sort of development.

11. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

Answer: To be confirmed during the EIA Phase, however, based on previous specialist studies done on site, there appears to be no significant impact.

Justification: The proposed activity will have an impact on the endangered and critically endangered vegetation found on site, which will be removed completely. However, the CoCT has confirmed land elsewhere to offset the Atlantis Industrial Area – so that it may be developed in future. An appropriate biodiversity offset has been agreed upon to balance the loss of the sensitive vegetation on this site which is located in the Atlantis Industrial Area. Please see CapeNature's confirmation and support of this in **Appendix N**. In addition **Appendix M** sows the confirmation from Heritage Western Cape that there are no heritage resources on site and they do not oppose development on this site.

12. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?

Answer: To be confirmed during the EIA Phase.

Justification:

- **Health and Wellbeing**: The presence of gas on site may cause this development to pose risks to human health. This will be determined in the EIA phase through an Air Quality Specialist Study and a Risk Assessment.
- **Noise**: There may be noise associated with this development during its operation and the impacts thereof will be determined in the Noise Impact Specialist Study in the EIA phase.
- **Odours**: These will be minimal during the construction phase and relatively minimal during the operational phase.
- **Visual Character and Sense of Place**: The proposed activity involves the construction of an industrial development within the Atlantis Industrial Area. The context within which the site is located is

already characterised by industrial buildings and therefore will not have a significant impact on the visual character or sense of place of the area.

13. Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?

Answer: No

Justification: The proposed activity involves the construction of an industrial development within the Atlantis Industrial Area. The most significant impacts could be the loss of a portion of Cape Flats Dune Strandveld (endangered) and Atlantis Sand Fynbos (critically endangered). However, an appropriate offset has been agreed upon to mitigate this impact, Please see **Appendix N.** In addition impacts relating to noise, air quality, risks and avifauna will be assessed in the EIA phase.

14. Will the proposed land use result in unacceptable cumulative impacts?

Answer: To be confirmed during the EIA Phase.

Justification: The significant cumulative impacts associated with this development include the following:

- Cumulative loss of vegetation within the Atlantis Industrial Area has led to extensive loss of two vegetation types, namely Atlantis Sand Fynbos (CRITICALLY ENDANGERED) and Cape Flats Dune Strandveld (ENDANGERED).
- While this activity will result in the further loss of vegetation (Cape Flats Dune Strandveld and Atlantis Sand Fynbos), listed as an endangered and critically endangered ecosystem respectively, an agreement by the CoCT to purchase a large portion of land elsewhere of a similar vegetation type of a better quality which will be set aside and managed for conservation purposes has been finalized.
- Job Creation
- Air emissions and air quality
- Economic growth and diversity
- Investment in the Energy Sector

It must be noted that the potential cumulative impacts resulting from the proposed project can only be objectively determined at the end of the EIA Process. These will be assessed as part of the EIA for this project.

1.3. REQUIREMENTS FOR AN ENVIRONMENTAL IMPACT ASSESSMENT

As noted above, in terms of the EIA Regulations promulgated under Chapter 5 of the NEMA published in GN R982, R983, R984 and R985 on 4 December 2014 and enforced on 8 December 2014, a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 2 listed in GN R984 (Listing Notice 2):

"*2. The development or development and related operation of facilities or structures, including associated structures and infrastructure, for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more, excluding where such development for photovoltaic installations occurs within an urban edge.*"

Chapter 4 of this Scoping Report contains the detailed list of activities contained in R984 and R985 which may be triggered by the various project components and thus form part of this Scoping and EIA Process. Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed project requires authorisation from the National Department of Environmental Affairs (DEA), acting in consultation with other spheres of government. The purpose of the EIA is to

identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The environmental assessment therefore needs to show the Competent Authority(i.e. the DEA), and the project proponent, CoCT, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

1.4. EIA TEAM

As previously noted, the CSIR has been appointed by CoCT to undertake the EIA required for the proposed project. A public participation process (PPP) forms an integral part of the Environmental Assessment Process and assists in identifying issues and possible alternatives to be considered during the EIA Process. The CSIR is undertaking the PPP for this EIA. Details on the PPP are included in Chapter 4 of this Scoping Report.

The EIA team which is involved in this Scoping and EIA Process is listed in Table 1.2 below. This team includes a number of specialists which have either been involved to date, or are planned to provide inputs during the EIA Process.

Table 1.2: The EIA Management Team

NAME	ORGANISATION	ROLE/ SPECIALIST STUDY UNDERTAKEN
Environmental Assessment Practitioners		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Rudolph du Toit	CSIR	Project Leader (*Pr. Sci. Nat.*)
Kelly Stroebel	CSIR	Project Manager (*Cand. Sci. Nat.*)
Specialists		
Mr Mark Zunckel	uMoyo-Nilu Consulting (Pty) Ltd	Air Quality and Climate Change Specialist Study & AEL application
Dr Brian Williams	SafeTech	Noise Impact Study
Mr. Mike Oberholzer	Riscom (Pty) Ltd	Risk Assessment
Dr. Graham Avery	N/A	Palaeontology Study
Dr. Lita Webley	ACO Associates	Archaeology Assessment
Dr. David McDonald	Bergwind Botanical Surveys and Tours	Terrestrial Ecology Study
Mr Chris van Rooyen	Chris van Rooyen Consulting	Avifauna (birds) Assessment

1.5. DETAILS AND EXPERTISE OF THE EAP

Over the past 30 years the CSIR has been involved in a multitude of projects across Africa and South Africa, with experience in 32 sub-Saharan African and Indian Ocean Island countries. The Environmental Management Services (EMS) group within the CSIR has been involved in the management and execution of numerous environmental assessment and management studies in more than 15 countries in Africa, as well as the Middle East, South America and Russia. These studies have included both public and private sector clients. Consequently, the CSIR EMS team offers a wealth of experience and appreciation of the environmental and social priorities and national policies and regulations in South Africa.

The EIA Project Team is being led by Rudolph du Toit, who will be supported by the Project Manager, Kelly Stroebel. Paul Lochner and Annick Walsdorff will act as Technical Advisors for the proposed project. Refer

to Appendix A of this Scoping Report for the Curriculum Vitae of the EAPs. Appendix B of this Scoping Report includes a declaration of and affirmation by the EAP as required by the 2014 EIA Regulations.

The following roles and responsibilities are assigned in terms of this Scoping and EIA Process:

Designated Environmental Assessment Practitioner (EAP):

Kelly Stroebel - Kelly is a Junior EAP in the EMS group of the CSIR and she has an Honours degree in Environmental Science and is a Registered Candidate Natural Scientist (Registration Number: 100151/14) with the SACNASP. She has experience in the Environmental Management field, and has been involved in various Basic Assessments, EIA's and SEA's in the infrastructure, agriculture and renewable energy fields.

Project Leader:

Rudolph du Toit – Rudolph is a Senior EAP in the EMS group of the CSIR and has 7 years' experience in leading EIAs in the renewable energy, oil/gas, and port development sectors. Rudolph's knowledge of integrated systems thinking combined with experience in environmental management and planning provides the CSIR team with a generalist perspective on the issues and impacts likely to result from proposed developments, thereby enabling a holistic approach to addressing environmental, social and economic impacts.

Technical Advisor:

Paul Lochner - Paul has 22 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included SEAs, EIAs and Environmental Management Plans. In July 2003, he obtained certification as a registered EAP with the Interim Certification Board for EAPs of South Africa (EAPSA).

1.6. OBJECTIVES OF THE EIA REPORT

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Report was made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 19 October 2016 to 30 November 2016. The comments received from stakeholders during the 30-day review of both the Scoping Report were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in January 2017, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 22 of the 2014 NEMA EIA Regulations. It is important to note that (for the purpose of completeness and continuity), the comments received from I&APs during the Scoping Phase have been included in Appendix H of this EIA Report. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 1 February 2017, which marked the end of the Scoping Phase, after which the EIA Process moved into the impact assessment and reporting phase. For background on the Scoping Process, the reader is referred to the Scoping Report (CSIR, 2016).

This EIA Report is currently being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making.

The primary objective of this EIA Report is to present stakeholders, I&APs and the Competent Authority, the DEA, with an overview of the predicted impacts and associated management actions required to avoid or mitigate the negative impacts; or to enhance the benefits of the proposed project.

In broad terms, the 2014 NEMA EIA Regulations (GN R982) stipulates that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA, and that it must include a description of the potential environmental impacts, mitigation and closure outcomes, as well as the residual risks of the proposed activity.

Based on the 2014 NEMA EIA Regulations, the objectives of the EIA Process is to:

- determine the policy and legislative context within which the activity is located and note how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as noted in Regulation 23 (3) of the GN R982). This section regulates and prescribes the content of the EIA Report and specifies the type of supporting information that must accompany the submission of the EIA Report to the Competent Authority. An overview of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations are addressed in this EIA Report is presented in Table 1.3.

As noted in Regulation 23 (4) of the GN R982, the EMPr that is required as part of the EIA Process is provided in Part B of this EIA Report and has been structured to comply with the requirements outlined in Appendix 4 of the 2014 NEMA EIA Regulations, as well as the requirements of DEA's acceptance of the Scoping Report and Plan of Study for EIA. An overview of this compliance is shown Part B of this EIA Report. In addition, the specialist studies that have been conducted as part of the EIA Phase need to comply with Appendix 6 of the 2014 NEMA EIA Regulations. Each specialist study (Appendices J to P) provides an overview table showing compliance with the regulations.

Furthermore, this EIA Process is designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the 2014 NEMA EIA Regulations relating to the PPP and, specifically, the registration of I&APs and recording of submissions from I&APs. All I&APs on the current database for this EIA (Appendix C) have been informed of the release of the EIA Report for a 30-day comment period. All comments received will be recorded and addressed in the finalised EIA Report (as applicable) for submission to the authorities for decision-making.

Table 1.3: Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
Appendix 3 - (3)(a)	Details of - i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Chapter 1 and Appendix A
Appendix 3 - (3)(b)	The location of the activity, including - i. the 21 digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 2 and Chapter 3
Appendix 3 - (3)(c)	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is - i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 2 and Chapter 3
Appendix 3 - (3)(d)	A description of the scope of the proposed activity, including – i. all listed and specified activities triggered and being applied for; ii. a description of the associated structures and infrastructure related to the development;	Chapter 2 and Chapter 4
Appendix 3 - (3)(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Chapter 4
Appendix 3 - (3)(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	Chapter 1, Chapter 2 and Chapter 5
Appendix 3 – (3) (g)	A motivation for the preferred development footprint within the approved site;	Chapters 2 and 5
Appendix 3 - (3)(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including - i. details of the development footprint alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that	Chapter 2, Chapter 4, Chapter 5, Chapter 6, Appendices I to S.

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
	may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. if no alternative development locations for the activity were investigated, the motivation for not considering such; and x. a concluding statement indicating the preferred alternative development location within the approved site;	
Appendix 3 - (3)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including - i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii. an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 5, Appendices J to R.
Appendix 3 – (3) (j)	An assessment of each identified potentially significant impact and risk, including- i. cumulative impacts; ii. the nature, significance and consequences of the impact and risk; iii. the extent and duration of the impact and risk; iv. the probability of the impact and risk occurring; v. the degree to which the impact and risk can be reversed; vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and vii. the degree to which the impact and risk can be mitigated;	Chapter 5, Appendices J to R.
Appendix 3 – (3) (k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapter 7, Appendices J to R.
Appendix 3 – (3) (l)	An environmental impact statement which contains- i. a summary of the key findings of the environmental impact assessment: ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapters 7
Appendix 3 – (3) (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapter 7 and Appendices J to R.
Appendix 3 – (3) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Chapters 5 and 7 and Appendices J to R
Appendix 3 – (3) (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 7 and Appendices J to R.
Appendix 3	A description of any assumptions, uncertainties and gaps in knowledge which	Chapter 7 and

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
– (3) (p)	relate to the assessment and mitigation measures proposed;	Appendices J to R.
Appendix 3 – (3) (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 7
Appendix 3 – (3) (r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Not Applicable
Appendix 3 - (3)(s)	An undertaking under oath or affirmation by the EAP in relation to - i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and interested and affected parties; i. the inclusion of inputs and recommendations from the specialist reports where relevant; and ii. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix B
Appendix 3 - (3)(t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
Appendix 3 – (3) (u)	An indication of any deviation from the approved scoping report, including the plan of study, including - i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and ii. a motivation for the deviation;	Not applicable
Appendix 3 - (3)(v)	Any specific information that may be required by the competent authority; and	See Appendix H for location of this information.
Appendix 3 - (3)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable at this stage

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 2:

Project Description

contents

figures

2. PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and an overview of the site and technology selection process for the proposed Atlantis Gas-To-Power facility.

The purpose of this chapter is to present sufficient project information to inform the EIA Process in terms of design parameters applicable to the project. It is important to note that the project description details are preliminary at this early stage of the project life-cycle and it is likely that some of the design features, presented herein may change during the detailed design phase[1]. However, the project description (and design) used in this EIA Process assumes a worst-case scenario, where the maximum development footprint and requisite infrastructure is considered. Figure 2.10 represents the preliminary "footprint" of the proposed facility (bearing in mind that the entire site is to be cleared). Consequently, should any changes in project design be affected; such changes will only serves to reduce the overall infrastructure requirement and/or development footprint.

2.1. SITE SELECTION

Additional information regarding the site selection process is provided in Chapter 4 of this Draft EIA report. The preferred and alternative sites were selected based on national level considerations (proximity to existing infrastructure) and a high-level site selection and Environmental Screening Study (see Chapter 4) conducted by the CSIR. On a site specific level, site 2 (33° 35' 59.82"S; 18° 28' 12.77"E) was deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, risks, current land use) being favourable.

The 21 digit Surveyor-General code of the preferred site is noted below:

C	0	1	6	0	0	0	0	0	0	0	0	1	1	8	3	0	0	0	0	4
C	0	1	6	0	0	0	0	0	0	0	1	1	8	3	0	0	0	0	0	1
1	**2**			**3**				**4**								**5**				

Corner coordinates of the proposed development site:

Corner point	Latitude	Longitude
A	33° 35' 39.121" S	18° 27' 51.470" E
B	33° 36' 22.202" S	18° 28' 21.442" E
C	33° 36' 11.947" S	18° 28' 33.653" E
D	33° 35' 37.646" S	18° 28' 0.553" E
E	33° 35' 37.095" S	18° 27' 58.088" E
F	33° 35' 37.087" S	18° 27' 56.347" E
G	33° 35' 37.799" S	18° 27' 53.823" E

2.2. KEY COMPONENTS OF A OCGT & CCGT FACILITY

Open cycle gas turbines can be fuelled by either natural gas or liquid fuel. The hot, high velocity gas used to turn the turbines is exhausted into the atmosphere. A gas turbine is an internal combustion engine that

[1] Please note that even though design optimisation is a normal and anticipated part of the detailed project design (which will follow only embarked once the EIA process is finalised); such design changes will not result in the introduction of activities which, in itself, constitutes listed activities, nor would such design changes be substantive in nature so as to impact on the assessment ratings established during this EIA process.

operates with rotary rather than reciprocating motion. Gas turbines are composed of three main components:

- Compressor
  - Air is drawn in and compressed up to 30 times ambient pressure and directed to the combustor section where fuel is introduced, ignited and burned.
- Combustor
  - Combustors can be either annular, can-annular, or silo. An annular combustor is a doughnut-shaped, single, continuous chamber that encircles the turbine in a plane perpendicular to the air flow. Can-annular combustors are similar to annular combustors, however they incorporate several can shaped combustion chambers rather than a single combustion chamber. Silo combustors are typically larger than annular or can-annular combustors and are used for larger scale operations.
- Power turbine

The open or simple cycle (OCGT) is the most basic operating cycle of gas turbine with a thermal efficiency ranging from 15 to 42 percent. OCGT technologies are available in a wide range of power outputs.

CCGT is the leading gas-based technology for intermediate and base-load power generation globally. CCGT plants share similar basic components to an OCGT plant, however, the heat associated to the gas turbine exhaust is used in a heat recovery steam generator (HRSG) to produce steam that drives a steam turbine and generates additional electric power. Large CCGT plants, such as the Atlantis facility, may have more than one gas turbine. Over the last few decades, impressive advancement in technology has meant a significant increase of the CCGT efficiency by raising the gas-turbine inlet temperature, with simultaneous reduction of investment costs and emissions. Due to the flexible nature of CCGT plants, they are designed to respond fairly quickly to changes in electricity demand. In general, because of the lower investment costs and the higher fuel (natural gas) cost vs. coal-fired power, CCGT plants are lower in the merit order for base-load operation, although its competitiveness also depends on local conditions, variable fuel prices and environmental implications.

The EIA is being undertaken without a specific technology provider in mind, and therefore the environmental authorisation will need to cater for a range of gas to power technologies, and emission profiles. The EIA will be based on the project "envelope" approach, whereby a range of potential project inputs and outputs will be specified (e.g. in terms of maximum project footprint, range of NOx emissions, bulk and scale of structures, maximum noise emissions), and the impact assessment provided for this project envelope. Then provided that the detailed project design is within this envelope, the assessment will remain valid. A combined cycle gas turbine (CCGT) plant uses a cycle configuration of combustion turbines, heat recovery steam generators (HRSG), and steam turbines, to generate electricity. This type of power plant is being installed in increasing numbers round the world where there is access to substantial quantities of natural gas. The components of a Gas-to-Power facility and systems that could potentially be utilized on site are:

- The Gas Turbine or Gas Engine Hall;
- Heat recovery steam generators;
- Dry cooling radiator systems; and
- Administration buildings.

Table 2.1: Technical details of the proposed facility as required by the Competent Authority

Component	Description/Dimensions
Height of stacks	30-40m high
Areas of gas facility	Approx. 32 has in total
Area occupied by inverter/ transformer stations/ substations	250m²
Capacity of on-site substation	N/A

Area occupied by both permanent and construction laydown areas	500m²-1ha
Area occupied by buildings	30-32 ha
Length of internal roads	Approx. 500m
Width of internal roads	6-8m
Proximity to grid connection	Transmission line for approx. 13km to Omega Substation. Please see page 2-12 and 2-13.
Length of Water pipeline	There will be no water pipeline associated with this project as it is implementing dry cooling.
Size and number of storage vessels for gas and other fuels	10 000m³ x 1 storage vessel
Height of fencing	4-5 m
Type of fencing	Wrought iron palisade

2.2.1. Gas combustion turbine

A combined cycle gas turbine (CCGT) is designed for maximum efficiency in which the hot exhaust gases from the gas turbine are used to raise steam to power a steam turbine with both turbines being connected to electricity generators. The generator generates electricity and waste heat is used to make steam to generate additional electricity via a steam turbine (Figure 2.1). The gas turbine is one of the most efficient systems for the conversion of gas fuels to mechanical power or electricity.

Small compressors to supply instrument quality air are required for plant operation, these are required at maximums of 4 Nm3/min (7 bar) (instrument air pressure) and 30 bar (compressed air pressure). Unit air is reticulated around the plant and workshop for general maintenance requirements with specific unit air compressors designated for this purpose. In the combustion turbine component, air is compressed to a high pressure and thereafter mixed with natural gas or atomized (sprayed via nozzles) liquid fuel (e.g. diesel), in a combustion chamber. The energy released drives the combustion turbine coupled to a generator. These units will be designed to run either in a combined cycle mode or simple cycle mode, depending on grid requirements. For large-scale power generation, a typical set would consist of a 270 MW gas turbine coupled to a 130 MW steam turbine, resulting in a production of 400 MW. A typical power station might consist of between 1 and 6 such set, however, the Atlantis gas-to-power facility is gearing for a maximum of 1500 MW, which would be a maximum of 4 sets of combustion turbines.

Each gas turbine has an elaborate air intake and filter system coupled with supporting structures. The structures are typically 15m high, 10m wide and 5m in depth. These structures provide a framework to support the filter elements which provide clean dry air to the gas turbines intake; they also provide noise attenuation and protection from the elements to ensure water ingress into the air intake system is prevented at all times. The intake is screened to prevent birds and wildlife from entering the structure.

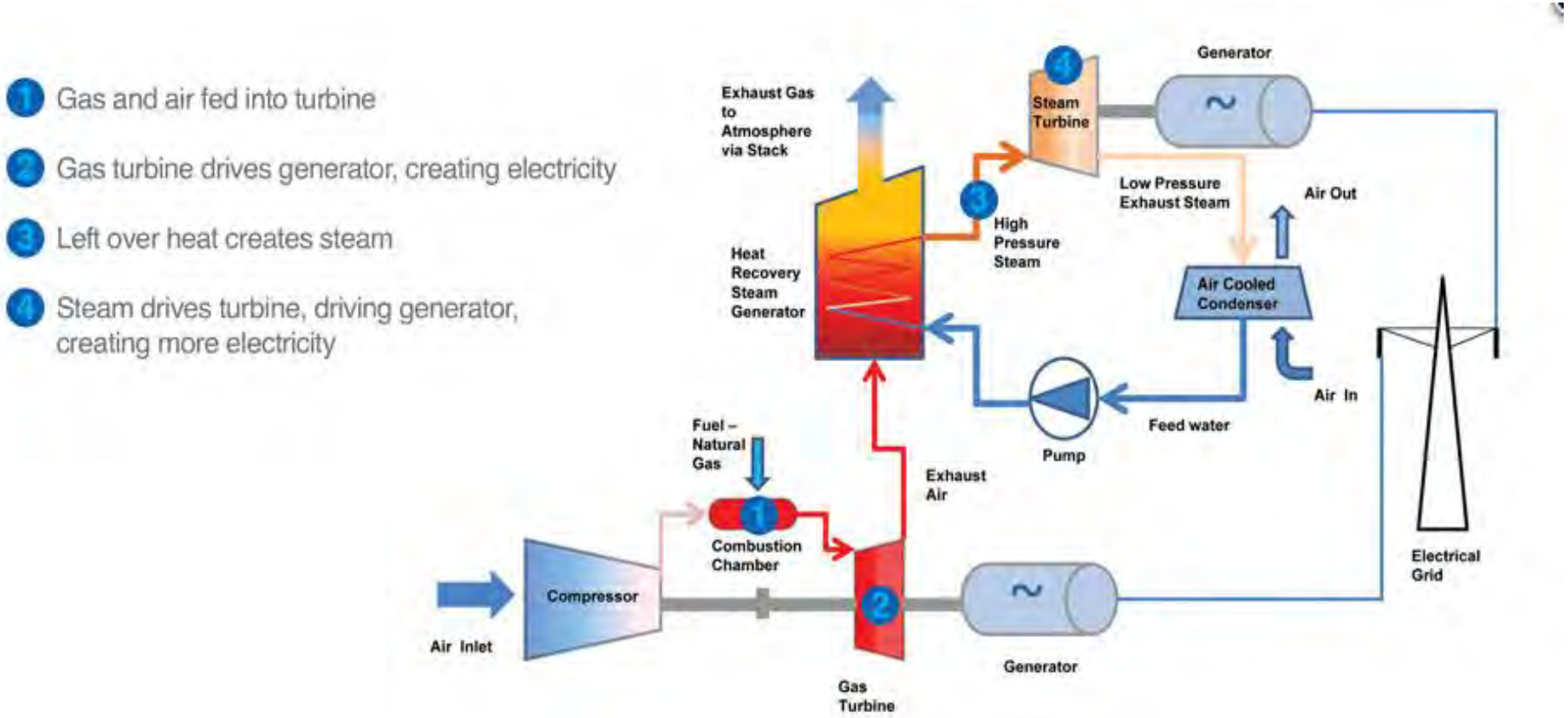


Figure 2.1: Schematic diagram of a typical CCGT power generation facility (Meaford energy centre)

2.2.2. *Heat recovery steam generators with associated chimneys*

Figure 2.2 below shows the current main development trends in CCGT power plants. The CCGT process can either be operated with a "simple" gas turbine, as has been common to date, or with a gas turbine with "reheat" options. For a gas turbine engine with reheat the working fluid is only partially expanded through an initial turbine. The working fluid is then routed through a reheater where more heat is added to the working fluid before entering the second turbine. As the number of turbines and reheaters in series is increased, the expansion process approaches an isothermal process. In real turbines the reheaters are combustion chambers and the number of combustors in series is limited by the supply of oxygen in the working fluid, which decreases after each combustion process. The right side of the figure shows the various ways of cooling the combustion chamber and the turbine. There is a choice between air and steam as a coolant and between open and closed systems.

The combined-cycle system typically includes single-shaft and multi-shaft configurations. The single-shaft system consists of one gas turbine, one steam turbine, one generator and one Heat Recovery Steam Generator (HRSG), with the gas turbine and steam turbine coupled to the single generator on a single shaft. Medium speed (i.e. between 500-750 rpm) gas fired reciprocating engines may be used in the installation of the Atlantis facility. The size of engine used will depend on the decided MW output and specific operational requirements, however, this typically varies between 5 MW and 20 MW for each engine. CCGT plants that incorporate two gas turbines matched with one steam turbine may have two stacks per unit (a total of four). Engine exhaust stacks are typically clumped together in groups of six to assist in the greater elevation dispersion of emissions (i.e. one collection of stacks can be modelled as a single point emission source).

The chimney structures are manufactured from rolled and welded steel plate. Single shaft combined cycle power plants only require one chimney per unit. These structures are typically 30m to 40m high and 5 m in diameter in order to satisfy environmental plume and noise requirements, but can be lower in order to satisfy current zoning regulations in Atlantis. Where required, the stacks may include silencers to ensure the noise level at the boundary, nearfield and far field is compliant with the relevant Acts and Regulations.

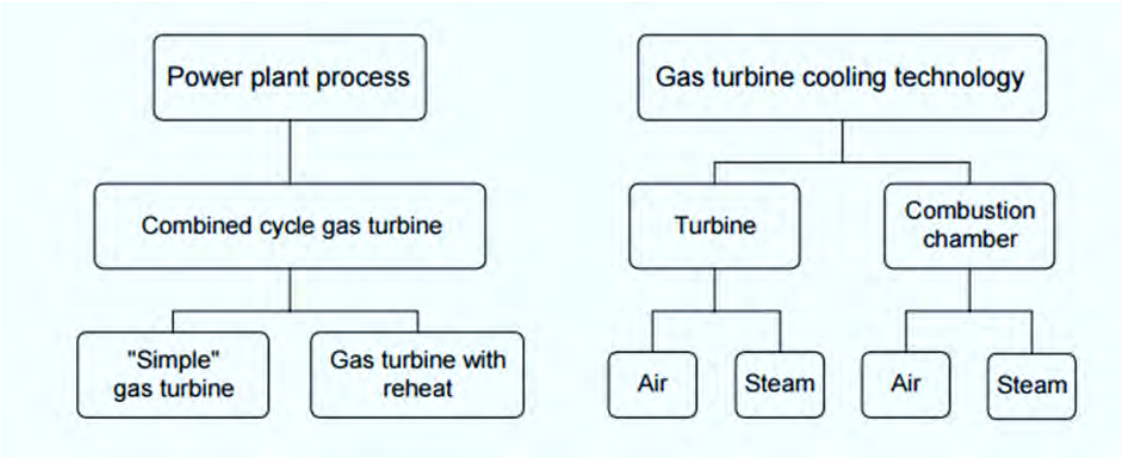


Figure 2.2: Primary development directions for CCGT plants

2.2.3. *Cooling system*

As previously mentioned, Atlantis is a water scarce area, which is why it is crucial that the systems employed on site involve dry/air cooling technologies. Dry cooling systems use mechanical forced air systems to condense steam and have no water requirements. While well-suited to arid climates, dry cooling systems are less efficient, particularly at high ambient temperatures. Dry cooling is not suitable for power plants that have significant steam production and thus large-scale cooling needs such as coal and nuclear units. However, it is well suited to gas-to-power facilities. Alternatives for dry cooling are the following:

1. Dry cooled radiator systems to be placed on the roof of the turbine/engine hall
    - This design works like an automobile radiator and employs high-flow forced draft past a system of finned tubes in the condenser through which the steam passes, simply transferring its heat to the ambient air directly.
2. Cooling towers
    - These are typically galvanised in weathered silver and grey in appearance. The structures will not detract from an industrial installation/SEZ aesthetic point of view and are approximately 70m*80m*6m high.

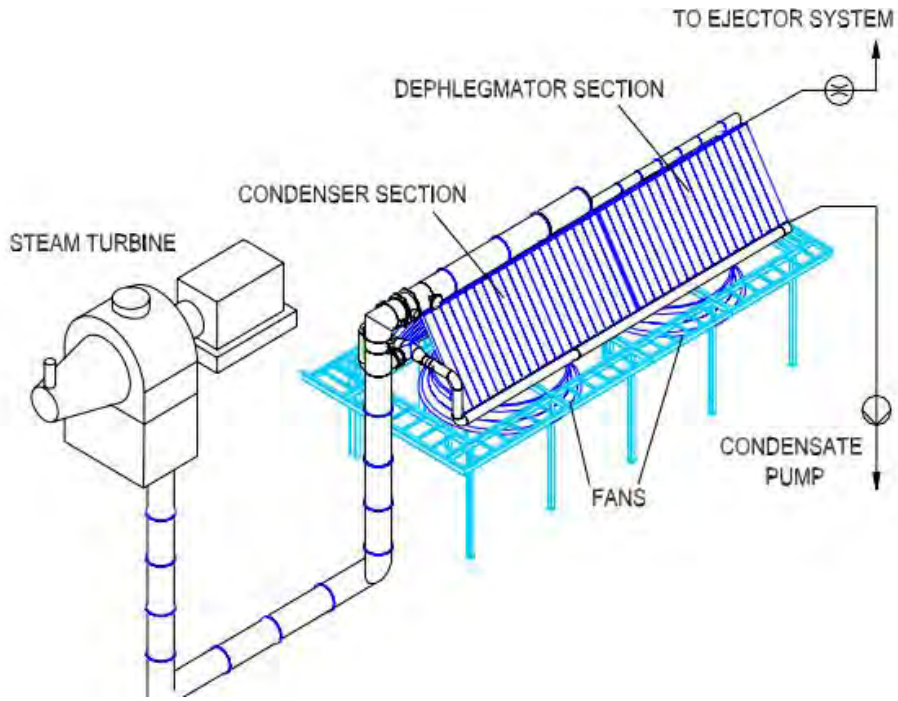


Figure 2.3: Air cooled condenser system

2.2.4. *Administration buildings and roads*

The Atlantis Gas-to-Power facility will consist of a typical "warehouse" structure. These structures will house offices and facilities for personnel and will not decrease aesthetic value in the surrounding area. The office and control room are often combined with ablution, crib and recreational facilities. The storage is combined with the workshop and provides accommodation for the maintenance personnel, plant equipment and spare parts.

There are existing access roads that will be used for the proposed development (Figure 2.6). The preferred access onto the local road network will be at the southern end of the site onto Neil Hare Road to avoid:

1. Road under Rail Bridge on Neil Hare Road to the west of the site.
2. Circuitous route if access was on the south side of the site onto Neil Hare Road.

Transport for Cape Town (TCT) indicated that access should be taken off Neil Hare Road on the southern boundary or Gideon Basson Road. Neil Hare Road is linked to Dassenberg Road via an "unnamed" road. The junction between the site access and Neil Hare Road, as well as the junction of Neil Hare Road and "unnamed" road and "unnamed" road and Dassenberg Road will all have to be widened to accommodate the sweep area for extra-large vehicle turning requirement. The access location from the site onto Neil Hare Road will result in crossing an operational railway track. Due to the fact that the railway line is under the jurisdiction of the City of Cape Town, a level crossing and right of way servitude may be implemented to facilitate a road over rail level crossing to gain access onto Neil Hare Road. However, it is more viable to gain access to the site off Neil Hare Road on the Southern Boundary or Gideon Basson Road. Internal roads are required around each of the units to provide access for operation and maintenance purposes and emergency vehicles. These internal roads shall be approximately 5 – 8 m in width, have 0.3m compacted road base and asphalt cover with kerb and gutters connected to drainage system. During construction, access roads to the site for construction are to be approximately 5m in width, compacted road base 0.3 m thick. The gradient is to be suitable for the delivery of the gas turbines and generators. Upon completion of the construction works, the site shall be levelled and finished with broken blue metal stone to prevent water erosion and dust.

Figure 2.4 below represents an illustration of a typical CCGT plant featuring access roads, site finishing, bunded transformers in the foreground, maintenance building centre foreground, two air intake filters structures, gas turbine building centre, heat recovery steam generators and stacks in the background.

Figure 2.4: Graphic representation of a Combined Cycle Power Plant.

2.3.KEY COMPONENTS OF GAS ENGINE TECHNOLOGY

Combustion engines employ the expansion of hot gases to push a piston within a cylinder, converting the linear movement of the piston into the rotating movement of a crankshaft to generate power. Modern combustion engines used for electric power generation are internal combustion engines in which an air-fuel mixture is compressed by a piston and ignited within a cylinder.

The size and power of a combustion engine is a function of the volume of fuel and air combusted. Thus, the size of the cylinder, the number of cylinders and the engine speed determine the amount of power the engine generates. By boosting the engine's intake of air using a blower or compressor – called supercharging – the power output of the engine can be increased. A commonly used supercharger is a turbocharger, which uses a small turbine in the exhaust gas path to extract energy for driving a centrifugal compressor.

For electric power generation, four-stroke engines are predominately used (Figure 2.5). During the intake stroke, the premixed air and fuel is drawn into the cylinder as the piston moves down to "bottom dead center" position. During the compression stroke in SG engines, the air-fuel mixture is compressed by the piston and ignited by a spark from a plug. Auto-ignition in SG engines is prevented with proper limits on the compression ratio. Dual-fuel (DF) engines are designed with the ability to burn both liquid and gaseous fuels. When operating in gas mode, the gaseous fuel is premixed with air, injected just after the compression stroke and ignited by a pilot fuel flame. In this process, the pilot fuel flame acts a "spark plug" to ignite the lean gas-air mixture. DF engines retain the ability to use a backup liquid fuel when gas supply is interrupted.

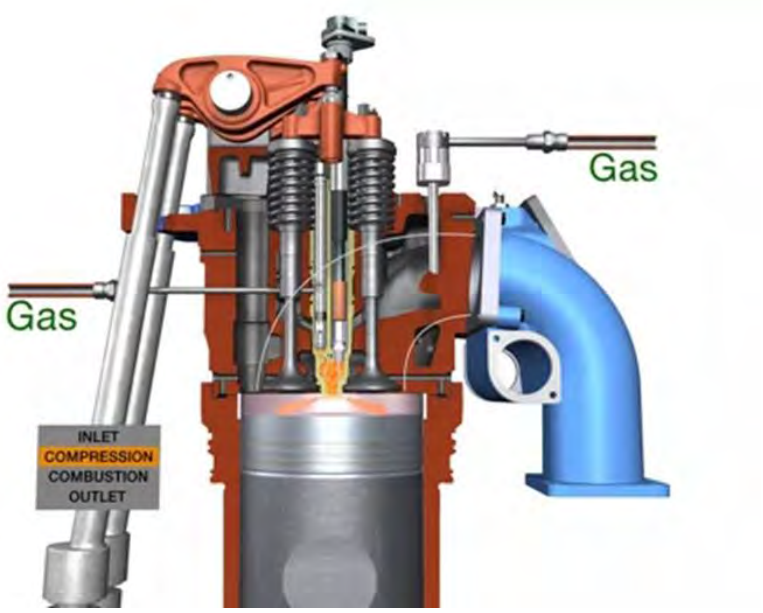


Figure 2.5: Graphic representation of a spark-ignited combustion engine during compression stroke

Thermal efficiencies for typical medium speed combustion engines used in power plant ranges between 42-48%. In a power plant, many engines are grouped into blocks called generating sets. Every engine is connected to a shaft which is connected to its electric generator. These generating sets provide modular electric generating capacity and come in standardized sizes, ranging from 4 to 20 MW.

In a combined cycle gas engine power plant (CCGE), each combustion engine generator set has an associated Heat Recovery Steam Generator (HRSG). Bypass valves are used to control the admission of steam to the steam turbine when an engine set is not operating. One engine can be used to preheat all the HRSG exhaust gas boilers with steam to keep the HRSGs hot and enable fast starting. Combined Cycle power plants combine the advantages of high efficiency in simple cycle and the modularity of multiple engines supplying the steam turbine.

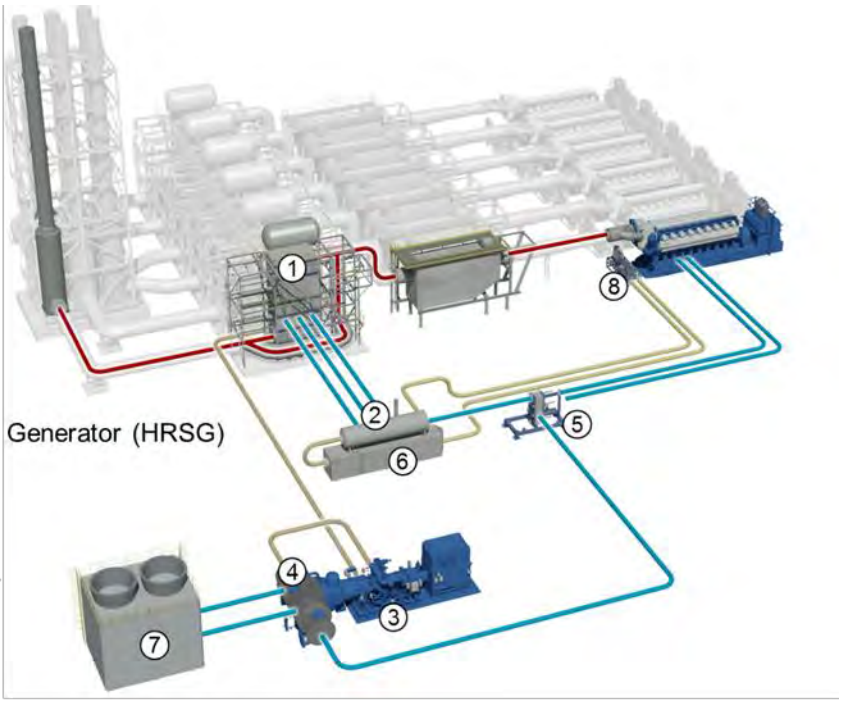


Figure 2.6: Graphic representation of a *Combined Cycle Process for Engines*

Thermal efficiencies for a combined cycle gas engine plant may range between 48-52%. Gas engine power plant sizes have no limit however, plants as large as 630MW have been constructed based on the combined cycle configuration. Engines present distinct advantages in terms of their operational capabilities. Due to their superior fast start up times and shut down times, combined with low load operational capabilities and high efficiency outputs throughout the output range of the plant, they are often used in power systems that require high flexibility due to intermittent renewable energy sources.

2.4. POWER EVACUATION AND ASSOCIATED INFRASTRUCTURE

The close proximity of the proposed facility to the Ankerlig Power Station and its associated infrastructure make this site ideal for a Gas-to-Power facility. As this proposed Atlantis Gas-to-Power facility falls within the Atlantis Special Economic Zone, there have been efforts made by CoCT to prioritize and streamline development in this area in order to have the best possible outputs. This means that there is existing electrical infrastructure such as transmission lines and substations, and any additions or extensions to these should not cause a major disturbance to any ecological, socio-economic or infrastructural features in the Atlantis industrial area. The City of Cape Town has planned the establishment of a new switching station in Atlantis, which will supply the substation via Eskom overhead lines passing by the substation. This could provide for additional capacity to cater for load growth.

In terms of adequate access for the pipeline and the powerline, there is a possibility of the City of Cape Town (applicant) to register an additional servitude, as it is the owner of the property. It is proposed that a corridor within which the transmission lines can be accommodated must be considered. This would be in addition to the existing Eskom servitude and will potentially be located adjacent to this servitude. The reasons for proposing a corridor is that there is uncertainty around the LNG pipeline route and servitude capacity. This should ensure minimum disturbances to the facility from a spatial perspective should the corridor be implemented. In terms of the gas pipeline (not being assessed in this EIA), please see **Appendix S page 47** for important information regarding the pipeline from DEA&DP.

There are several options and relating to power evacuation that will need to be investigated at a more in depth level through the project life-cycle. A few high-level options are discussed below. Please see **Appendix S page 56 – 58** for important information from GreenCape and Eskom regarding the powerline capacity at Ankerlig **(this is very important information for the Competent Authority).**

Option 1: Integration at the Ankerlig Busbar

The first option is that the facility will be integrated at the Ankerlig busbar only, as opposed to connection to the Omega-Sterrekus Substation. Connection at 400 kV may be possible with a loop-in and out as opposed to dedicated feeders. This may rely on the completion of the planned new double circuit 400 kV Ankerlig-Sterrekus 400 kV line (around 2019) to aid with power evacuation under N-2, considering that this new generation will form part of a generation pool (Koeberg + Ankerlig). Clarification will be gained as to whether the newly built 132 kV busbar is dedicated for the offsite supply or whether it can be zoned to accommodate customers/generators. In summary, integration will most likely be at 400 kV and will be dependent on the planned new double circuit 400 kV Ankerlig-Sterrekus 400 kV line scheduled for completion in 2019.

Option 2: Powerlines following the same route as the Ankerlig Power lines (to Omega Substation)

The second option, should the above not be feasible, would be to implement power lines to connect to the Omega-Sterrekus Substation. The route of the powerline and all associated impacts will thus be investigated in the EIA phase should the situation arise that these lines need to be constructed. The route for the lines will follow the same route as the Ankerlig Power line route, so as to concentrate the impacts into an already existing route, instead of creating further obstructions and disturbance. The Ankerlig Powerline route is represented in Figure 2.7 below. The findings of the Specialist studies will inform this route, should Option 1(the preferred option) not be feasible.

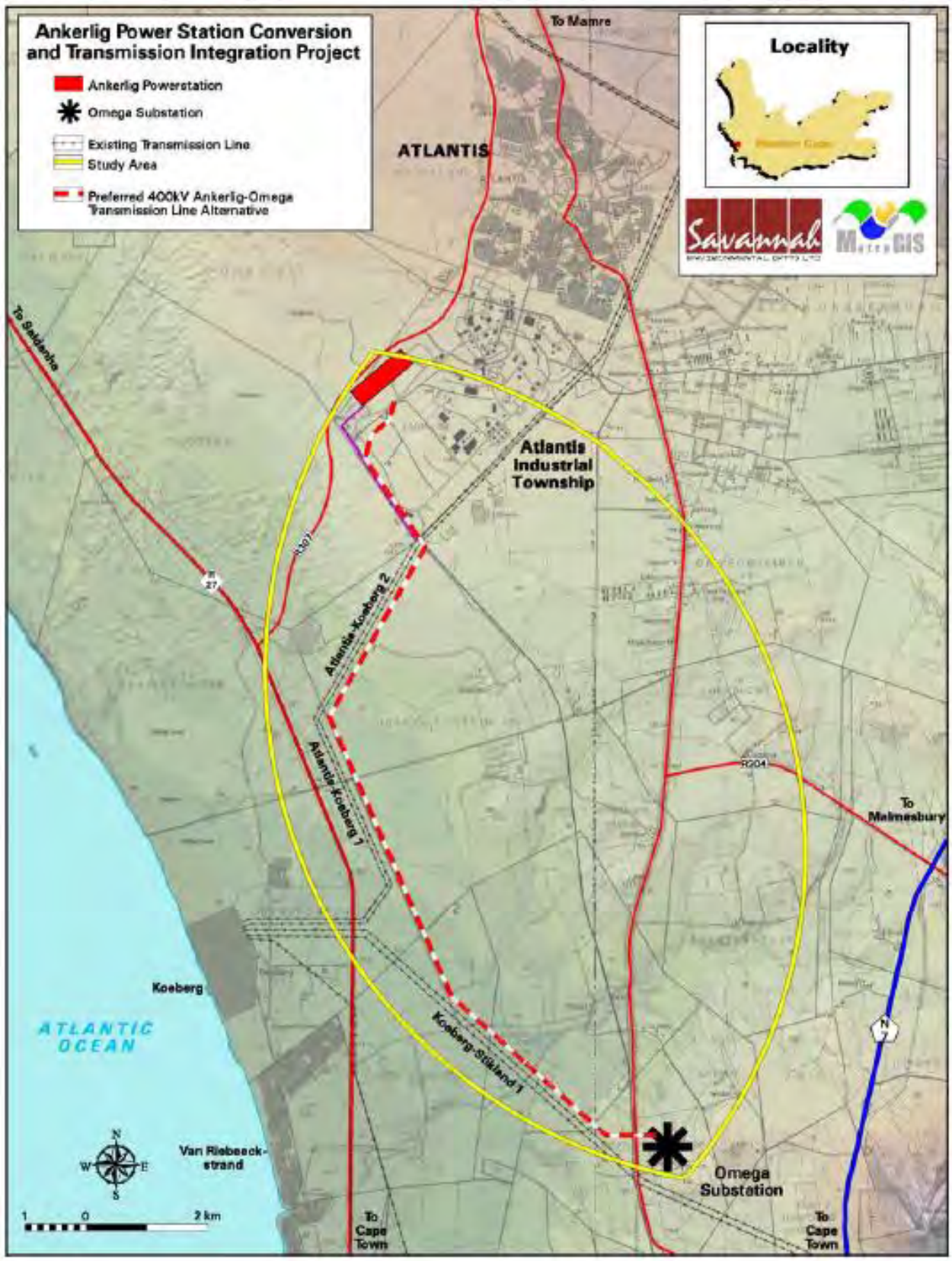
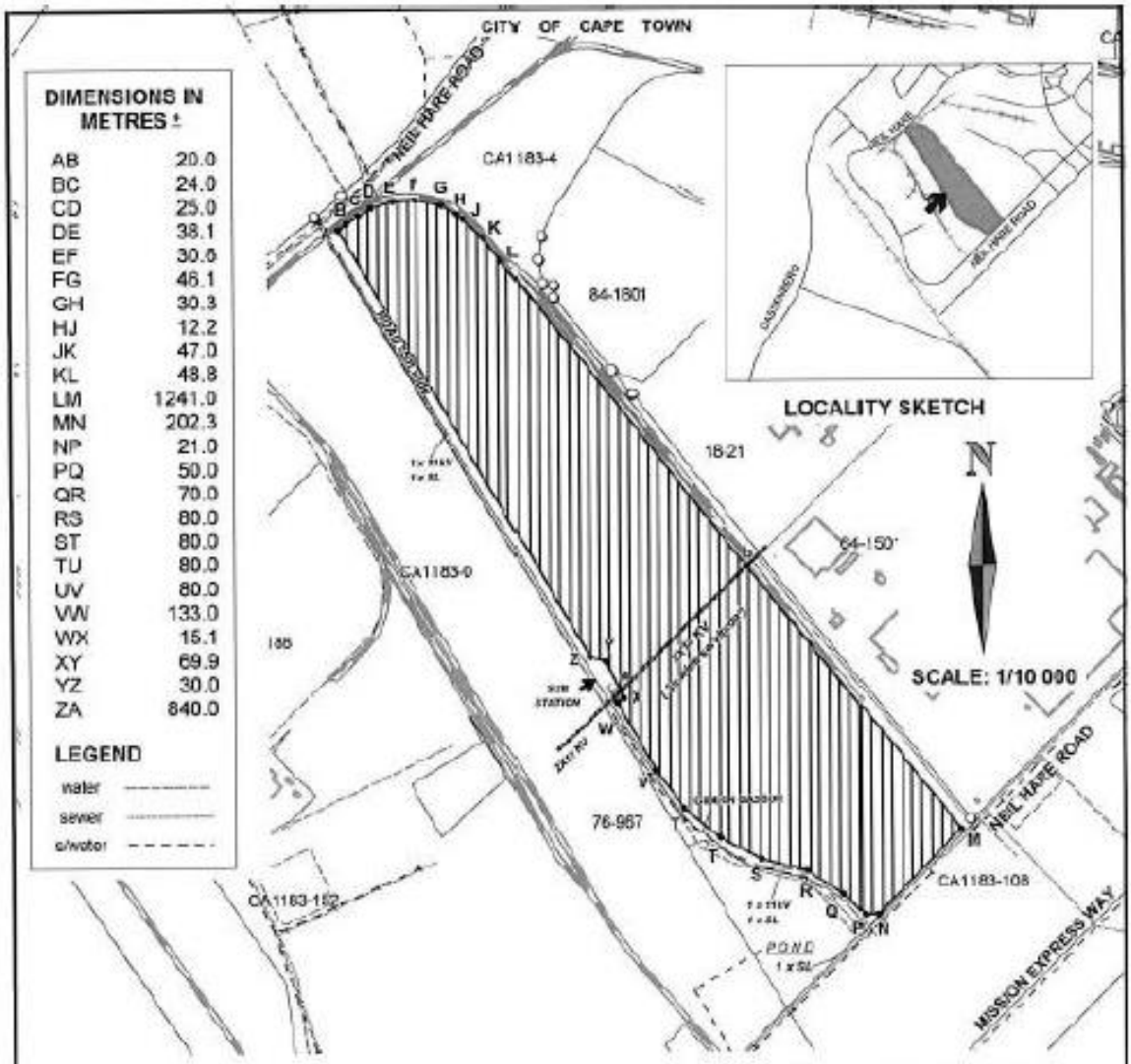


Figure 2.7: Route that the powerlines for this proposed project will also follow



PROPOSED GREEN TECHNOLOGY INDUSTRIAL PARK - PORTION OF CA1183-4-1 - NEIL HARE ROAD ATLANTIS

The figure ABCDEFGHJKLMNPQRSTUVWXYZ shown hatched illustrates portion of CA1183-4-1 in extent approximately 38.65 ha to be made available for lease from the City

Property of above, CA1183-4-1 is zoned General Industrial.
Owner: City of Cape Town - D/T 47358 dated 1982/11/08.

Note 1. A - M are existing railway fence posts surveyed by V Davids.
2. n - Z are co-ordinates from survey record E481.84.
3. Z - A is the north eastern road boundary 25 m wide.
4. ZYxW - Sub-Station, parking area and enclosure.
5. a - b represents electrical cables to be protected by a 3 metre servitude.

REFER TO	JOB 1059	SURVEYOR	V DAVIDS
		GIS OPERATOR	A M HAUPT (2012/02/01)
SOURCE	CO-ORDINATES FROM V DAVIDS	PROJECT MANAGER	
	ZONING BOUNDARY: E481/84		
WARD	2		
FILE/REC.	HO14/3/4/3/644/CA (32282)		

M VAN NIEKERK
HEAD: GIS & SURVEYS

SA PARKER
MANAGER: PROPERTY INFORMATION

LIS 760v3

Figure 2.8: Locality of the proposed Atlantis Gas-to-Power Facility Site

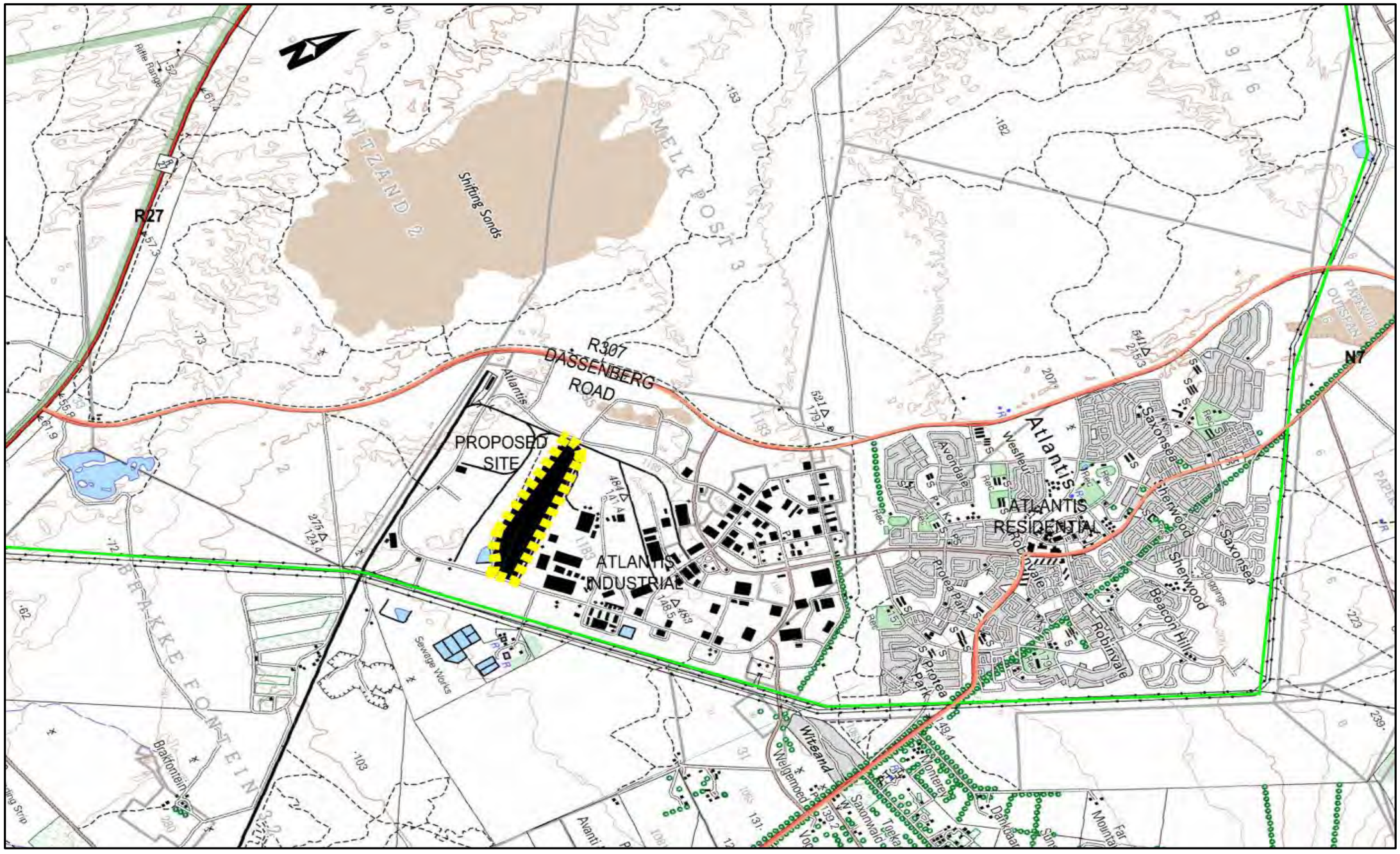
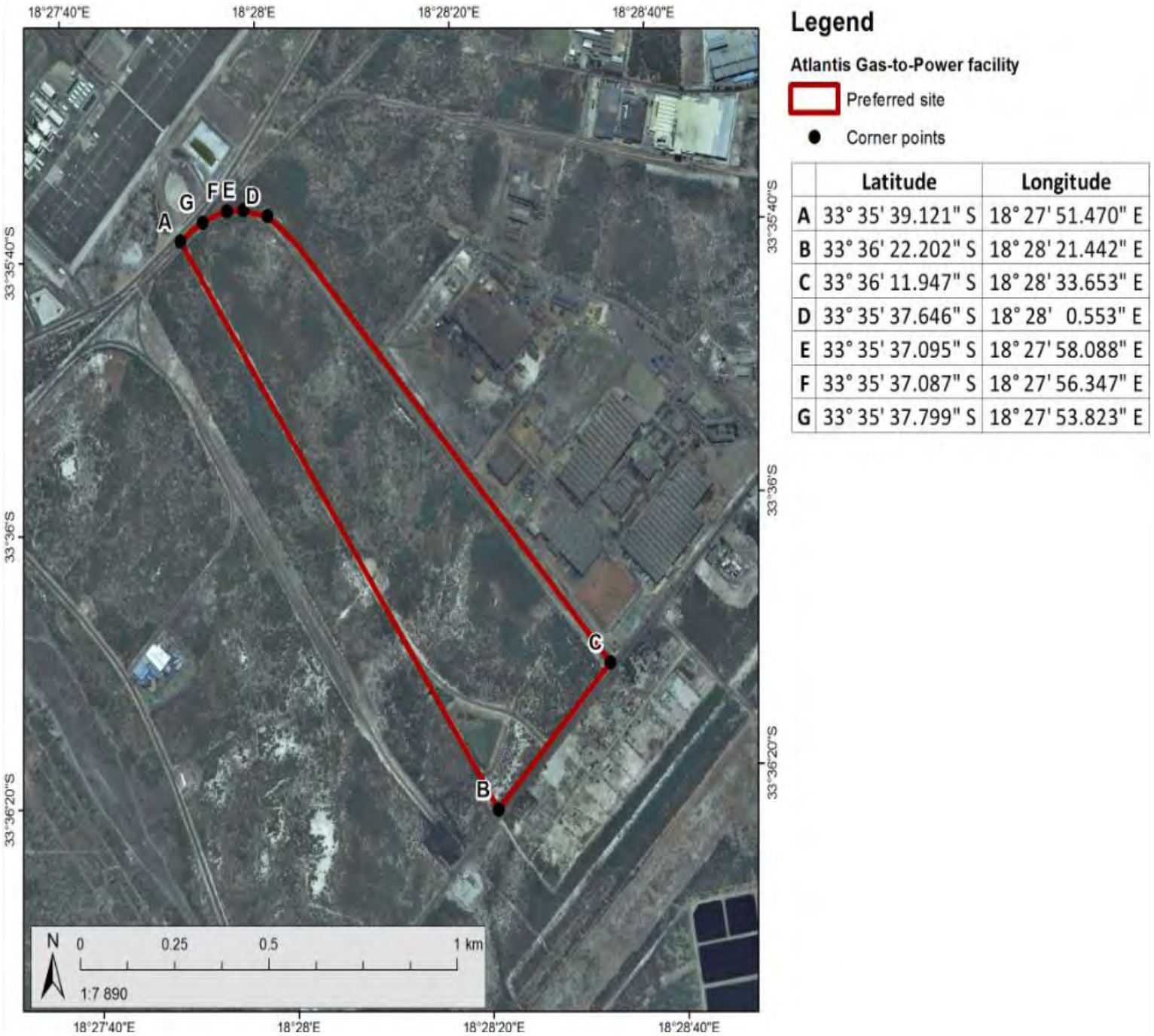


Figure 2.9: **Locality of the proposed Atlantis Gas-to-Power Facility (Site 2 is preferred alternative – Erf 277) (Atlantis Services report, GIBB 2012)**

Figure 2.10: Site footprint and provisional layout structure (to be confirmed in design and planning phase)



	Latitude	Longitude
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F	33° 35' 37.087" S	18° 27' 56.347" E
G	33° 35' 37.799" S	18° 27' 53.823" E

Figure 2.11: Map showing the corner co-ordinates of the site

2.5. PROJECT DEVELOPMENT CYCLE

2.5.1. *Construction*

The construction phase will take place subsequent to the issuing of an Environmental Authorisation (EA). The construction phase for the proposed Atlantis Gas-to-Power project is expected to extend over a period of between 15 and 38 months, assuming normal daylight working hours are in place (however the construction period is subject to the final requirements of Eskom).

The construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the site. In terms of site establishment, laydown areas will be required at the outset of the construction phase, as well as dedicated access routes from the laydown areas to the working areas. Haul roads for construction traffic (for the delivery of concrete, road materials and other construction materials) will be required.

The laydown area will either be located adjacent to or at the project site. It is expected that the laydown area will be temporary in nature (for the duration of the construction phase) and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed Contractors). The laydown area is expected to cover a maximum area of 500m^2-1 ha (depending on the contracting strategy at the time). If the laydown area is located outside of the footprint of the gas-to-power facility itself, the area will thereafter be rehabilitated (i.e. returned to its pre-construction condition) at the end of the construction phase.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the Environmental Management Programme (EMPr), which will be compiled during the EIA Phase and included in the EIA Report. During the construction phase, both skilled and unskilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however approximately 200 personnel in project support industries will be utilized during the construction phase.

2.5.2. *Operation and Maintenance*

The proposed Atlantis Gas-to-Power project is expected to become operational around the beginning of 2018. The following activities will occur during the operational phase:

- Generation of up to (maximum) 1500 MW of electricity to add to the national grid; and
- Maintenance of the Gas-to-Power facility (routine, scheduled and unscheduled).

The projected operations are expected to provide several services and added economic spin offs (as highlighted in Chapter 1 of this Scoping Report). The Gas-to-Power facility is expected to generate electricity for a minimum period of 20 years. The operational phase of the project is expected to create skilled employment opportunities. However, other opportunities may arise for unskilled labour to be integrated to the ancillary activities. Approximately 280 temporary and 180 permanent employment opportunities will be created over the lifespan of the proposed facility.

2.5.3. Decommissioning

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the site will be rehabilitated and returned to its pre-construction state.

GreenCape

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 3:

Description of the Affected Environment

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figures

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter of the Scoping Report provides an overview of the affected environment for the proposed Atlantis Gas-to-Power project and the surrounding region. The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development.

This information is provided to identify the potential issues and impacts of the proposed project on the environment. The information presented here has been sourced from:

- Scoping input from the specialists that form part of the project team;
- Review of information available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and
- City of Cape Town Metropolitan Municipality IDPs and the Cape Town PSDF.
- Basic Assessment & correlating specialist studies conducted on site in 2012

It is important to note that this chapter intends to provide an overview and does not represent a detailed environmental study. Detailed studies focused on significant environmental aspects of this project will be provided during the EIA Phase[1].

3.1 BACKGROUND

The proposed project is situated on Portion 1 of Portion 4 of Cape Farm CA 1183. The total portion property covers approximately 38.65 ha in area. As previously noted, the site is located approximately 43 km north of Cape Town, in the Koeberg and Blaauwberg Sub-Councils of the Cape Town Metropolitan Municipality. The co-ordinates of the corner points of the preferred project area are provided in Chapter 2 of this Scoping Report. Figure 3.1 provides a locality map of the proposed project area within a regional setting.

The proposed Gas-to-Power facility is far removed from major centers, roads and tourist attractions. It is located near the R307 which functions as a primary access route to Atlantis from Cape Town. The closest major road is the R27 which functions as a connector between Saldanha and Cape Town.

3.2 PRELIMINARY SENSITIVITY SCREENING

Figure 3.1 represents the regional setting of the proposed Atlantis Gas-to-Power project in terms of the surrounding sensitive ecosystem features and sensitive geographical areas (as indicated in Listing Notice 2 and 3 of the 2014 EIA Regulations) in proximity to the site.

Based on the preliminary sensitivity screening undertaken for the site, the proposed Atlantis gas-to-power facility is situated within the Cape West Coast Biosphere reserve and approximately 8 km west of Camphill Private Nature Reserve. Site 2 is approximately 3.5 km north-east of Koeberg Private Nature Reserve. In terms of the City of Cape Town (CoCT) urban conservation areas, the proposed site is approximately 10.5 km north-west of Philadelphia. The proposed development of the Atlantis gas-to-power facility may have a visual impact on surrounding protected areas. However, the landscape has already been altered by industrial infrastructure (e.g. Ankerlig power station), and therefore the proposed development is anticipated to have limited visual impacts on sensitive visual receptors.

[1] Environmental Impact Assessment within the South African context exists of 2 distinct phases; namely, the Scoping Phase (of which this report is part), and the Environmental Impact Assessment Phase.

Cape Flats Dune Strandveld is listed as being Endangered, whilst the Atlantis Sand Fynbos is listed as being Critically Endangered (South Africa, 2004). The proposed facility is situated partly in the Atlantis Sand Fynbos vegetation type.

The proposed facility is located in an area identified by the Biodiversity Network (BioNet) as *Other natural vegetation*, which means that activities in the area are negotiable, but low impact activities are preferable as the vegetation is still in a good condition and should be sustainably managed. An artificial National Freshwater Ecosystem Priority Areas (NFEPA) wetland is present on Site.

Figure 3.1: Regional Context of the Atlantis Gas-to-Power sites (site 2 is preferred alternative)

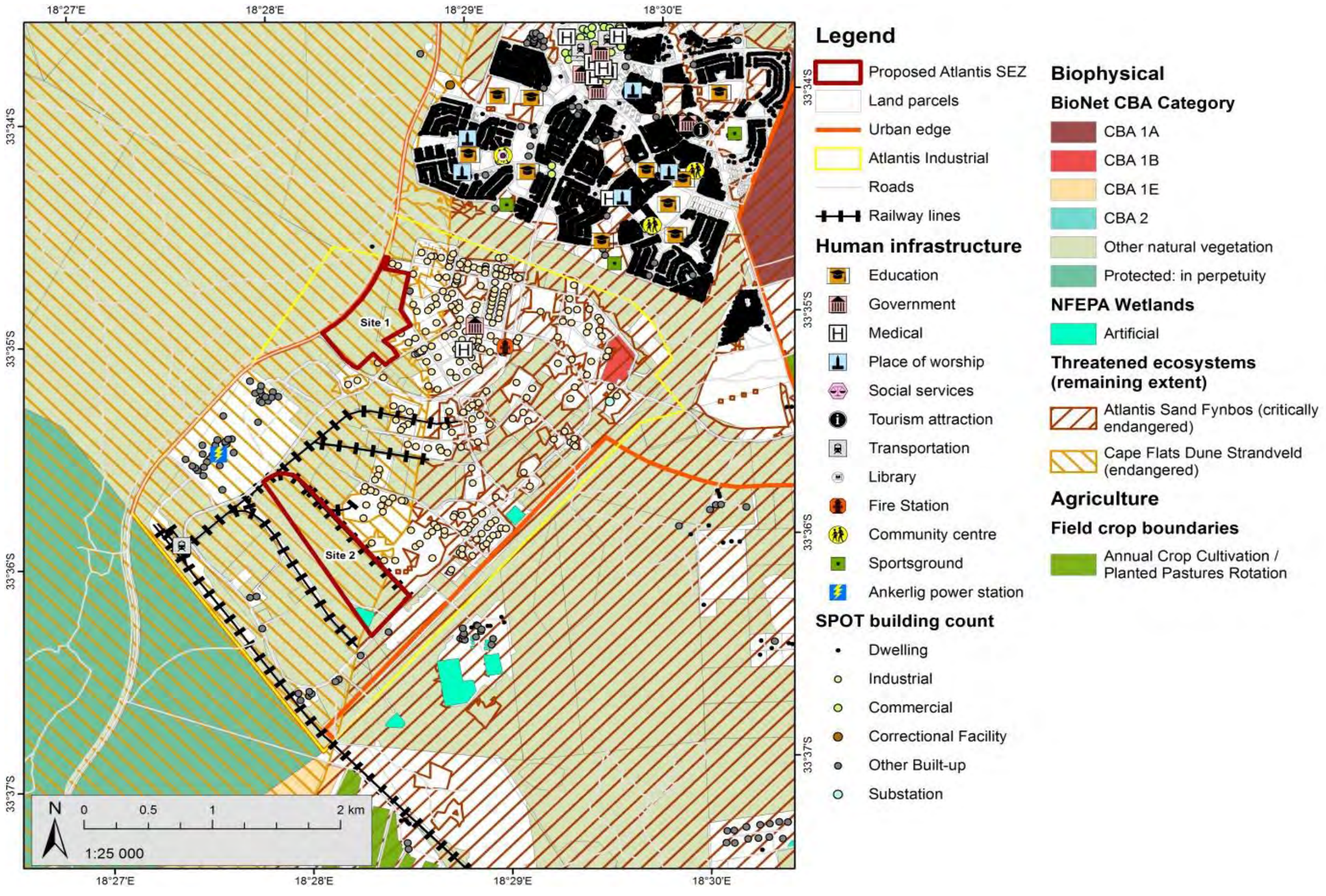

Figure 3.2: **Environmental Sensitivities Map (biophysical, agricultural and human infrastructure) in the area proposed for the Atlantis SEZ (site 2 is preferred alternative)**

3.3 BIOPHYSICAL ENVIRONMENT

3.3.1 Climatic Conditions

The mean annual rainfall of South Africa is shown in Figure 3.3 below. The climate of the Western Cape is semi-arid with a late summer-autumn rainfall regime. Average rainfall of the area varies from 50 mm to 400 mm per year. Evaporation levels within this province exceed the annual rainfall. Climate conditions are extreme (i.e. very cold in winter and extremely hot in summer).

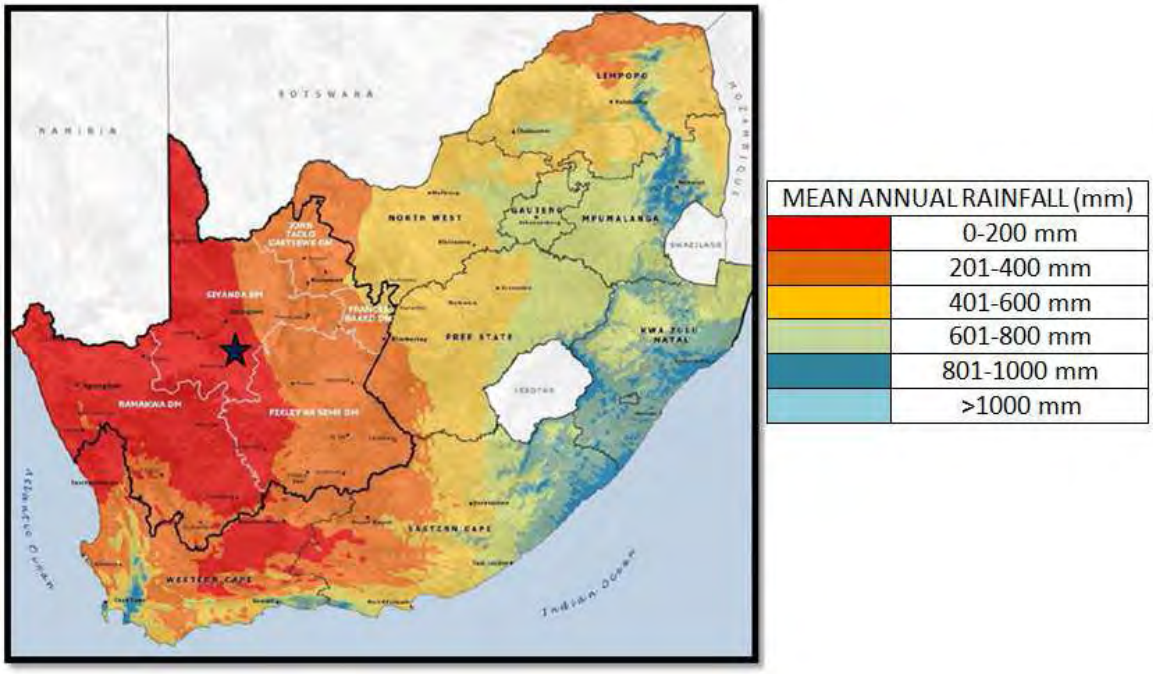

Figure 3.3: Mean Annual Rainfall Levels of South Africa (Source: Northern Cape PSDF, 2012)

In terms of climatic conditions, rainfall and temperature are arguably two of the key parameters requiring consideration during this assessment. The Atlantis area is characterised by Mediterranean climate with the majority of rainfall received during the winter months (approximately 39 mm on average during June/July), and with corresponding low temperatures experienced during July (approximately 10 degree Celsius on average) and maximum temperatures in February (approximately 22 degrees Celsius on average) (Figure 3.4).

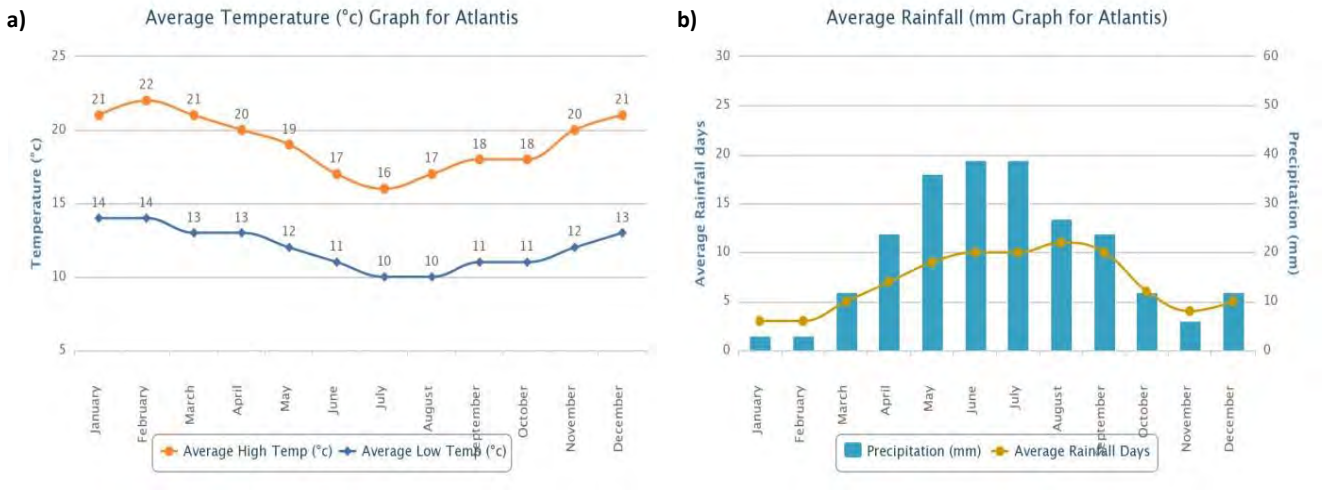

Figure 3.4: Long-term mean a) temperatures (°C); and b) mean precipitation (mm) for Atlantis, Western Cape (Worldweatheronline.com, 2015).

3.3.2 *Geology*

The geological formation of the CoCT is dominated by the Malmesbury Group which is composed of sedimentary rocks, mudstones and sandstones, the Cape Granite made up of metamorphic rocks containing feldspar, black mica and quartz, the Table Mountain Group composed of sedimentary rocks and sandstone, and the Sandveld Group. The Blaauwberg district is composed of the Malmesbury Group with overlaps of the Cape Granite deposits (CoCT Spatial Development Plan & Environmental Management Framework, 2011).

According to the Basic Assessment conducted on site in 2012, the site consists of low to moderate vegetated dunes, which are characteristic of the surrounding area. The dunes are of aeolian origin, underlain by fine- to medium- grained sand. These contain detrital carbonate (mainly finely broken sea shells) of the Witzand Formation (Figure 3.5). The sands associated with most of the site (except a relatively small portion along the southern boundary) are alkaline due to the high calcium content. The southern portion of the site also contains aeolian deposits, however, the detrital carbonate (sea-shells) has been leached from the original dune sands and they are therefore most likely acidic.

3.3.3 *Topography*

The Blaauwberg district is characterised by plains and hills, with the plains extending from the Cape Peninsula to Atlantis. The coastal belt has relatively low lying hills of between 100m and 200m above sea level. The topography of the Atlantis area is relatively flat with minor slopes. The slope of the area is southward, and largely undeveloped, with the exception of partial agriculture (CoCT Spatial Development Plan & Environmental Management Framework, 2011). The vegetation of the area consists of the Cape Flats Dune Strandveld and the Atlantis Sand Fynbos (Mucina, *et al*., 2005). The area comprises of vegetated dunes of low to moderate size, with the site however in isolation from the main dune system. Most of the sites vegetation has been transformed by alien invasive plants, with the remaining parts dominated by the small trees of the Cape Flats Dune Strandveld and the partially disturbed Atlantis Sand Fynbos vegetation (McDonald, 2012).

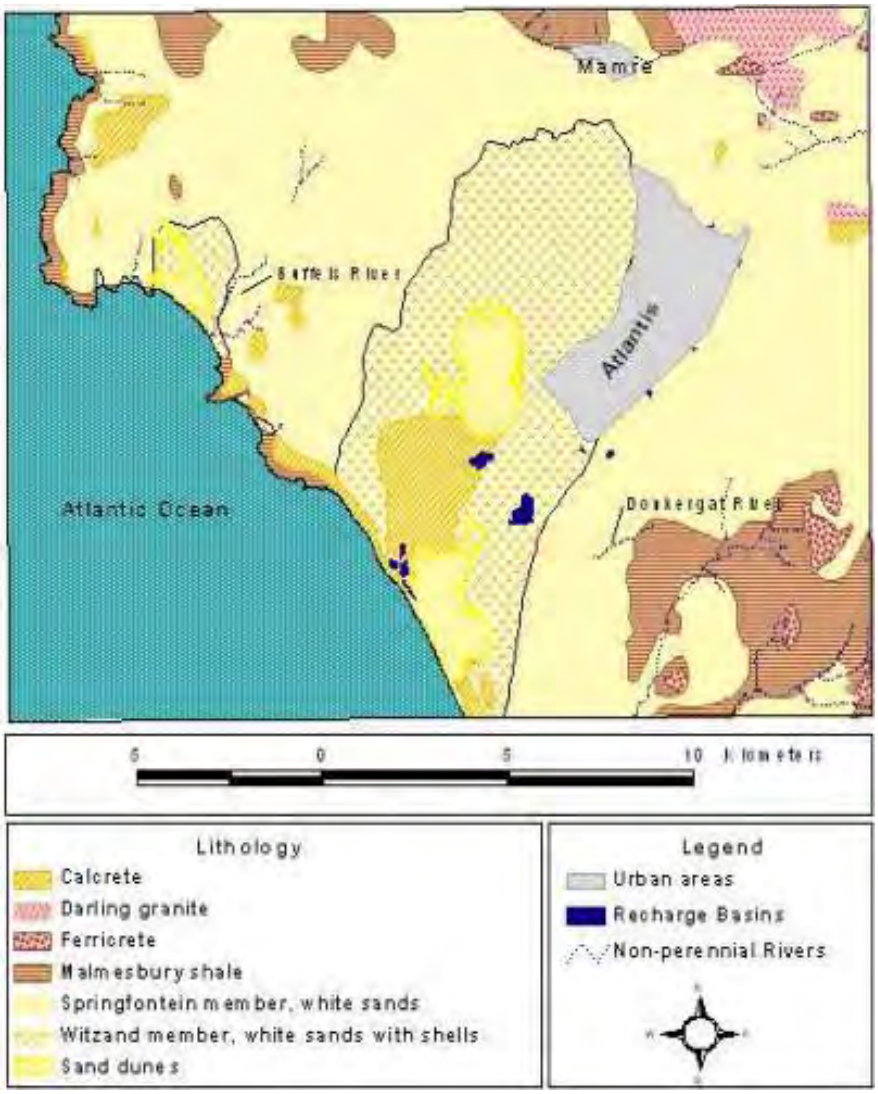

Figure 3.5: Geological features of the Atlantis Area

3.3.4 Agricultural Capability and Sensitivity

The limiting factor to agricultural expansion in the Atlantis area is water availability. While different soil types are suitable for differing crops cognisance must be taken of the need for appropriate crop selection, which can have a substantial influence on water requirements and the sustainability thereof. For example, the sandy soils of the Sandveld on the west coast are not suitable for most crops, but are highly suited to seed potato farming. However, the West Coast is a low rainfall area, and irrigation of these potato crops is heavily reliant on groundwater. These crops also rely heavily on pesticides and fertilisers, which can contaminate the runoff into the freshwater resources in the area.

The land capability of the proposed Gas-to-Power facility and surrounds are moderately arable, whilst annual crops/planted pastures are located approximately 1 km south of Site 2 (Figure 3.6). Although the area is indicated as having a moderate potential productive farming, it is zoned for industrial land-uses and is not expected to be considered for agricultural activities. The Atlantis Industrial area is lies within the Atlantis Coastal Plain, which is characterized by white sandy soils that are not suitable for agriculture, making the area undesirable for agricultural activities (Atlantis Foundries Draft EIA Report, 2015).

Figure 3.6: Agricultural potential and existing crops in the area proposed for the Atlantis Gas-to-Power facility.

As stated in the Basic Assessment that was completed for Site 2 in 2012, a small excavated pond is located towards the middle of the site and a larger retention pond is found in the south-eastern corner of the site. Both ponds are covered with bulrush (*Typha capensis*) and are surrounded by alien vegetation. The possible presence of a wetland in terms of the CoCT wetland layer mapping was checked and found to be a grassy area with alien vegetation. The existing retention pond (refer to Figure 3.7) to the west of Gideon Basson Road is to remain as is and is to be located off site and will therefore not be affected by the proposed development.

Figure 3.7: Large retention pond (off-site) dominated by bulrush (*Typha capensis*)

3.3.5 Soil Types and Soil Potential

As a result of chemical and mechanical weathering of the Malmesbury Group geological form, the derived soils towards the eastern and north-eastern boundary of the Blaauwberg district are rich in clay. The site is characterised by low to moderate aeolin origin dunes of fine to medium grained sand, containing detrital carbonate. Majority of the site's sands are alkaline and the southern portion of the site consisting of Aeolian deposits acidic sands. As previously stated, the sandy soils of the Sandveld on the west coast are not suitable for most crops, but are highly suited to seed potato farming. However, the West Coast is a low rainfall area, and irrigation of these potato crops is heavily reliant on groundwater.

3.3.6 Existing Groundwater Data

The study area falls within the Berg River Water Management Area (WMA) and extends over portions of four Quaternary Catchments, namely G10L, G21A, G21B and G21D. The central parts of the study area are poorly drained due to the flat-lying nature of the terrain and an extensive cover of unconsolidated Cenozoic sands which absorb most of the rainfall. The easterly and northerly-flowing Modder and Groën Rivers drain the northern part of the area. The southern boundary of the study area is formed by the Sout River which discharges into the Atlantic Ocean between Riebeeckstrand and Melkbosstrand. The southerly flowing Swart and Diep Rivers occur to the east of the study area. The hydrogeological environment in the Blaauwberg district is diverse as a result of the variety of the geological formations. The area hosts fractured aquifers, intergranular aquifers, and fractured and intergranular aquifers (CoCT Spatial Development Plan & Environmental Management Framework, 2011).

According to the Preliminary Assessment done for the Ankerlig Power Station (Woodford, 2007), the Atlantis Primary Aquifer System (APAS) forms part of an almost continuous coastal primary aquifer system that extents from Cape Town in the south to the Olifants River in the north (Bredenkamp and Vandoolaeghe, 1982). The Aquifer System has been subdivided into a number of groundwater units namely: *ƒ* Silverstroom; *ƒ* Witzand; *ƒ* Brakkefontein; and Wesfleur. These units were defined according to the groundwater flow regime, as well as palaeo-channels and topographic 'highs' within the Malmesbury bedrock. Therefore groundwater can flow freely between the units in the APAS. Sediments of the Springfontein Member form the main transmissive zone of this Aquifer System. The Malmesbury rocks are generally regarded as forming the base of the APAS, although exploration drilling at the Koeberg Nuclear Power Station (Murray and Saaiman, 2000) and in the Langebaan Road Aquifer System has indicated that it is not uncommon to intersect substantial yields (>10 L/s) of groundwater in the Malmesbury bedrock where it is overlain by thick, saturated Cenozoic sands. At places along the coast there is evidence of groundwater emerging from fractures in the bedrock and flowing into the sea (Visser, 1972).

Table 3.1: Estimated Volumes of Groundwater stored in the Atlantis Primary Aquifer System (Bredenkamp and Vandoolaeghe, 1982)

Groundwater Resource Unit	Area (km^2)	Volume Groundwater in Storage ($x\ 10^6\ m^3$)	
		Total	Abstractable
Silverstroom	52.6	71	50
Witzand	44.8	189	130
Wesfleur	36.5	79	55*
TOTAL	-	**339**	**235**

Source: Bredenkamp and Vandoolaeghe (1983)
Note: The Matroosbaai GRU has been included in the Silverstroom Unit.
The extend / boundary of the Witzand GRU towards Melkbosstrand is unknown and was estimated.
* - boundary condition are unkown

3.3.7 Terrestrial Environment

3.3.7.1 Protected Areas

The proposed Atlantis Gas-to-Power facility is situated within the Cape West Coast Biosphere reserve and approximately 8 km west of Camphill Private Nature Reserve. The proposed site is approximately 3.5 km north-east of Koeberg Private Nature Reserve, whilst Site 1 is located approximately 7 km south of Burgherspost Wine Estate, CapeNature stewardship site and the Pela Nature Reserve; as well as 12 km south of the Riverlands Nature Reserve (Figure 3.8). In terms of CoCT urban conservation areas, Site 1 is situated approximately 5.5 km south and south west of the Mamre Cultural Landscape and Pella Mission Station, whilst Site 2 is approximately 10.5 km north-west of Philadelphia. The proposed development of the Atlantis Gas-to-Power facility may have a visual impact on surrounding protected areas. However, the landscape has already been altered by industrial infrastructure (e.g. Ankerlig power station), and therefore the proposed development is anticipated to have limited visual impacts on sensitive visual receptors. Site 2 (proposed site) located the furthest away from nature protection areas.

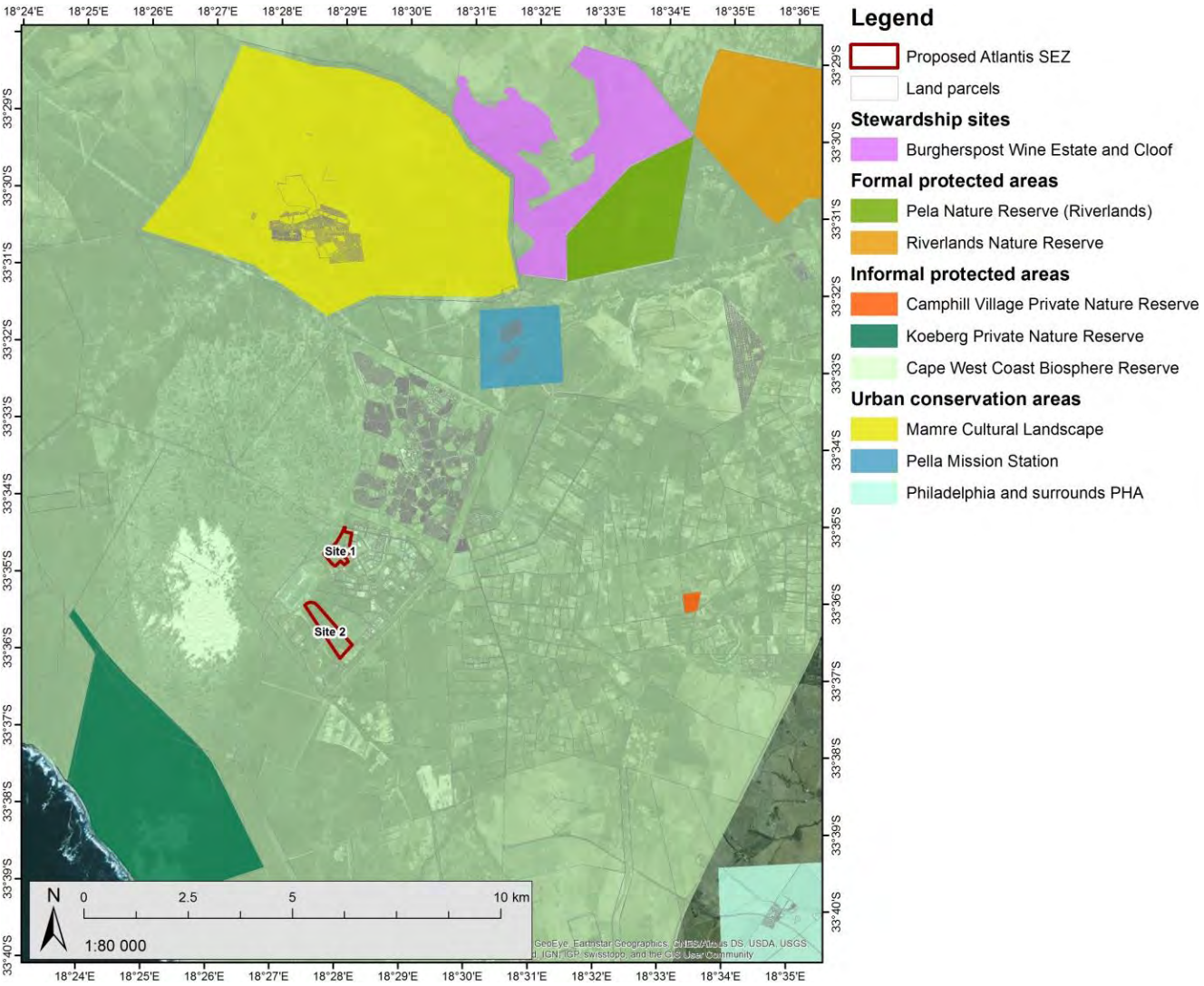

Figure 3.8: National Protected Areas within 15 km of the proposed Atlantis SEZ.

3.3.8 Threatened ecosystems (remaining extent)

A national list of threatened ecosystems is provided for in The National Environmental Management: Biodiversity Act (NEMBA) (No. 10 of 2004) (South Africa, 2004). There are three classes of threatened ecosystems namely: i) Critically endangered (CR) vegetation types which have less than 25 % of its original cover remaining, have undergone severe degradation of ecological structure, function or composition due to human activities, and are subject to an extremely high risk of irreversible transformation; ii) Endangered (EN) vegetation types have lost more than 60% of its original extent and have undergone degradation of ecological structure, function, or composition due to human activities, although they are not critically endangered ecosystems; and iii) Vulnerable (VU) vegetation types that have lost approximately 50 % of its original extent and are at a high risk of undergoing significant degradation of ecological structure, function or composition due to human activities, although they are not critically endangered ecosystems or endangered ecosystems.

Cape Flats Dune Strandveld is listed as being Endangered, whilst the Atlantis Sand Fynbos is listed as being Critically Endangered (South Africa, 2004). The proposed Atlantis Gas-to-Power facility is partly situated in the Atlantis Sand Fynbos (Site 2) vegetation types (Figure 3.9).

In terms of the impacts on loss of biodiversity due to this proposed facility, a terrestrial ecological specialist study was conducted for this site and included in this Scoping Report as **Appendix J**. In response to high demand and need for development within the Atlantis urban edge, the City of Cape Town adopted a pro-active stance towards the conservation of the highly threatened biodiversity within the Atlantis district. The vegetation types in this area are Endangered or Critically Endangered and there are remnants of these vegetation types occurring within the urban edge.

The City of Cape Town consequently embarked on the Atlantis Industrial Incentives Scheme, which has also been termed a Land Banking Mechanism. The project entails the pro-active purchase or obtaining of land for formal conservation, which then forms part of the land bank against which development of natural areas within the Atlantis urban edge can be used as a debit against the proactively secured land and therefore act as an incentive for industrial development within the Atlantis urban edge.

The biodiversity offset property consists of Critically Endangered Atlantis Sand Fynbos in very good condition with a low level of alien invasive species infestation (very rare within an urban context) and contains several Red Listed threatened species. The subject property is therefore suitable for offsetting the fragments of natural vegetation within the urban edge, which are more fragmented and heavily infested with alien invasive species, however still of conservation importance due to the threatened status and possibility of threatened species present, but unlikely to be viable in the long term.

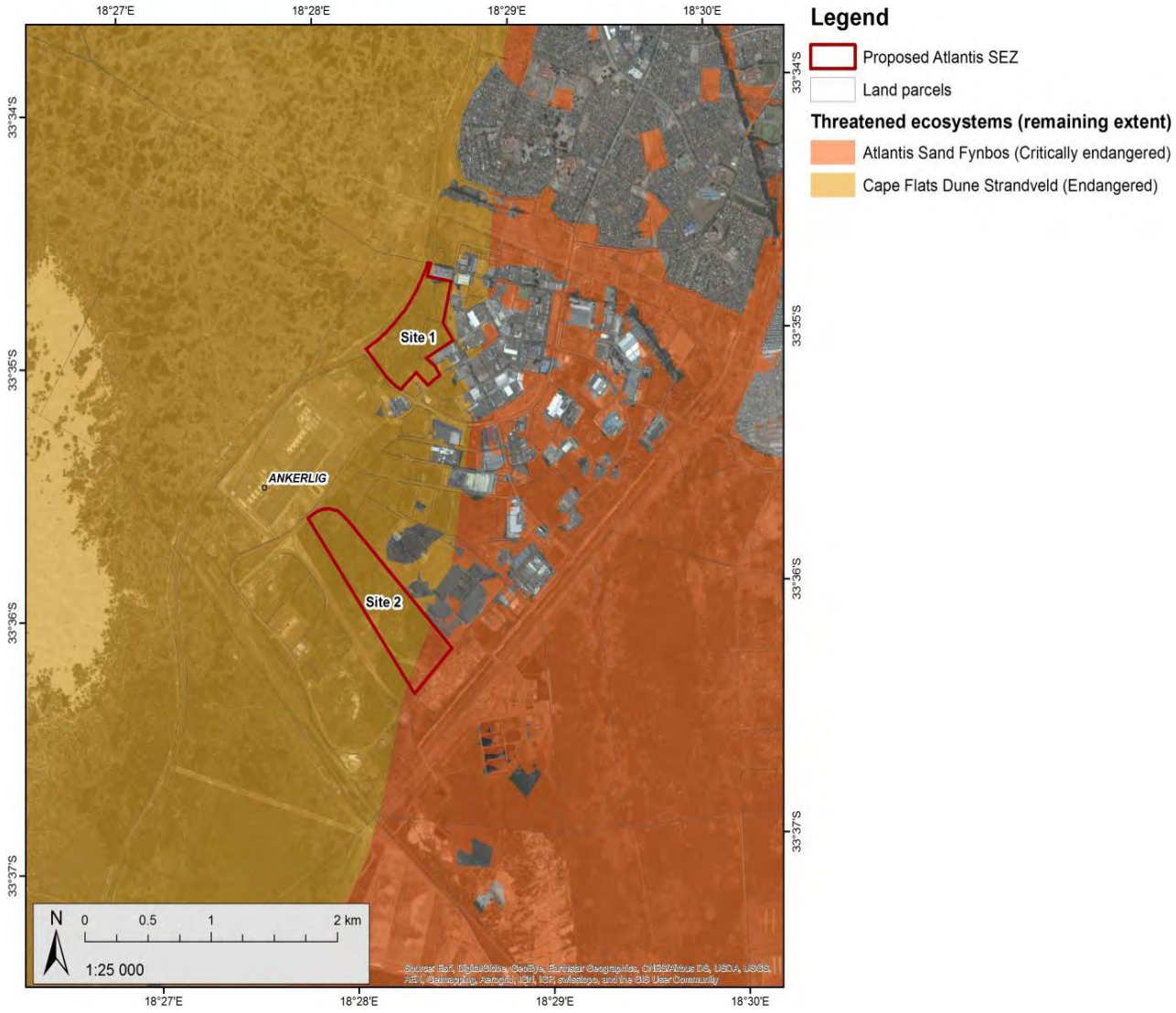

Figure 3.9: Remaining extent of threatened ecosystems in the area proposed for the Gas-to-Power facility

3.3.8.1 Conservation planning and aquatic systems

The CoCT Biodiversity Network (BioNet) employed a systematic biodiversity planning approach to prioritise remnants of indigenous vegetation based on factors such as habitat connectivity and condition, as well as the distribution of threatened flora (Holmes *et al*., 2012). The CoCT BioNet spatial information includes Protected Areas, Critical Biodiversity Areas (CBAs), and Ecological Support Areas (ESAs). The protected areas are divided into i) conservation areas that have not yet been proclaimed, ii) protected areas proclaimed in perpetuity, and iii) protected areas proclaimed for a limited period. The BioNet also includes levels of CBAs and ESAs such as areas critical for landscape connectivity, irreplaceable core flora sites, and natural / transformed ecosystems of conservation significance.

The proposed Atlantis SEZ is located in an area identified by the BioNet as *Other natural vegetation* (3.10), which entails that the activities in the area is negotiable, but low-medium impact activities are preferable as the vegetation in some parts of the site is still in a good condition and should be sustainably managed (refer to Table 3.2). As indicated earlier, an artificial NFEPA wetland is present on Site 2.

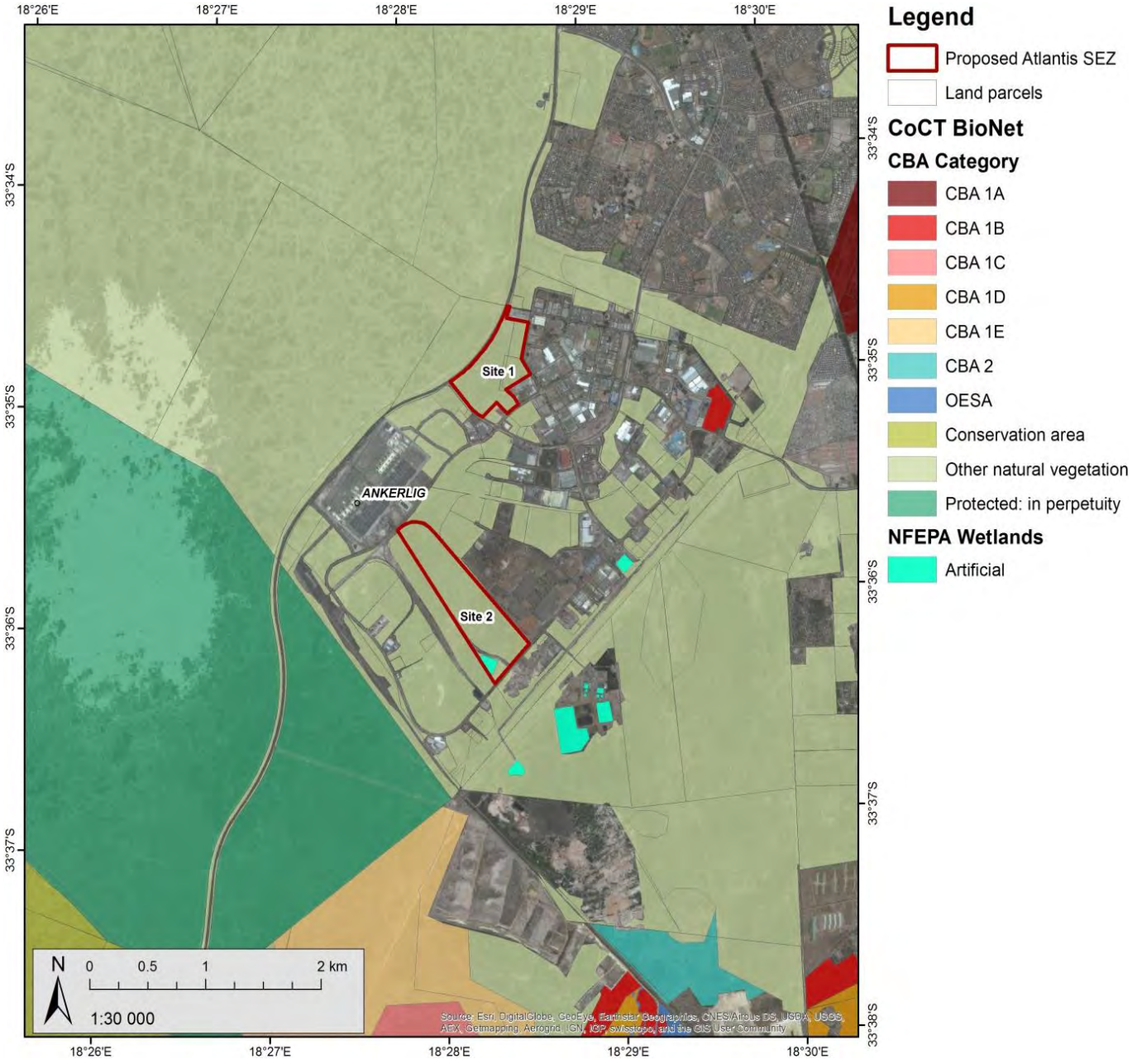

Figure 3.10: Conservation planning as per CoCT BioNet for the area proposed for the Atlantis Gas-to-Power facility

Table 3.2: Description, significance and permissible actions for the Critical Biodiversity Areas as defined by the CoCT BioNet (adapted from Holmes *et al*, 2012).

BioNet CBA category	Description	Significance of habitat	Objective	Action	Compatible action
Other natural vegetation[2]	Natural vegetation in endangered, vulnerable and least concern in good or restorable condition.	Local significance. Will result in impaired ability to meet targets, given that higher categories will not always be achievable.	Sustainable management within general rural land-use principles.	Negotiable. Low priority, no urgency. Invasive alien control.	Until BioNet is secured elsewhere, these areas may become important if required as biodiversity offset sites. **Higher impact activities could be considered on degraded portions**. Vegetation in good condition should be subject to low impact activities only.

3.3.9 *Heritage Profile*

3.3.9.1 *Historical Background*

The proposed development site (Site 2) is located on a portion of the original farm Brakkefontein. During the Verenigde Oosindichse Compangie (VOC) period, this farm occupied a strategic position in the *Slagtersveld* - the area around the outposts Ganze Kraal and Groene Kloof, largely used for grazing cattle, for slaughter, and for sale to passing ships. The farm continued to be occupied and was farmed by successive owners until 1855. Heritage Western Cape has commented on this application confirming that no further heritage studies would be required **(Appendix M)**.

3.3.9.2 *Archaeology*

The terrain is largely flat and there are a number of dune fields. Where agriculture is not taking place, alien plant species have taken over. Previous archaeological surveys have described the poor visibility due to dense ground cover of alien vegetation as a limiting factor in surveying the site. A large number of Heritage and Archaeological Impact Assessments have been conducted in this area, including a survey by Hart *et al*. (2007) which also covered the two sites identified for the current development. Hart *et al* reported that no significant archaeological material was recovered.

According to the palaeontology, archaeology and heritage study conducted as part of the Basic Assessment on site in 2012, the likelihood of uncovering any significant archaeological remains on Portions 0, 1 & 4 of the Farm CA1183 (Site 2) are minimal **(Reports attached as Appendix J, K, L and M).** Prior surveys have been conducted on the same property which has been identified for the current proposed development. No significant archaeological remains were reported **(Appendix K and L).**

[2] The area proposed for the Atlantis SEZ is identified by the BioNet as this CBA category *Other natural vegetation*

3.3.9.3 Palaeontology

The Palaeontological report (Appendix K) suggested that peaty deposits occur in deeper sediments. Traces of Pleistocene age terrestrial fossils have been located in sediments along the west bank of the Diep River entrance to Rietvlei and in sediments underlying Rietvlei. Early Pliocene marine mammal remains (whale bone) have been recovered from the Potsdam Sewerage pumping station (Graham Avery pers. observation), on Milnerton Beach at the Diep River estuary and Ysterplaats. During construction of the Koeberg Nuclear Power Station, Early Pliocene sediments yielded marine mammals, mainly whales. Further North, Middle Pleistocene terrestrial fossils and Middle Stone Age stone artefacts occur at Bokbaai. 20 km inland of Langebaan (Klein, *et al*. 2007), has yielded important Middle Pleistocene animal fossils (700 ka to 400 ka) and the earliest human remains (archaic *Homo sapiens*) found so far in the Western Cape. Late Pleistocene animal fossil occurrences occur along the coast from Melkbosstrand to Ysterfontein (Graham Avery pers. obs.) and at Elandsfontein. It is clear, therefore that the area is palaeontological important and thus was addressed as part of previous authorizations on site. The impacts anf findings of this study will be included in this impact assessment.

3.3.10 Socio-Economic Environment

Atlantis SEZ is located 7 km inland on the Cape West Coast. Important landmarks in the greater area are the Ankerlig Power Station, Koeberg Nuclear Power Station (approximately 9 km south-west of the site) and the small village of Mamre (approximately 4 km north of the site). The Atlantis Industrial was established as a recognized "growth-point" in the mid- 1970's and was established with infrastructure and services which could facilitate growth in the future. The Industrial area includes an already established set of services such as tarred road network, stormwater, sewer, street lighting and water supply services. The site is zoned General-Industrial and the area surrounding the proposed facility is visually dominated by industrial stacks, buildings and transmission lines.

- ***Demographic Profile***

In 2011 the population of 2011 Census suburb Atlantis was 67 491 and the number of households was 15 564. The average household size was 4.34 and Afrikaans is the most common spoken language in Atlantis (87%). As seen inTable 3.3 below, Gender distribution is relatively equal across the study area, with slightly more females than males. The age distribution, shown in Figure 3.11, is slightly younger than the average for the City of Cape Town, with a larger percentage aged under 17 years.

Table 3.3: Demographic Profile of the Atlantis Area (City of Cape Town Suburbs Census, 2011)

Atlantis Population	Male		Female		Total	
	Num	%	Num	%	Num	%
Black African	4 626	6.9%	4 087	6.1%	8 713	12.9%
Coloured	27 536	40.8%	29 835	44.2%	57 371	85.0%
Asian	144	0.2%	99	0.1%	243	0.4%
White	49	0.1%	51	0.1%	100	0.1%
Other	672	1.0%	391	0.6%	1 063	1.6%
Total	33 027	48.9%	34 463	51.1%	67 490	100.0%

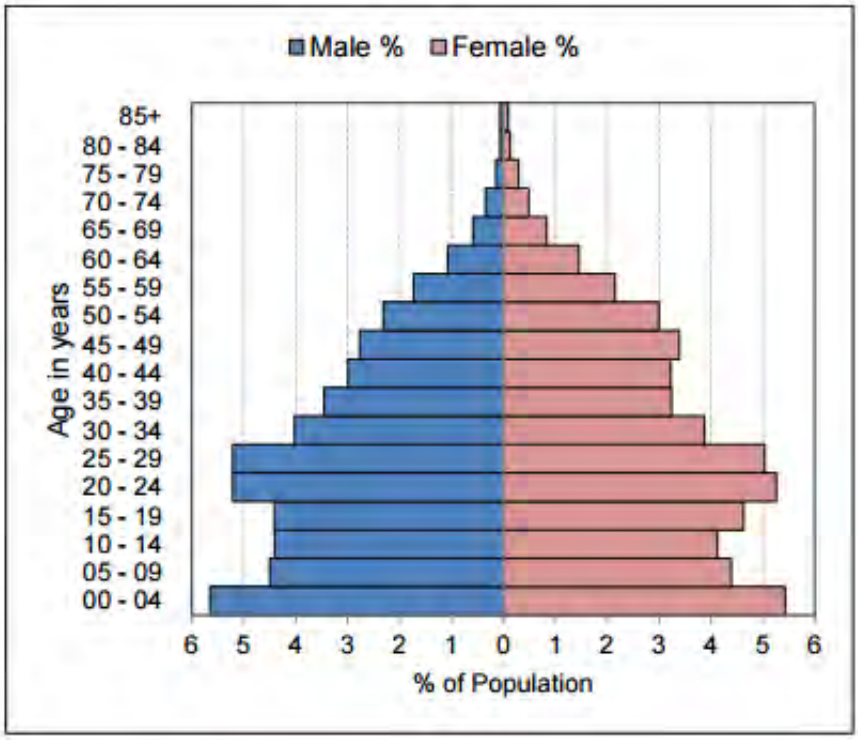

Figure 3.11: Age profile of the Atlantis Area (City of Cape Town Suburbs Census, 2011)

The education profile of Atlantis, as depicted in Table 3.4, shows that approximately 29% of the Atlantis residents aged 20+ had completed Matric in 2011, and less than 4% had attained any further levels of education. The percentage with "no schooling" was slightly lower than that of Cape Town as a whole at 2 %. As a matter of contrast, the nearby town of Melkbosstrand had less than 2% with no education, over three quarters of the population had completed matric and just under a third had attained some level of tertiary education.

Table 3.4: Education Profile of the Atlantis Area (City of Cape Town Suburbs Census, 2011)

Atlantis Adult Education (for all aged 20+)	Black African		Coloured		Asian		White		Other		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
No schooling	102	1.8%	681	1.9%	3	1.9%	0	0.0%	36	4.6%	822	2.0%
Some primary	621	10.7%	3 990	11.3%	15	9.4%	6	8.0%	63	8.0%	4 695	11.2%
Completed primary	303	5.2%	2 454	7.0%	9	5.7%	0	0.0%	18	2.3%	2 784	6.6%
Some secondary	2 874	49.6%	16 926	48.0%	57	35.8%	36	48.0%	219	28.0%	20 112	47.8%
Grade 12	1 728	29.8%	10 059	28.5%	60	37.7%	27	36.0%	345	44.1%	12 219	29.1%
Higher	156	2.7%	1 071	3.0%	9	5.7%	6	8.0%	78	10.0%	1 320	3.1%
Other	9	0.2%	60	0.2%	6	3.8%	0	0.0%	24	3.1%	99	0.2%
Total	5 793	100.0%	35 241	100.0%	159	100.0%	75	100.0%	783	100.0%	42 051	100.0%

- ***Employment and Income Profile***

The economically active population (i.e the labour force) of Atlantis comprises approximately 60% of the population, as seen in Table 3.5. 26% of Atlantis residents are unemployed which is slightly higher than the average for Cape Town as a whole. Of the economically active residents of Atlantis, approximately 12% commute to jobs outside Atlantis. The remainder is employed by local industries, and small-to-medium and micro-enterprises (SMME's). Furthermore, a significant number of jobs in Atlantis (approximately 3000) are held by outsiders who commute to the area, of which the majority fall into the educational and other professional occupations. In terms of monthly household income, over half of the households in Atlantis earn less than R6 400 per month (Table 3.6)

Table 3.5: Employment Profile of the Atlantis Area (City of Cape Town Suburbs Census, 2011)

Atlantis Labour Force Indicators	Black African	Coloured	Asian	White	Other	Total
Population aged 15 to 64 years	**6 366**	**38 769**	**168**	**75**	**819**	**46 197**
Labour Force	**4 467**	**22 641**	**120**	**51**	**618**	**27 897**
Employed	3 117	16 734	93	42	495	20 481
Unemployed	1 350	5 907	27	9	123	7 416
Not Economically Active	**1 899**	**16 128**	**48**	**24**	**201**	**18 300**
Discouraged Work-seekers	429	2 091	6	0	27	2 553
Other not economically active	1 470	14 037	42	24	174	15 747
Rates %						
Unemployment rate	30.22%	26.09%	22.50%	17.65%	19.90%	26.58%
Labour absorption rate	48.96%	43.16%	55.36%	56.00%	60.44%	44.33%
Labour Force participation rate	70.17%	58.40%	71.43%	68.00%	75.46%	60.39%

Table 3.6: Household Income Profile of the Atlantis Area (City of Cape Town Suburbs Census, 2011)

Atlantis Monthly Household Income	Black African		Coloured		Asian		White		Other		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
No income	747	22.7%	1 164	9.7%	9	17.6%	3	12.5%	36	16.0%	1 959	12.6%
R 1 - R 1 600	933	28.4%	1 758	14.7%	12	23.5%	3	12.5%	39	17.3%	2 745	17.6%
R 1 601 - R 3 200	825	25.1%	2 268	18.9%	3	5.9%	0	0.0%	48	21.3%	3 144	20.2%
R 3 201 - R 6 400	465	14.2%	2 838	23.7%	9	17.6%	6	25.0%	51	22.7%	3 369	21.7%
R 6 401 - R 12 800	198	6.0%	2 316	19.3%	15	29.4%	0	0.0%	30	13.3%	2 559	16.5%
R 12 801 - R 25 600	72	2.2%	1 164	9.7%	0	0.0%	9	37.5%	15	6.7%	1 260	8.1%
R 25 601 - R 51 200	33	1.0%	375	3.1%	3	5.9%	3	12.5%	6	2.7%	420	2.7%
R 51 201 - R 102 400	6	0.2%	39	0.3%	0	0.0%	0	0.0%	0	0.0%	45	0.3%
R 102 401 or more	6	0.2%	48	0.4%	0	0.0%	0	0.0%	0	0.0%	54	0.3%
Unspecified	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	3 285	100.0%	11 970	100.0%	51	100.0%	24	100.0%	225	100.0%	15 555	100.0%

The economy of the Atlantis Area is dominated by industry and agriculture and contributes greatly to the economy of the Western Cape. Atlantis offers significant potential for economic development, and the City of Cape Town Metropolitan Municipality IDP (2004) identified Atlantis as one of the focal areas for residential upgrading. The Atlantis Industrial area is ideal and unique in its suitability and potential to contribute to industrial and economic development, specifically in terms of South Africa's power mix. It has been noted that there are no major tourist destinations in close proximity to the site (Figure 3.12 below), which adds to the suitability of this site for the proposed Gas-to-Power facility. Due to the zoning of this area as a Special Economic Zone, earmarked for industrial development, the CoCT IDP indicates that industrial development is one of the most important economic sectors in the Western Cape, specifically in Atlantis, due to its locality and existing infrastructure.

3.3.11 Municipal Services

As part of the 2012 Basic Assessment Process, a **Services Report** for the Atlantis Industrial areas was conducted, and this report is attached as **Appendix I.** This highlights the services available in the area and what capacity the municipality has to take on services for a new development.

The following are an approximation of the Municipal services required for the proposed development, taking into consideration that final quantities will be applied for in the planning and design phase of the facility:

1. **Water**

Atlantis receives the bulk of its water from the Witzand Water Treatment Works which abstract from the Atlantis aquifer. The site is currently services from a 150 mm diameter pressurized pipeline located along the western boundary of the site. The municipal pipeline provides for both domestic and fire-fighting requirements. Pressure within the pipeline is maintained between 7 to 9 bars, should water be required at higher pressure then booster pumps will have to be installed by the developer. The project does not require water for the running and operation of the system (air/dry cooled), so the water will be for potable and firefighting purposes.

2. **Sanitation**

In the Atlantis district there are two parallel municipal gravity pipeline in the adjacent road network. Generally effluent is divided into two categories namely:

a. Domestic effluent generated from toilets, showers, hand basins and kitchen sinks.
b. Industrial effluent which could include noxious effluents (bye product from manufacturing process).

The proposed project does not foresee any Industrial effluent to be generated from the facility. Buildings which generate domestic effluent, and which require connection to the municipal sewerage reticulation will be situated close to the adjacent road to ensure domestic effluent can gravitate into the dedicated municipal pipeline for conveyance to treatment works for domestic wastewater.

The site is serviced by a 300 mm gravity pipeline adjacent to the western and south section of the eastern boundary. Buildings requiring connection into the municipal pipeline will be situated as close to the municipal sewer lines to ensure waste water can gravitate into the municipal pipeline without pumping.

Generally service connections (potable water and foul sewer) to the site are installed by the developer (i.e. the City of Cape Town), however they might not be in the position dedicated by the preferred placement of the building footprint. In this instance an application to the Municipality for new service connections would be necessary. Domestic effluent can be discharged directly into the municipal network provided for conveyance thereof.

3. Solid Waste Removal

The removal of refuse (solid waste) is managed by the municipality, alternatively this service can be provided by private contractors, depending on developer's needs. There will not be large quantities of solid waste needing to be removed from the proposed project, other than basic domestic waste, as the facility will not generate solid waste through its operations.

4. Electrical

The City of Cape Town is the supplier of electricity to the Atlantis Industrial area. Currently the power supply network capacity in the area is limited. The municipality indicates they could provide up to 2MVA to the site. Anything larger than 2 MVA can be accommodated, but with significant implications to their network.

The following will be noted and adhered to when electricity connection and quantity is applied for:

- The proponent will include in the development measures to improve energy efficiency and reduce consumption where possible;
- The proponent will conform to any conservation and/or rationing programme adopted by any regulating body by reducing the electricity usages required;
- Applications for a connection to the City's electricity network will be subject to conditions applicable at the time.

In order to determine the specific energy needs of the proposed project, the proponent (City of Cape Town) will appoint a consulting electrical engineer to investigate in detail the specific energy needs of the development and to submit a report to the Utility Services Directorate of CoCT.

3.3.12 Proximity to the Koeberg Nuclear Power Station's Urgent Protection Zone (UPZ)

The preferred site (site 2) is situated between the 5- 16 km Urgent Protective Action Planning Zone (UPZ) boundary of the Koeberg Nuclear Power Station (KNPS). Figure 3.12 indicates the location of the site in relation to the Koeberg UPZ.

It is difficult to estimate the exact number of people to be employed on a temporary and permanent basis as well as the amount sourced locally or non-locally, as this may only be finalized in the development phase (and may fluctuate). [3]However, it is important to provide a high-level assessment and anticipation of the population increase to the UPZ under the circumstance of a nuclear emergency. Thus, this increase needs to be tested against the KNPS Traffic Evacuation Model (TEM), as seen in Table 3.7 below.

[3] This table will be updated in the development phase when the size of the project as well as the number of personnel needed is finalized by the Applicant.

Table 3.7: Anticipated population increase affecting the Koeberg Nuclear Power Station's TEM

Proposed Atlantis gas-to-power facility's population increase for the Koeberg TEM					
PLEASE SPECIFY THE TYPE OF LAND USE:	**SG CODE OR X,Y - COORDINATES**	**(GLA m²) / Nr OF DWELLING UNITS / HOUSEHOLDS**	**INCOME GROUP (LOW/MIDDLE/HIGH FOR TYPE OF LAND USE)**	**POP INCREASE FROM INSIDE UPZ (RESIDENTS, WORKERS, OTHER OCCUPENTS)**	**POP INCREASE FROM OUTSIDE UPZ (RESIDENTS, WORKERS, OTHER OCCUPENTS)**
General Industrial (GI)	SG Code: C0160000000118300004 C0160000001183000001	Gas-to-power facility consisting of an office for personnel	Skilled personnel working on site will be predominaely from a high income group, where as the unskilled personnel from low- middle income groups.	~200 (Staff, skilled and support labour, construction and/or operation)	~20 (Specialist shutdown and outage personnel to be mobilised into the area for short periods)

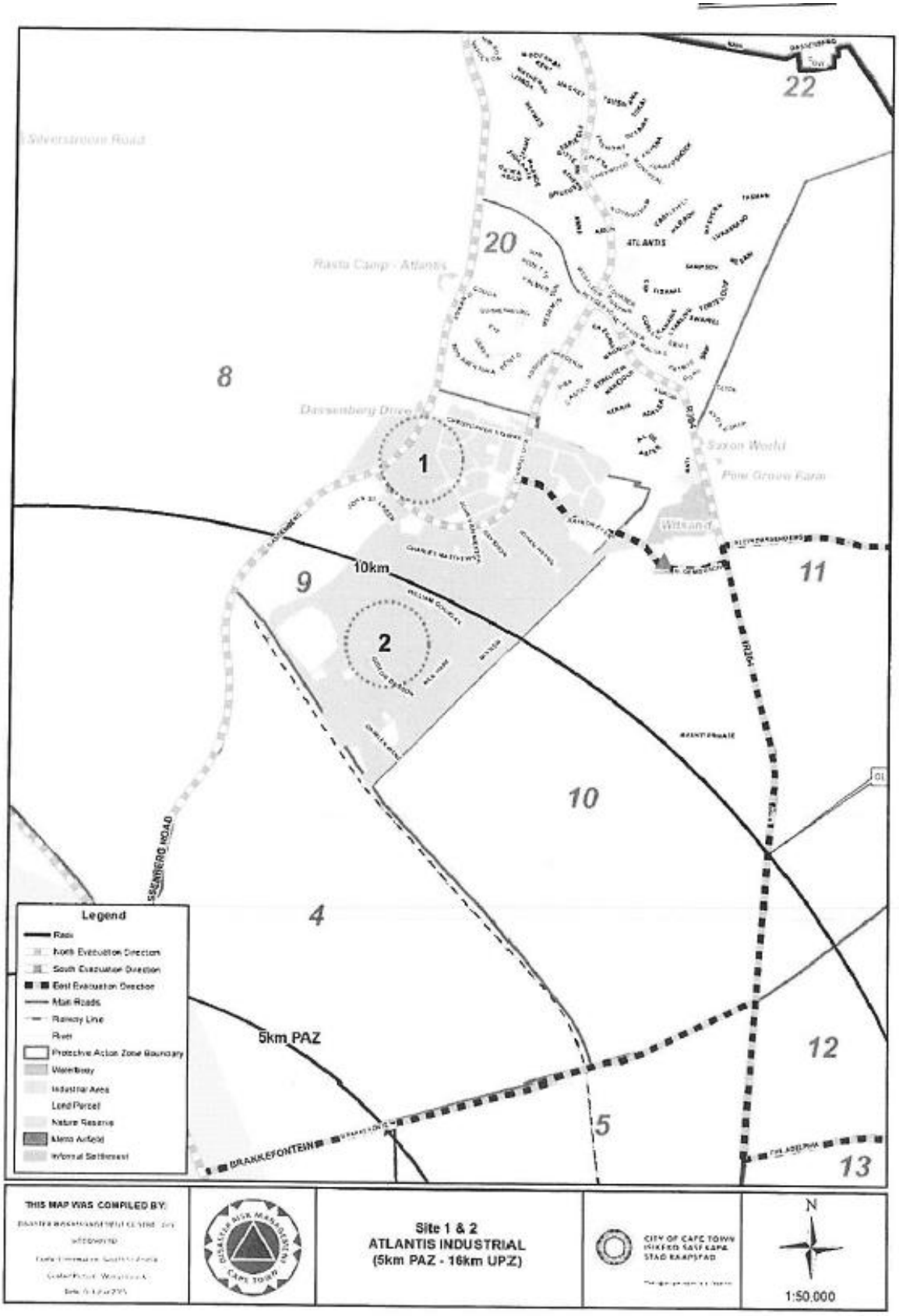

Figure 3.12: Location of preferred site (site 2) in relation to the Koeberg UPZ

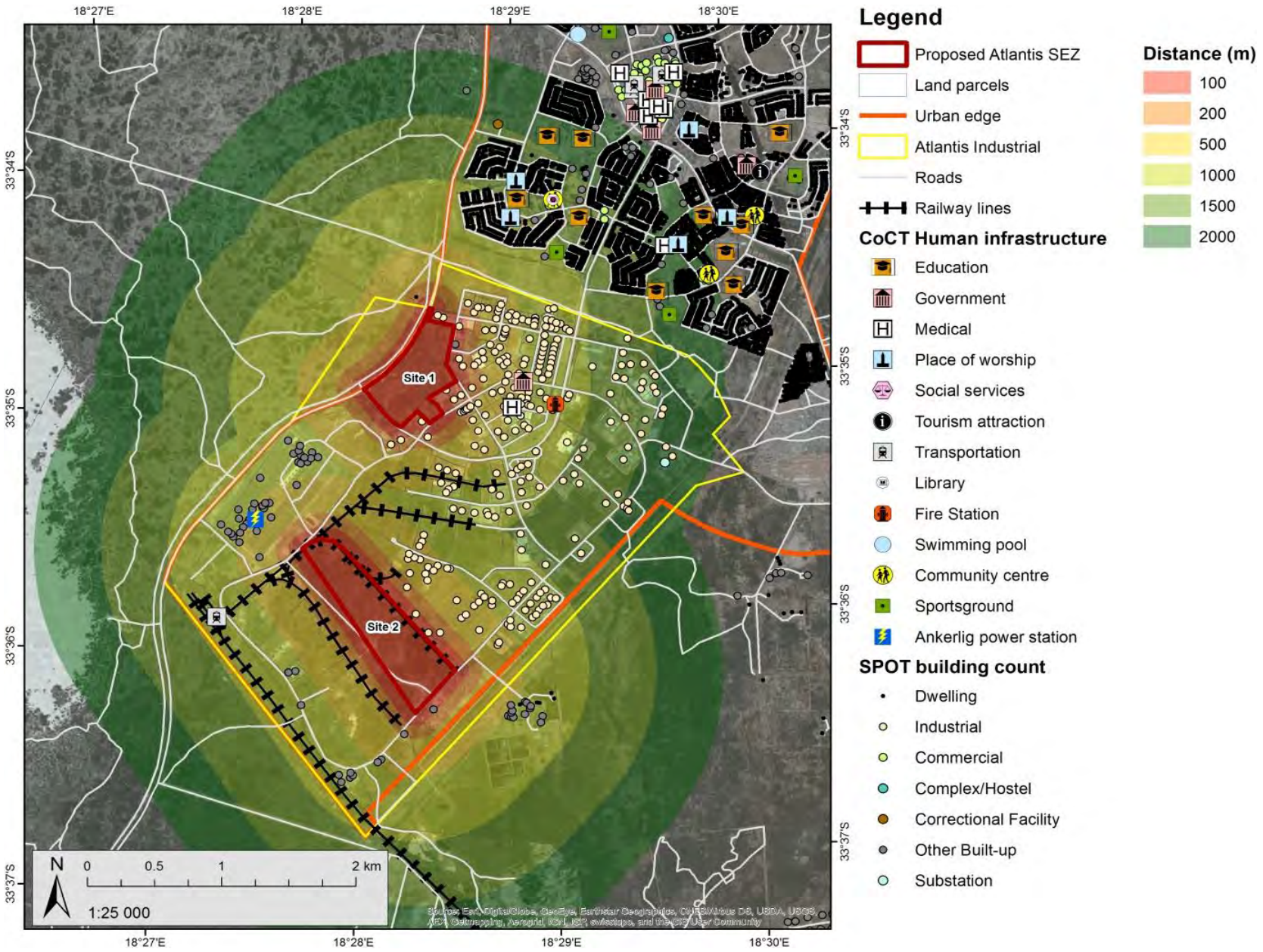

Figure 3.13: Map indicating sensitivities within distances of 100, 200, 500, 1500 and 2000 m from the edges of the proposed Atlantis Gas-to-Power site (site 2 is preferred alternative).

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 4:

Approach to EIA Process and Public Participation

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4. APPROACH TO EIA PROCESS AND PUBLIC PARTICIPATION

This chapter presents the approach to the impact assessment phase of the EIA Process, for the proposed development and gives particular attention to the legal context and guidelines that apply to this EIA, the steps in the Public Participation component of the EIA (in accordance with Regulations 41, 42, 43 and 44 of GN R982), the schedule for the EIA Process, and the Terms of Reference (TOR) for the specialist studies that have been undertaken. The EIA Phase is shaped by the findings of the Scoping Process. For information from the Scoping Phase, including the approach to stakeholder engagement, identification of issues, overview of relevant legislation, and key principles and guidelines that provide the context for this EIA Process, refer to the finalised Scoping Report (CSIR, Jan 2017).
The purpose of the EIA Phase is to:

- Address issues that have been identified through the Scoping Process;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Recommend actions to avoid/mitigate negative impacts and enhance benefits.

The EIA Phase consists of three parallel and overlapping processes:

- Central assessment process through which inputs are integrated and presented in an EIA Report that is submitted for approval to the DEA and other commenting authorities (Sections 4.1, 4.4, and 4.6);
- Undertaking of a PPP whereby findings of the EIA Phase are communicated and discussed with I&APs and responses are documented (Section 4.4);
- Undertaking of specialist studies that provide additional information/assessments required to address the issues raised in the Scoping Phase (Sections 4.8 and 4.9).

The EIA Process is a planning, design and decision making tool used to demonstrate to the responsible authority, DEA, and the project proponent, Scatec Solar, what the consequences of their choices will be in biophysical, social and economic terms. As such it identifies potential impacts (negative and positive) that the project may have on the environment. The EIA makes recommendations to mitigate negative impacts and enhance positive impacts associated with the proposed project.

4.1 OVERVIEW OF APPROACH TO PREPARING THE EIA REPORT AND EMPR

The objectives of the EIA Phase are noted in Chapter 1 of this EIA Report. The results of the specialist studies and other relevant project information for the Atlantis gas-to-power project have been included in this Report (Appendices J to Q). Chapter 7 of this EIA Report includes a summary of the findings, the overall conclusions and the recommendations. The EIA Report is currently being released for a 30-day I&AP and authority review period, as outlined in Section 4.4. All registered I&APs on the project database have been notified in writing of the release of the EIA Report for review.

Comments raised during the review of the EIA Report, through written correspondence (emails, comments, forms), will be captured in a Comments and Responses Trail for inclusion in the EIA Reports that will be submitted to the DEA for decision-making in terms of Regulation 23 (1) (a) of the 2014 EIA Regulations. Comments raised will be responded to by the EIA team and/or the applicant. These responses will indicate how the issue has been dealt with in the EIA Process. Should the comment received fall beyond the scope of this EIA, clear reasoning will be provided.

As previously noted, the EIA Report includes an EMPr (Part B of this EIA Report), which has been prepared in compliance with the relevant regulations (i.e. Appendix 4 of the 2014 EIA Regulations). This EMPr is based broadly on the environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPr are drawn primarily from the management actions in the specialist studies for the construction and operational phases of the project. If the project components are decommissioned or re-developed, this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time.

4.2 LEGAL CONTEXT FOR THIS EIA

Section 24(1) of the NEMA states:

- *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization."*

The reference to "listed activities" in Section 24 of the NEMA relates to the regulations promulgated in GN R982, R983, R984 and R985 in Government Gazette 38282, dated 4 December 2014, which came into effect on 8 December 2014. The relevant Government Notices published in terms of the NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a Basic Assessment, or Scoping and EIA (that is a "full EIA") be conducted. As noted in Chapter 1 of this EIA Report, the proposed project requires a full EIA, as it particularly includes, *inter alia*, the inclusion of Listed Activity Number 2 in GN R984:

"2. The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more."

All the listed activities potentially forming part of this proposed development and therefore requiring EA were included in the Application Form for EA that was prepared and submitted to the DEA on 19 October 2016 together with the Draft Scoping Report. Refer to Appendix O of this EIA Report for the copy of the Application Form to the DEA. As noted in Chapter 1 of this EIA Report, the DEA acknowledged receipt of the Scoping Report and Application for EA on 19 October 2016 via email. DEA EIA Reference Number: 14/12/16/3/3/2/981 was assigned to the Atlantis gas-to-power project. A copy of the Application Form for the Atlantis gas-to-power project and the letter of acknowledgement from the DEA have been included in Appendix O of this EIA Report.

The DEA requested, as part of the acceptance of the finalised Scoping Report, that the EIA Report must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for, and that the listed activities represented in the EIA Report and Application for EA must be the same and correct. Activity 28 of GN R984 has become applicable to the proposed project (i.e. triggered by the proposed project, as a result of the need for an Air Emissions License).

Therefore, in order to ensure that the listed activities presented in the EIA Report and the Application for EA are the same, a request to amend the Application for EA will be submitted to the DEA together with the submission of the Draft EIA Report for decision-making. The listed activities that are triggered by the proposed project are indicated in Table 4.1. Table 4.1 also shows the sections in the EIA Report where the triggered listed activity is assessed.

Table 4.1: Listed Activities in GN R983, R984 and GN R985 that potentially form part of the proposed Atlantis gas-to-power project

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
	GN R983	
Activity 11	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) Inside an urban area or industrial complex with a capacity of 275 kilovolts or more.	The site is zoned "General Industrial" and falls within the Atlantis Industrial Complex. Powerlines will be incorporated into the project to evacuate power from site to the Omega-Sterrekus Substation (approximately 13 km south of the Atlantis area on the farm Groot Olifantskop 81).
Activity 41	The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.	The proposed project will potentially result in the need for the transmission lines from Ankerlig power station to the existing Omega Substation (approximately 13 km south of the Atlantis area on the farm Groot Olifantskop 81) to be expanded to include a greater capacity for this proposed facility.
	GN R984	
Activity 2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.	The proposed Gas-to-Power facility will be constructed on Portions 1 and 4 of Cape Farm 1183 in Atlantis, approximately 40 km North of Cape Town in the City of Cape Town Metropolitan Municipality. The proposed project will entail the construction of a LNG to electricity facility which will be able to generate electricity up to a maximum of 1500 MW and a minimum of 100 MW. Liquified Natural Gas is a non-renewable resource. The Risk Assessment has assessed the risks associated with such a facility as well as the risks of processing LNG. This report is attached as Appendix N.
Activity 5	The development and related operation of facilities or infrastructure for the refining, extraction or processing of gas, oil or petroleum products with an installed capacity of 50 cubic metres or more per day, excluding – (i) facilities for the refining, extraction or processing of gas from landfill sites; or (ii) the primary processing of a petroleum resource in which case activity 22 in this Notice applies.	The proposed project will entail the construction of a facility and all associated components for the refining and processing of gas in LNG form. This gas resource intake will exceed 50 cubic meters per day for the expected maximum output of 1500 MW. The Risk Assessment has assessed the risks associated with such a facility as well as the risks of processing LNG. This report is attached as Appendix N.
Activity 6	The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding	The proposed Gas-to-Power facility will involve the processing of LNG to generate electricity, this will result in certain levels of air emissions and thus an Air Emissions License may be required. Additional information regarding the air emissions

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
	(i) activities which are identified and included in Listing Notice 1 of 2014 (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (iii) The development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2000 cubic metres or less.	profile of the proposed Gas-to-Power Facility can be found in the Air Quality Impact Assessment attached as Appendix M.
Activity 9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	The proposed gas-to-power facility will require transmission of electricity to the nearby substation. Although the proposed site is inside an industrial complex/urban area, the powerlines may transverse through rural areas in order to reach the Omega-Sterrekus Substation (approximately 13 km south of the Atlantis area on the farm Groot Olifantskop 81).
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed project may entail the excavation, removal and moving of more than 20 ha of indigenous vegetation on Portions 1 and 4 of Cape Farm 1183 in Atlantis Industrial. Additional information regarding the removal of vegetation can be found in the Botanical Impact Assessment which was conducted by Bergwind Botanical Surveys and Tours in 2012 (Appendix J). There has also been a biodiversity offset secured for the Atlantis SEZ which is can be found in Appendix R to this report.
Activity 28	Commencing of an activity, which requires an atmospheric emissions license in terms of section 21 of NEM:AQA, 2004, (Act no. 39 of 2004)- Excluding: i) Activities which are identified in Listing Notice 1 of 2015 ii) Activities which are included in the list of waste management activities in section 19 of NEM:WA.	This project will require an Air Emissions License as per section 21 of NEM:AQA, 2004, (Act no. 39 of 2004). Please see more information on this in Appendix M.
	GN R985	
Activity 12	The clearance of 300 square meters or more of indigenous vegetation except where such clearance is required for the maintenance purposes undertaken in accordance with a	The proposed project will entail the removal of 38.65 ha of indigenous vegetation which consists of the following ecosystems: 1. Cape Flats Dune Strandveld (CFDS): an

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity
	maintenance management plan. (a) In the Western Cape- i. Within any critically endangered or endangered ecosystem in terms of section 52 of the NEMBA	ENDANGERED ecosystem, covering almost the entire site; and 2. Atlantis Sand Fynbos (ASF): a CRITICALLY ENDANGERED ecosystem, covering a small section along southern boundary.

Notes regarding the identification of potential listed activities:

- It should be noted that a precautionary approach was followed when identifying listed activities (for inclusion in the Application for EA and to be assessed as part of the Scoping and EIA Process), i.e. if the activity potentially forms part of the project, it is listed. However, the final project description will be shaped by the findings of the EIA Process and certain activities may be added or removed from the project proposal. The DEA and I&APs will be informed in writing of such amendments accordingly.

- Based on the preliminary sensitivity screening undertaken for the site, the proposed project area does fall within a threatened ecosystem. A national list of threatened ecosystems is provided for in The National Environmental Management: Biodiversity Act (NEMBA) (No. 10 of 2004) (South Africa, 2004). There are three classes of threatened ecosystems namely: i) Critically endangered (CR) vegetation types which have less than 25 % of its original cover remaining, have undergone severe degradation of ecological structure, function or composition due to human activities, and are subject to an extremely high risk of irreversible transformation; ii) Endangered (EN) vegetation types have lost more than 60% of its original extent and have undergone degradation of ecological structure, function, or composition due to human activities, although they are not critically endangered ecosystems; and iii) Vulnerable (VU) vegetation types that have lost approximately 50 % of its original extent and are at a high risk of undergoing significant degradation of ecological structure, function or composition due to human activities, although they are not critically endangered ecosystems or endangered ecosystems.

The Atlantis Sand Fynbos is listed as being Critically Endangered (South Africa, 2004). The proposed Atlantis Site (Portion 1 and 4 of Cape Farm 1183) is situated partly in the Atlantis Sand Fynbos (Site 2) vegetation types (4.1 below):

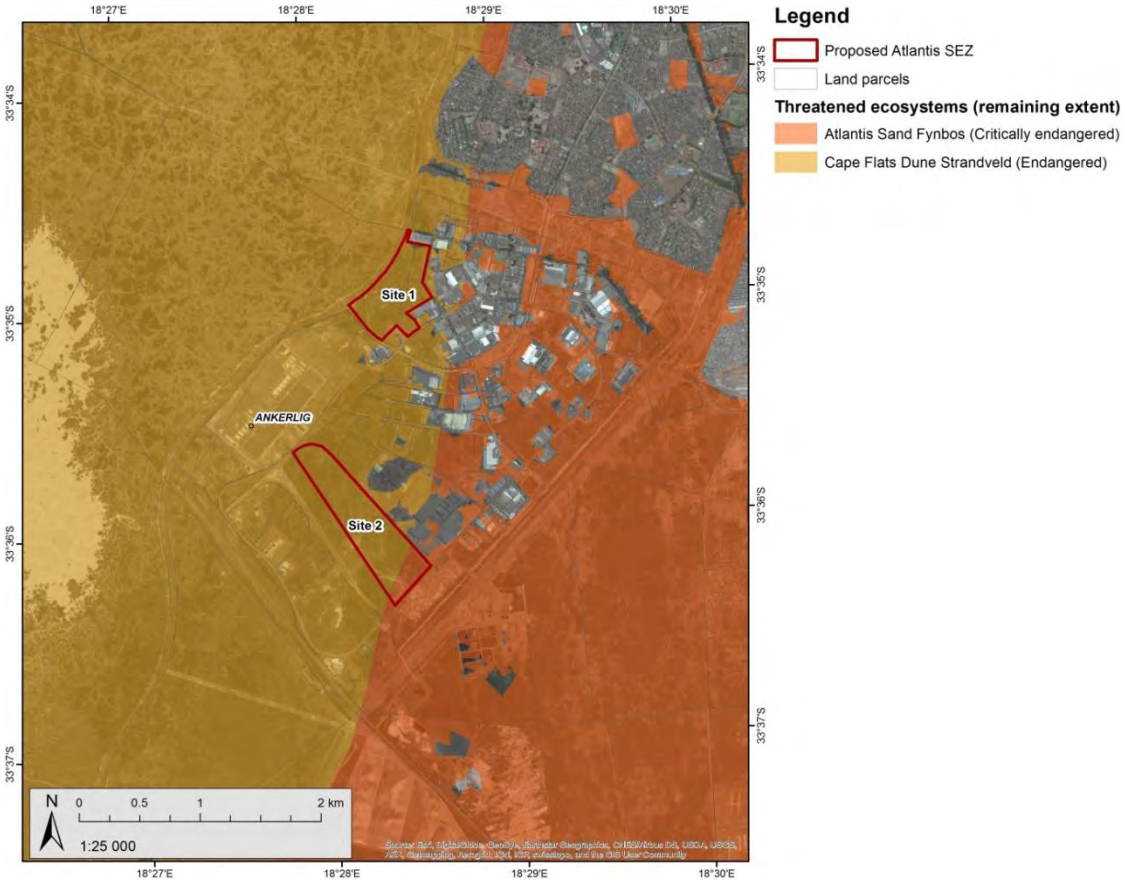


Figure 4.1: Remaining extent of threatened ecosystems in the area proposed for the Atlantis Gas-to-Power site.

It is important to note that due to the already existing environmental authorizations granted for activities on this the site in 2013, a terrestrial ecology specialist study was conducted in order to assess the impacts of clearing the entire 38.65 ha site. In addition a biodiversity offset for the Atlantis SEZ (including the site for this proposed facility) been secured (**Appendix R**). As such, all relevant similarly listed activities for which CoCT already obtained environmental authorizations will still be *included* in this EIA process in order to assess this application holistically[1]. In addition, the findings from the above mentioned specialist study will be used to inform the impacts of this proposed project.

4.3 LEGISLATION AND GUIDELINES PERTINENT TO THIS EIA

The scope and content of this EIA Report has been informed by the following legislation, guidelines and information series documents. It is important to note that the specialist studies included in Appendices J to Q of this EIA Report also include a description of the relevant applicable legislation.

4.3.1 National Legislation

The Constitution of the Republic of South Africa (Act 108 of 1996)
The Constitution, which is the supreme law of the Republic of South Africa, provides the legal framework for legislation regulating environmental management in general, against the backdrop of the fundamental human rights. Section 24 of the Constitution states that:

- "Everyone has the right:
    - to an environment that is not harmful to their health or well-being; and
    - to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that –
        - prevent pollution and ecological degradation;
        - promote conservation; and
        - secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Section 24 of the Bill of Rights therefore guarantees the people of South Africa the right to an environment that is not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps that ensure that the right is upheld and that, among other things, ecological degradation and pollution are prevented.

In support of the above rights, the environmental management objectives of proposed project is to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site.

NEMA and EIA Regulations published under Chapter 5 of the NEMA on 8 December 2014 (GN R982, GN R983, GN R984 and GN R985)

The NEMA sets out a number of principles (Chapter 1, Section 2) to give guidance to developers, private land owners, members of public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA. NEMA, as the primary environmental legislation, is complemented by a number of sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a

[1] Please note that such an holistic approach is intended to simplify the decision-making process for the Competent Authority, and should not the construed as an attempt to renege the Environmental Authorisation (EA) already granted to the Applicant by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), or the rights issues under said (EA).

development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, inter alia i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for "the management and conservation of South Africa's biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions". The Act states that the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes inter alia the loss of threatened or protected species. Biodiversity offsets are a means of compensating for the loss of biodiversity after all measures to avoid, reduce or remedy biodiversity loss have been taken, but residual impacts still remain and these are predicted to be medium to high. Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the land owner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

An amendment to the NEMBA has been promulgated, which lists 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. Based on the preliminary sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area. This will be confirmed as part of the Ecological Impact Assessment study undertaken during the EIA Phase.

The National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for the managements of national heritage resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) (8) of the NHRA apply to the proposed project:

Archaeology, palaeontology and meteorites:

Section 35 (4) No person may, without a permit issued by the responsible heritage resources authority:

a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves:

Section 36 (3) (a) No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:

a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Heritage resources management:

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:

a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of the site –
    (i) exceeding 5000 m^2 in extent, or
    (ii) involving three or more erven or subdivisions thereof; or
    (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
d) the re-zoning of a site exceeding 10 000 m^2 in extent; or
e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list "historical settlements and townscapes" and "landscapes and natural features of cultural significance" as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

NOTE: A Heritage Impact Assessment (including Archaeology and Cultural Landscape) was undertaken as part of the Basic Assessment conducted in 2012 pertaining to this site. Confirmation from Heritage Western Cape has been given that there are no significant heritage resources present on site and that they do not object to development on this site. Proof of this confirmation from Heritage Western Cape can be seen in **Appendix Q** to this scoping report.

Conservation of Agricultural Resources Act (Act 43 of 1983)

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or land owner to control invasive alien plants occurring on the land under their control.

Should alien plant species occur within the study area; this will be managed in line with the EMPr. Rehabilitation after disturbance to agricultural land is also managed by CARA. The DAFF reviews and approves applications in terms of these Acts according to their Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated
September 2011.

National Water Act (Act 36 of 1998)

One of the important objectives of the National Water Act (Act 36 of 1998) (NWA) is to ensure the protection of the aquatic ecosystems of South Africa's water resources. Section 21 of this Act identifies certain land uses, infrastructural developments, water supply/demand and waste disposal as 'water uses' that require authorisation (licensing) by the Department of Water and Sanitation (DWS). Chapter 4 (Part 1) of the NWA sets out general principles for the regulation of water use. Water use is defined broadly in the NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering the bed, banks, course or characteristics of a watercourse, removing water found underground for certain purposes, and recreation. In general a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface and ground water.

Section 21 of the Act lists the following water uses that need to be licensed:

a) taking water from a water resource;
b) storing water;
c) impeding or diverting the flow of water in a watercourse;
d) engaging in a stream flow reduction activity contemplated in section 36;
e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) disposing of waste in a manner which may detrimentally impact on a water resource;
h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) altering the bed, banks, course or characteristics of a watercourse;
j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) using water for recreational purposes.

Any activities that take place within a water course or within 500 m of a wetland boundary require a Water Use Licence (WUL) under the Section 21 (c) and Section 21 (i) of the NWA. The need for a Water Use Licence will be determined in the EIA Phase.

National Environmental Management: Air Quality Act (Act 39 of 2004)

The aim of this act is to reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures.

Development Facilitation Act (Act 67 of 1995)

The Development Facilitation Act (Act 67 of 1995) (DFA) sets out a number of key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;
- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

Hazardous Substances Act (Act 15 of 1973)

This Act provides for the control of substances which may cause injury or ill health to, or death, of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature. To provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.

Other Applicable Legislation

Other applicable national legislation that may apply to the proposed project include:

- Integrated Resource Plan for Electricity (IRP) (GN R400, 6 May 2011)
- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Energy Efficiency Strategy of the Republic of South Africa (Department of Minerals and Energy (DME) now operating as Department of Mineral Resources (DMR), March, 2005);
- Promotion of Administrative Justice Act (Act 2 of 2000);
- Integrated Resource Plan for South Africa (2010);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 31 of 2004);
- National Environmental Management: Waste Management Act (Act 59 of 2008); and
- National Road Traffic Act (Act 93 of 1996).

4.3.2 Regional Planning Legislation

Blaauwberg District Spatial Development Plan and Environmental Management Framework (2011)

Due to the relatively large amounts of undeveloped land within the urban edge of the Blaauwberg district, combined with the fact that land outside the urban edge in the district is of lower agricultural quality than in other areas of the City, the district is viewed as a major growth axis of the City. However, the undeveloped land parcels within the Blaauwberg district contain some of the last remaining tracts of two of South Africa's rarest vegetation types, namely Sand Plain Fynbos and West Coast Renosterveld. From a biodiversity perspective, it is imperative that high conservation worthy remnants is protected and that ecological corridors are provided to allow for the movement of fauna and flora.

This situation often leads to conflict between environmental and developmental objectives within the district. The challenge is therefore to create a balance between these competing needs to ensure the sustainability of the district, the environment and communities. The form and location of development therefore needs to happen in a way that allows for the provision and accommodation of the development needs of a growing City, but still ensures the sustainable conservation of valuable natural assets. The direction, form and phasing of growth within the district needs to be managed and directed to ensure resource protection and linked infrastructure provision. The district SDP needs to begin to provide guidance in this regard, particularly in relation to the phasing of development in the short and medium term as a guide to infrastructure provision. The phasing of development in the district should take guidance from the City SDF in terms of overall City growth.

The removal of tax relief incentives for industrial development in Atlantis and the poor historic settlement patterns resulting in isolated nodes with very limited access to employment opportunities (Atlantis and Mamre) have been identified as pressures and constraints for this district that need to be addressed. Also to be addressed are high levels of unemployment, and the associated socio-economic pressures, particularly in Doornbach, Du Noon, Saxonworld, Witsand, Tafelozono and the outlying settlements of Atlantis and Mamre.

Guidelines, Frameworks and Protocols

- Public Participation Guideline, October 2012 (Government Gazette 35769);
- DEADP and DEA Guidelines published in terms of the NEMA EIA Regulations, in particular:
    - Guideline on Transitional Arrangements (DEADP, March 2013);
    - Guideline on Alternatives (DEADP, March 2013);
    - Guideline on Public Participation (DEADP, March 2013); and
    - Guideline on Need and Desirability (DEADP, March 2013);
- Information Document on Generic Terms of Reference for EAPs and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 – 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEADP; CSIR and Tony Barbour, 2005 – 2007);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

4.3.3 International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed Atlantis Gas-to-Power project will, as far as practicable, incorporate the environmental and social policies of the International Finance Corporation (IFC). These policies provide a frame of reference for lending institutions to review of environmental and social risks of projects, particularly those undertaken in developing countries.

Through the Equator Principles, the IFC's standards are now recognised as international best practice in project finance. The IFC screening process categorises projects into A, B or C in order to indicate relative degrees of environmental and social risk. The categories are:

- Category A - Projects expected to have significant adverse social and/or environmental impacts that are diverse, irreversible, or unprecedented.
- Category B - Projects expected to have limited adverse social and/or environmental impacts that can be readily addressed through mitigation measures.
- Category C - Projects expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, projects such as the proposed Atlantis Gas-to-Power project are categorised as Category B projects. The EA Process for Category B projects examines the project's potential negative and positive environmental impacts and compares them with those of feasible alternatives (including the 'without project' scenario). As required for Category B projects a Scoping and EIA Process is being undertaken.

Other Acts, standards and/or guidelines which may also be applicable will be reviewed in more detail as part of the specialist studies to be conducted for the EIA.

4.4 PRINCIPLES FOR PUBLIC PARTICIPATION

The PPP for this EIA Process is being driven by a stakeholder engagement process that will include inputs from authorities, I&APs, technical specialists and the project proponent. Guideline 4 on "Public Participation in support of the EIA Regulations" published by DEAT in May 2006, states that public participation is one of the most important aspects of the EA Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority (CA) to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently.

- "Provides an opportunity for I&APs, EAPs and the CA to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
    - Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;
    - Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
    - Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;
    - Is an important aspect of securing transparency and accountability in decision-making; and
    - Contributes toward maintaining a health, vibrant democracy."

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion documents, meetings, workshops, focus group discussions, and the printed and broadcast media;

- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the EIA team.
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.
- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP will aim to obtain an indication of trade-offs that all stakeholders (i.e. I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the project.

4.5 PUBLIC PARTICIPATION PROCESS

The key steps in the PPP for the EIA Phase are described below. This approach has been confirmed with the DEA through their review and acceptance of the Plan of Study for EIA (as shown in Appendix O of this EIA Report). The PPP for the Scoping Process is described in Chapter 4 of the finalised Scoping Report (CSIR, 2017).

All advertisements, notification letters and emails etc. will serve to notify the public and organs of state of the joint availability of all reports for the abovementioned project and will provide I&APs with an opportunity to comment on the reports. It is important to note that in order to notify and inform the public of the proposed projects and invite I&APs to register on the project database, the project and EIA Process was advertised in one local newspaper (i.e. The Cape Times and Die Burger) during the Project Initiation Phase on 8 October 2015. A copy of the advertisement placed is contained in Appendix D of this EIA Report.

Furthermore, Regulation 41 (2) (a) of the 2014 EIA Regulations require that a notice board providing information on the project and EIA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. To this end, a notice board was placed at specific locations on 8 October 2015 during the Project Initiation Phase, as highlighted in Appendix F.

The correspondence sent to I&APs during the Scoping Phase (including the submission of the finalised Scoping Report to the DEA) is included in Appendix E of this EIA Report. Appendix G contains all the comments and correspondence received from I&APs during the Scoping Phase (i.e. during the Project Initiation Phase and 30-day review of the Scoping Reports). Appendices E will be respectively updated with correspondence sent to I&APs for the release of the EIA Reports, and any comments received from I&APs during the review of the EIA Report.

TASK 1: I&AP REVIEW OF THE EIA REPORT AND EMPR (Current Stage)

The first stage in the process will entail the release of the EIA Report for a 30-day I&AP and stakeholder review period. Relevant organs of state and I&APs will be informed of the review process in the following manner:

- Placement of one advertisement in The Cape Times newspaper (English) and one in Die Burger newspaper (Afrikaans) to notify potential I&APs of the availability of the EIA Report;
- A letter will be sent via registered mail and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include notification of the 30-day comment period for the EIA Report.
- It was noted in the Scoping Reports that a public meeting could possibly be held during the review of the EIA and BA Reports, if warranted and if there is substantial public interest during the EIA Phase. However, this was not deemed necessary. Telephonic consultations with key I&APs will take place, upon request; and
- Meeting(s) with key authorities involved in decision-making for this EIA (if required and requested).

The EIA Report will be made available and distributed through the following mechanisms to ensure access to information on the project and to communicate the outcome of specialist studies:

- Copies of the report will be placed at the Avondale local library for I&APs to access for viewing;
- Key authorities will be provided with either a hard copy and/or CD of the EIA Report;
- The EIA Report will be uploaded to the project website (https://www.csir.co.za/environmental-impact-assessment) and
- Telephonic consultations will be held with key I&AP and organs of state groups, as necessary.

TASK 2: COMMENTS AND RESPONSES TRAIL

A key component of the EIA Process is documenting and responding to the comments received from I&APs and the authorities. The following comments on the EIA Reports will be documented:

- Written and emailed comments (e.g. letters and completed comment and registration forms);
- Comments made at focus group meetings (if required);
- Telephonic communication with CSIR project team; and
- One-on-one meetings with key authorities and/or I&APs (if required).

The comments received during the 30-day review of the EIA Report will be compiled into a Comments and Responses Trail for inclusion in the finalised EIA Report that will be submitted to the National DEA in terms of Regulation 23 (1) (a) for decision-making. The Comments and Responses Trail will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided will indicate how the comment received has been considered in the EIA Reports for submission to the National DEA and in the project design or EMPRs.

TASK 3: COMPILATION OF EIA REPORTS FOR SUBMISSION TO THE DEA

Following the 30-day commenting period of the EIA Report and incorporation of the comments received into the reports, the EIA Report (i.e. hard copies and electronic copies) will be submitted to the DEA for decision-making in line with Regulation 23 (1) (a) of the 2014 EIA Regulations. In line with best practice, I&APs on the project database will be notified via email (where email addresses are available) of the submission of the EIA Reports to the DEA for decision-making.

The EIA Report that is submitted for decision-making will also include proof of the PPP that was undertaken to inform organs of state and I&APs of the availability of the EIA Report for the 30 day review (during Task 1, as explained above). To ensure ongoing access to information, copies of the EIA Report that are submitted for decision-making and the Comments and Response Trail (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website (https://www.csir.co.za/environmental-impact-assessment).

The DEA will have 107 days (from receipt of the EIA Report) to either grant or refuse EA (in line with Regulation 24 (1) of the 2014 EIA Regulations).

TASK 4: EA AND APPEAL PERIOD

Subsequent to the decision-making phase, if an EA is granted by the DEA for the proposed project, all registered I&APs and stakeholders on the project database will receive notification of the issuing of the EA and the appeal period. The 2014 EIA Regulations (i.e. Regulation 4 (1)) states that after the Competent Authority has a reached a decision, it must inform the Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) if the 2014 EIA Regulations stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure and its respective timelines.

The following process will be followed for the distribution of the EA (should such authorisation be granted by the DEA) and notification of the appeal period:

- Placement of one advertisement in The Cape Times newspaper (English) and one in Die Burger newspaper (Afrikaans) to notify I&APs of the EA and associated appeal process;
- A letter will be sent via registered mail and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EA;
- A copy of the EA will be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment) and
- All I&APs on the project database will be notified of the outcome of the appeal period in writing.

4.6 AUTHORITY CONSULTATION DURING THE EIA PHASE

Authority consultation is integrated into the PPP, with additional one-on-one meetings held with the lead authorities, where necessary. A pre-application meeting was held with the Department of Environmental affairs on the 15th September 2016. It is proposed that the Competent Authority (DEA) as well as other lead authorities will be consulted at various stages during the EIA Process. At this stage, the following authorities have been identified for the purpose of this EIA Process (additional authorities might be added to this list as the EIA Process proceeds):

- National DEA;
- Department of Environmental Affairs and Development Planning Western Cape
- CapeNature
- City of Cape Town Municipality
- DWS of the Western Cape
- Department of Energy of the Western Cape Province;
- Eskom Holdings SOC Ltd;
- Transnet SOC Ltd;
- South African National Parks;
- Department of Social Development;
- National Energy Regulator of South Africa;

- National DAFF;
- DAFF of the Western Cape Province;
- Department of Agriculture, Land Reform & Rural Development of the Western Cape Province;
- Department of Public Works, Roads and Transport of the Western Cape Province;
- Department of Labour;
- Heritage Western Cape;
- South African National Road Agency Limited;
- SENTECH
- EWT
- BirdLife SA
- Department of Mineral Resources

The authority consultation process for the EIA Phase is outlined in Table 4.2 below.

Table 4.2: Authority Communication Schedule

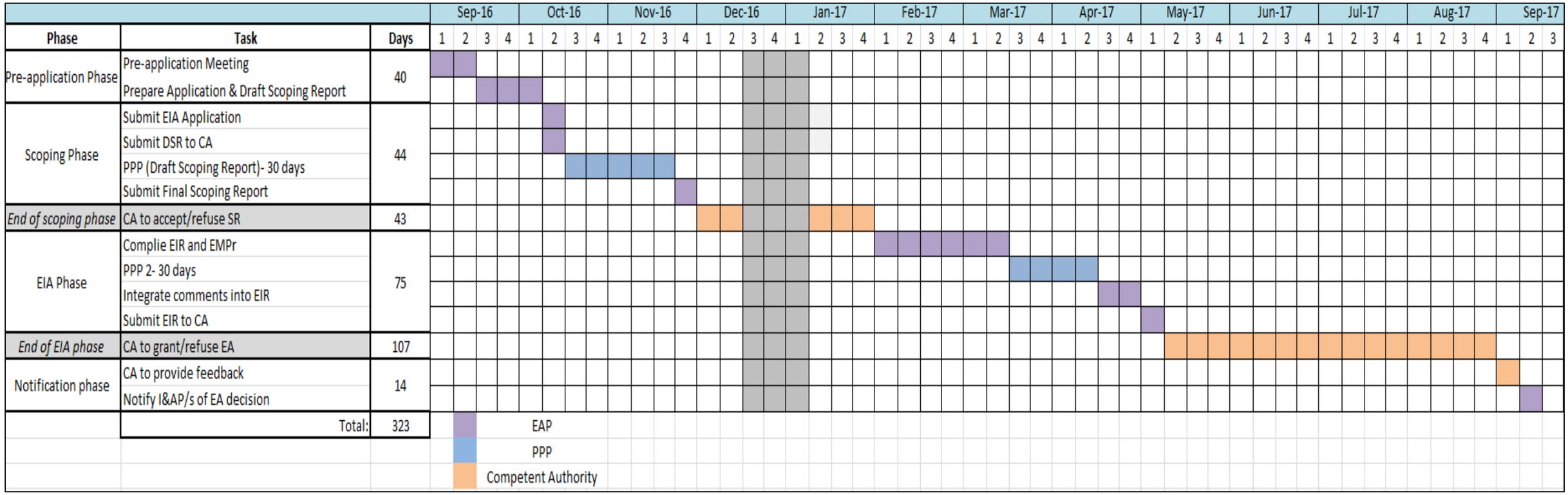
STAGE IN EIA PHASE	FORM OF CONSULTATION
During the EIA Process	Site visit for authorities, if required.
During preparation of EIA Reports	Communication with the DEA on the outcome of Specialist Studies (if required).
On submission of EIA Reports for decision-making	Meetings with dedicated departments, if requested by the DEA, with jurisdiction over particular aspects of the project (e.g. Local Authority) and potentially including relevant specialists.

4.7 SCHEDULE FOR THE EIA

The proposed schedule for the EIA, based on the legislated EIA Process, is presented in Table 4.3. It should be noted that this schedule could be revised during the EIA Process, depending on factors such as the time required for decisions from authorities.

Table 4.3: Schedule for the Proposed Project

Phase	Task	Days
Pre-application Phase	Pre-application Meeting	40
	Prepare Application & Draft Scoping Report	
Scoping Phase	Submit EIA Application	44
	Submit DSR to CA	
	PPP (Draft Scoping Report)- 30 days	
	Submit Final Scoping Report	
End of scoping phase	CA to accept/refuse SR	43
EIA Phase	Complie EIR and EMPr	75
	PPP 2- 30 days	
	Integrate comments into EIR	
	Submit EIR to CA	
End of EIA phase	CA to grant/refuse EA	107
Notification phase	CA to provide feedback	14
	Notify I&AP/s of EA decision	
	Total:	323



4.8 APPROACH TO IMPACT ASSESSMENT AND SPECIALIST STUDIES

This section outlines the assessment methodology and legal context for specialist studies, as recommended by the DEA 2006 Guideline on Assessment of Impacts.

4.8.1 Generic TOR for the Assessment of Potential Impacts

The identification of potential impacts included impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts is to include direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts includes:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

The impact assessment methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (j) of the 2014 EIA Regulations, which states the following:

- An EIA Report must contain the information that is necessary for the CA to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including -
    - (i) cumulative impacts;
    - (ii) the nature, significance and consequences of the impact and risk;
    - (iii) the extent and duration of the impact and risk;
    - (iv) the probability of the impact and risk occurring;
    - (v) the degree to which the impact and risk can be reversed;
    - (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
    - (vii) the degree to which the impact and risk can be mitigated.

As per the DEAT Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the predication and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of 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 as a result of the activity.

- **Cumulative impacts** are 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. The cumulative impacts have been assessed by identifying other solar energy project proposals and other applicable projects, such as construction and upgrade of electricity generation, and transmission or distribution facilities in the local area (i.e. within 20 km of the proposed Atlantis gas-to-power project) that have been approved (i.e. positive EA has been issued) or is currently underway. The proposed and existing gas-to-power developments that have been considered as part

of the EIA Phase are provided in Table 4.4 below. Cumulative effects associated with these similar types of projects include inter alia:

- Traffic generation;
- Avifaunal collisions and mortalities;
- Habitat destruction and fragmentation;
- Loss of agricultural land;
- Removal of vegetation;
- Increase in stormwater run-off and erosion;
- Increase in water requirements;
- Job creation;
- Increased air emissions;
- Increased noise disturbance;
- Social upliftment; and
- Upgrade of infrastructure and contribution of energy into the National Grid.

Table 4.4: Similar projects in existence (or underway) within 20 km of the proposed project

Project Name	Location	Potential activity similar to this project	Potential cumulative impacts (in conjunction with the Atlantis Gas-to-power)
Ankerlig Power Station- CCGT (1350 MW)	Remainder of Farm 1395 – Atlantis Industrial	All listed activities	• Air emissions • Loss of indigenous vegetation • Noise impacts • Visual intrusion impacts • Risk factors i.e. explosion risks • Traffic impacts • Avifaunal impacts • Climate change
Atlantis Foundries	Niel Hare Road- Atlantis Industrial	Clearance of indigenous vegetation	• Loss of indigenous vegetation • Traffic Impacts • Visual Intrusion
Comar Chemicals (Pty) Ltd	Niel Hare Road- Atlantis Industrial	Air emissions Clearance of indigenous vegetation	• Air emissions and air quality impacts • Loss of indigenous vegetation • Climate change • Visual intrusion • Risk factors i.e. explosion risks
Mpact Plastic Containers	Neil Hare Rd, Atlantis Industrial	Air emissions Clearance of indigenous vegetation	• Air emissions and air quality impacts • Loss of indigenous vegetation • Climate change • Visual intrusion
Supapackers Fish Processor	Neil Hare Rd, Atlantis Industrial	Clearance of indigenous vegetation	• Loss of indigenous vegetation • Visual/sense of place/smell • Traffic Impacts
New Era Packaging	Louwtjie Rothman St, Atlantis Industrial	Clearance of indigenous vegetation	• Loss of indigenous vegetation • Traffic Impacts • Visual Intrusion

In addition to the above, the impact assessment methodology includes the following aspects:

- **Spatial extent** – The size of the area that will be affected by the impact/risk:
  - Site specific;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).

- **Consequence** – The anticipated consequence of the risk/impact:
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
  - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

- **Duration** – The timeframe during which the impact/risk will be experienced:
  - Very short term (instantaneous);
  - Short term (less than 1 year);
  - Medium term (1 to 10 years);
  - Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or
  - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **Reversibility of the Impacts** - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  - Yes: High reversibility of impacts (impact is highly reversible at end of project life);
  - Partially: Moderate reversibility of impacts; or
  - No: Impacts are non-reversible (impact is permanent).

- **Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks** – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact/risk occurring:
  - Very likely;
  - Likely;
  - Unlikely;
  - Very unlikely; and
  - Extremely unlikely.

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (as shown in Figure 4.2). This approach incorporates internationally recognised methods from the IPCC (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity. The significance is then rated qualitatively as follows against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 4.2:

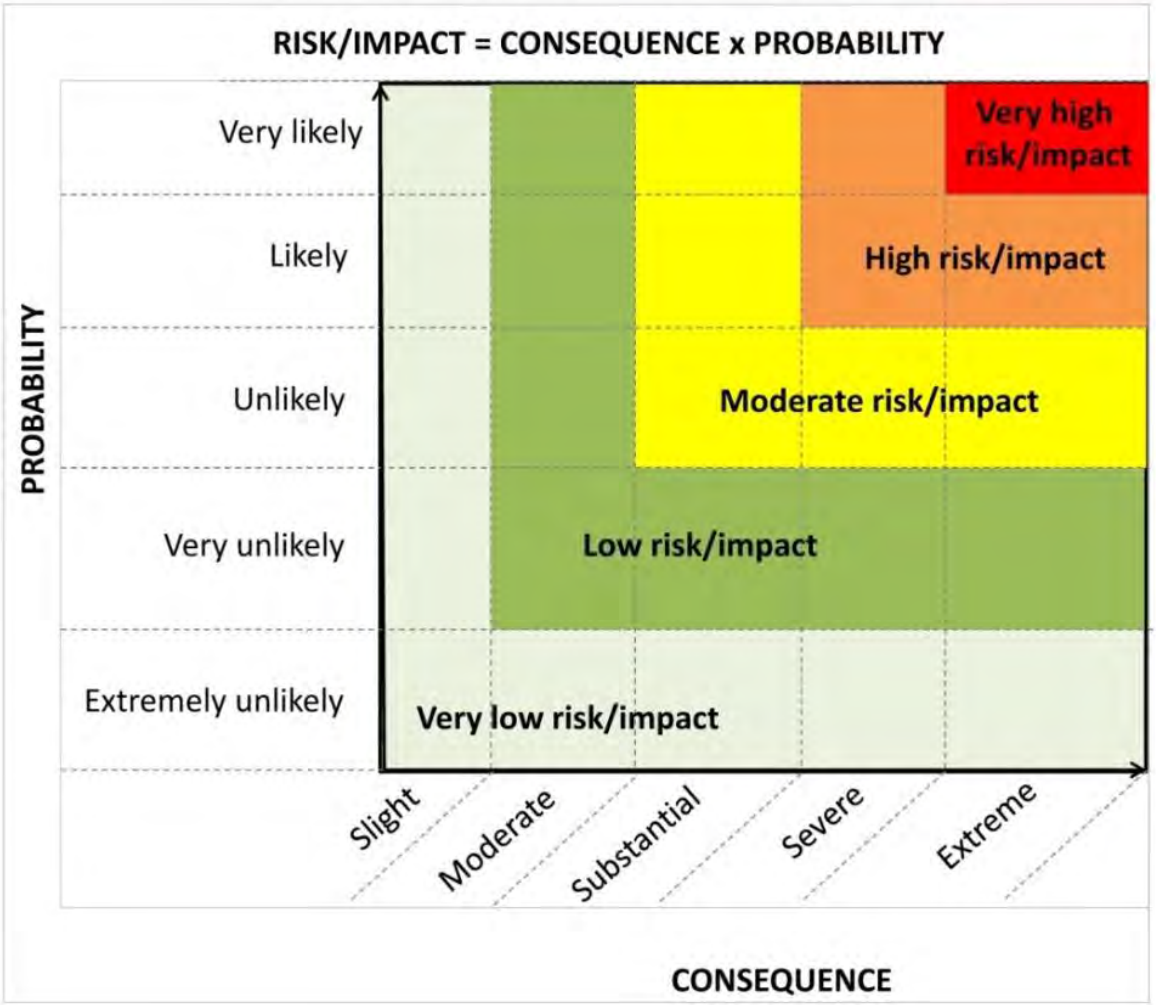


Figure 4.2: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
  - High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and

- Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks will be ranked as follows in terms of significance (based on Figure 4.2):

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

- **Status** - Whether the impact/risk on the overall environment will be:
  - Positive - environment overall will benefit from the impact/risk;
  - Negative - environment overall will be adversely affected by the impact/risk; or
  - Neutral - environment overall not be affected.

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Impacts have been collated into the EMPr (Part B of the EIA Report) and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated.
- Positive impacts and augmentation measures have been identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts are evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase is brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts have been evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation has, where possible, taken into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area (as described above and in Table 4.5); and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

Table 4.5 is used by specialists for the rating of impacts.

Table 4.5: Example of Table for Assessment of Impacts

Aspect/Impact Pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/ Risk	Confidence Level
										Without Mitigation	*With Mitigation*		
CONSTRUCTION PHASE (EXAMPLE)													
Clearing of 150 ha of vegetation	Loss of Habitat and Species	Negative	Site Specific	Long term	Substantial	Very Likely	Yes	Moderate	Undertake Plant Search and Rescue prior to the commencement of construction	Moderate	Low	4	Medium
	Susceptibility of soil erosion on exposed surfaces	Negative	Site Specific	Medium term	Moderate	Likely	Yes	Moderate	Implement an Erosion Management Plan throughout the construction Phase	Moderate	Low	5	High

4.9 TOR FOR THE SPECIALIST STUDIES

The TOR for the specialist studies essentially consist of the generic assessment requirements and the specific issues identified for each discipline. The TOR has been updated to include minor relevant comments received from I&APs and authorities during the 30-day review of the Scoping Reports and Addendums.

The following specialist studies have been identified based on the issues identified to date, as well as potential impacts associated with the project. The TOR for each specialist study is discussed below (as noted in the Plan of Study for EIA). However, it should be noted that the detailed scope and methodology of the specialist studies are included in each relevant study (included in Appendices J to Q of this EIA Report). 3 specialist studies as well as an opinion from HWC have already been conducted for this site and the validity of their results confirmed by the specialists (**Appendices J, K L and Q**)[2]. The specialist studies and associated specialists are shown in Table 4.6 below.

Table 4.6: Specialist Studies and Associated Specialists

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Mr Mark Zunckel	uMoyo-Nilu Consulting (Pty) Ltd	Air Quality Specialist Study
Dr Brian Williams	SafeTech	Noise Impact Study
Mr. Mike Oberholzer	Riscom (Pty) Ltd	Risk Assessment
Dr. Graham Avery	N/A	Palaeontology Study
Dr. Lita Webley	ACO Associates	Archaeology Assessment
Dr. David McDonald	Bergwind Botanical Surveys and Tours	Terrestrial Ecology Study
Mr Chris van Rooyen	Chris van Rooyen Consulting	Avifauna (birds) Assessment

In terms of Social Impacts, please see paragraph 4.10, page 18 of Appendix O, which contains the Environmental Authorisation issued by the Western Cape Department of Environmental Affairs and Development Planning (DEADP) for the development of a green manufacturing facility on Portion 1 and Portion 4 of Cape Farms 1183 (*i.e.* Site 2). According to paragraph 4.10, DEADP already considered the impact of an industrial-scale development on the socio-economic conditions of the study area, and subsequently concluded that an industrial facility, developed on Portion 1 and Portion 4 of Cape Farms 1183, will not have a detrimental impact socio-economic impact[3]. On the contrary, DEADP finds that such a development will have an employment creation and economic growth benefit to the larger Atlantis area. Nevertheless, Social impacts, interventions and relevant management actions have been incorporated into the EMPr for the proposed project (Part B of the EIA Report).

In terms of waste and visual impacts, appropriate management actions will be incorporated into the EMPr (Part B of the EIA Report).

[2] **NOTE:** It is important to note that these 3 studies were conducted for the BA for the development of a manufacturing facility, however, due to the fact that the nature of the impacts i.e. clearing the entire site, are similar for this proposed development, the findings of those studies (2012) will be used to inform this EIA process. Letters from the specialists confirming the impacts are still valid are in front of each specialist report (Appendix J, K and L)

[3] **NOTE**: CSIR respectfully submit that socio-economic impacts, likely to result from a comparable industrial-scale development, has already been assessed and considered by a Competent Authority; namely DEA&DP. As a result, the administrative action (i.e. the decision) as it relates to the consideration and approval of socio-economic impacts is *functus officio*, and is therefore final and conclusive and cannot be revoked or varied by the decision-maker. In this regard, The Department is respectfully referred to paragraph 113 of *Earthlife Africa Pretoria v Minister of Environmental Affairs* (8 March 2017).

In terms of traffic, the traffic volumes contributed by the construction and operation phases of the facility on the existing traffic volumes are considered acceptable. To this end, a Traffic Impact Statement has been prepared by the EAP, which provides recommendations for inclusion in the EMPr (Part B of the EIA Report). In addition, an assessment of Traffic Impacts has been compiled and is included in Chapter 6.

Furthermore, the issues that have been addressed in the specialist studies are detailed in each specialist report included in Appendices J to P of this EIA Report.

4.9.1 Air Quality Impact Assessment

The air quality study will follow the methods described below:

- Determine if an Air Emissions License is required and if so, determine the requirements thereof.
- Impacts of the proposed Gas-to-Power facility emissions on CO_2 emissions and global warming
- Impact of emissions associated with the various components of the project (e.g. diesel generators)
- Impact of potential gas emissions
- Impact of potential odours associated with atmospheric emissions
- Impact of potential greenhouse gas emissions on climate change
- Cumulative impacts from potential emissions on the ambient air quality, as well as climate change and increasing greenhouse gases in the atmosphere.

4.9.2 Noise Impact Assessment

The noise study will follow the methods described below:

- Conduct a desktop study of available information that can support and inform the specialist noise study;
- Identify all noise sensitive receptors within the study area. These include the receptors within 1km of the site boundary (external to the site);
- Measure the existing ambient noise at the proposed site during both the day and night time; and
- Conduct a noise modelling study of the future impact during construction and operation of the Gas-to-Power, taking into account sensitive receptors.
- Identify cumulative impacts of the noise generated by the proposed facility as well as the nearby facilities on the ambient noise levels of the area.
- Identify the cumulative impacts of the noise generated by the facility and the other facilities in the area.

The method employed will attempt not to deviate from the test method contained in SANS 10103:2008 . If the method is not adhered to, this will be stated in the report. The data that is collected will be modelled to determine the future impact using the Concawe method (SANS 10357).

Relevant noise related legislation will be identified. Where applicable the following standards will also be consulted:

- GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989);
- GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989);
- SANS 10103:2008 Version 6 - The measurement and rating of environmental noise with respect to annoyance and to speech communication;
- SANS 10210, Calculating and predicting road traffic noise;
- SANS 10328, Methods for environmental noise impact assessments;
- SANS 10357, The calculation of sound propagation by the Concawe method;

- World Bank Guidelines on Pollution Prevention; and
- International Finance Corporation – 2007 General EHS Guidelines: Environmental Noise.

Table 4.7: Sensitivities and potential impacts related to Noise Impacts

Environmental feature	Sensitivity	Potential impact/enhancement
Surrounding residents	*Impact on the closest residents due to noise from the facility (Option 1 & 2 to be investigated)*	*Noise disturbance and nuisance that will not meet the noise guidelines*
Construction of the gas-to-power facility	*Noise impact from the construction vehicles and equipment (including blasting if required)*	*Noise disturbance and nuisance that will not meet the noise guidelines*

4.9.3 Risk Assessment

A Quantitative Risk Assessment (QRA) is will be conducted in parallel with the EIA process. The findings from this QRA will be incorporated into the EIA process in order to address the following issues that have been identified during scoping:

- What is the risk of a catastrophic event on the local population and its potential impacts?
- Safety distances and buffers around the facility. What is international best practice? What is proposed by GreenCape/CoCT? What restrictions will there be on activities surrounding the facility?
- What is the possibility of LNG accidents, explosions, tanker risks, fires and pipeline failure?
- What is the risk of gas leakages?
- Who will take responsibility for leakages if the facility is sabotaged?
- What will the impact be from a population increase on the Koeberg Nuclear Power Station's Urgent Protection Zone (UPZ)?
- What are the cumulative impacts of risk factors on the nearby area – does the proposed facility pose a cumulative dangerous risk(s)?

4.9.4 Avifaunal (bird) Assessment

An Avifauna (bird) Impact Assessment will be undertaken as part of the EIA proses to investigate the impacts the proposed 400 kV transmission line may have on birds. The Avifauna (bird) Impact Assessment will be conducted in the following manner:

- Undertake a desktop assessment of avifaunal conditions, and a description of the current environmental conditions, in sufficient detail so that there is a baseline description/status quo against which impacts can be identified and measured i.e. suitability of the project area with regards to bird habitat/foraging, important vegetation features etc. Establish which species may occur in the area, their relevant conservation status and which species would be potentially most at risk.
- Draw on desktop information sources, the knowledge of local experts, information published in the scientific press and information derived from relevant EIAs and similar specialist studies previously conducted within the surrounding area.
- Provide a description of species composition and conservation status in terms of protected, endangered or vulnerable bird species. This description will include species which are likely to occur within, traverse across or forage within the proposed project area, as well as species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development.
- Conduct field work to assess bird species presence at the proposed site.
- Compile a detailed list of bird species of special concern.
- A review of detailed information relating to the project description in order to precisely define the environmental risks to the avifauna.

- Identification of issues and potential impacts related to birds, which are to be considered in combination with any additional relevant issues that may be raised through the PPP.
- Identify and rate potential direct, indirect and cumulative impacts on avifauna within the site during the construction, operation and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of other energy-related projects, together with the impact of the proposed project. Provide an assessment of the irreversibility of impacts, and the irreplaceability of lost resources.
- Compilation of a bird sensitivity map or identification of buffer zones and no-go areas to inform the turbine layout.
- Compile an assessment report qualifying the risks and potential impacts on avifauna in the study area and impact evaluations.
- Incorporate relevant information from other specialist reports/findings if required.
- Provide input to the EMPr, including mitigation and monitoring requirements to avoid or reduce negative impacts, and to enhance positive benefits of the project on avifauna. Provide an outline of additional management guidelines.
- In addition to the specialist study, undertake a pre-construction bird monitoring programme (i.e. commissioned by Mainstream). The results and recommendations of this monitoring programme should be included in the specialist study and EMPr.

4.10 KEY MILESTONES OF THE EIA PROCESS

Key Milestones activities	Proposed Timeframe
I&AP, Stakeholder and Authority Review of the Draft EIA Report: 30 days	March 2017 – May 2017 (Current Stage)
Submit EIA Reports to the DEA for Decision-making.	May 2017
Review of the EIA Reports by the DEA (i.e. grant or refuse EA): 107 days since receipt of the EIA Reports.	May 2017 – September 2017
Next steps: 5 days for notification to applicant	

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 5:

Project Alternatives

tables

figures

5. ASSESSMENT OF ALTERNATIVES

This chapter discusses the alternatives, as well as the selection process of the preferred alternatives that have been considered and assessed as part of the EIA Phase. The 2014 EIA Regulations (GN R982) define "alternatives", in relation to a proposed activity, "as different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity; or
- operational aspects of the activity; and
- includes the option of not implementing the activity".

The following objectives apply to the consideration of alternatives during the Scoping Phase (as indicated in Appendix 2 of the 2014 EIA Regulations):

- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process; and
- To identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment.

The Scoping Report therefore provided a full description of the process followed to reach the proposed preferred activity, site and location within the site, including details of all the alternatives considered and the outcome of the site selection matrix. For additional information regarding the alternatives that were considered during the Scoping Phase, refer to the finalised Scoping Report (CSIR, 2017).

Sections 24(4) (b) (i) and 24(4A) of the NEMA require an EIA to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) also requires that the Competent Authority, when considering an application for EA, takes into account "where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment".

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

5.1 NO-GO ALTERNATIVE

The no-go alternative assumes that the proposed project will not go ahead i.e. the proposed Atlantis Gas-to-Power project is not constructed and developed into an operational energy facility. This alternative entails that the development of the proposed gas-to-power facility would not drive any environmental change and result in no environmental impacts on the site or surrounding local area. It provides the *status quo* or baseline against which other alternatives are compared and will be considered throughout the report. At present the proposed site is zoned for "General Industrial" use, and is not being utilized (natural vegetation). Preliminary investigations indicate that area is classified as non-arable and low potential

grazing land – hence, utilising the area for continued agricultural land-use is not a preferred or sustainable alternative.

The costs/implications and benefits of implementing the 'no-go' alternative is presented in Table 5.1. Implementing the 'no-go' alternative entails that this **gas-to-power facility will not be contributing to environmental, social and economic change** (positive/negative) in the area surrounding the proposed project site.

Table 5.1: Costs and benefits of implementing the 'no-go' alternative (i.e. no gas-to-power facility development).

COSTS	BENEFITS
• No additional power will be generated or supplied through means of gas-to-power generation by this project at this location. • A gas-to-power facility is not present to assist Government in achieving its energy generation targets. • Electricity generation sources will remain unchanged, with approximately 90% coal-based power generation associated with high CO_2 emissions and water consumption. • Electricity generation will remain constant (i.e. no additional energy generation will occur on the proposed site) entailing that the local economy will not be diversified. • The local municipality's vulnerability to economic downturns will increase because of limited access to capital. • No additional employment opportunities will be created. Both skilled and unskilled employment opportunities are anticipated to be created for the construction and operation of the gas-to-power facility. • No additional opportunities for skills transfer and education/training of local communities created. • Potential positive socio-economic impacts likely to result from the project, such as increased local spending and the creation of local employment opportunities, will not be realised.	• No threatened vegetation will be disturbed or removed. • The current landscape character will not be altered by a gas-to-power facility. • No influx of people (mainly job-seekers), driven by the development of a facility will occur, which entails that there would not be additional pressures on the infrastructure and service delivery of local municipalities and towns in the area. • No fragmentation of habitat or disturbance to faunal species.

The country is facing serious power and water shortages due to its heavy dependency on fossil fuels. Therefore, a need for additional electricity generation options to be developed throughout the country exists. The main purpose of the proposed Atlantis Gas-to-Power project is to provide electricity into the national electricity grid. Many other socio-economic benefits are expected to result from the development of this project such as a contribution to the increase of energy security, employment creation and local economic development. It is expected that the Minister of Energy will release the gas-to-power IPP in the first quarter of 2017, which highlights the importance of obtaining sustainable and responsible Environmental Authorizations for gas-to-power projects in strategic regions.

On the other hand, the development of the proposed Atlantis Gas-to-power project will also result in negative environmental impacts (as detailed in Chapter 6 of this report). However, given the socio-economic and environmental realities relevant to the project area; it is expected that the positive impacts of the proposed project will outweigh its negative impacts. Importantly, CSIR anticipates that the balance

of positive and negative impacts resulting for the proposed project will result in a nett benefit when compared to the no-go alternative.

In summary, it is generally assumed that the "no-go" alternative will not directly drive any negative environmental and social impacts. However, the assumption that the *status quo* merely represents an environmentally-neutral, and value-neutral stable state is incorrect on at least two accounts. Firstly, the status quo may be unsustainable or unjust (e.g. the *status quo* might be driving the growth and spread of alien invasive species; or might prevent a highly marginalised community from accessing employment). It follows that merely allowing an unsustainable/unjust *status quo* to continue, will not result in a value-neutral state where no further negative impacts will manifest as a result of the proposed project not being developed. Secondly, socio-economic and environmental processes do not cease to function in a *status quo* environment. Accordingly, the vagaries of changing environmental and macro/micro economic conditions will continue to result in both positive and negative impacts to the local environment; regardless of whether the proposed project is developed or not. It is therefore important not to reflectively ascribe neutral values to the no-go option.

Similarly, developers often depreciate the *status quo* as not being able to provide positive benefits to the local community in the absence of a proposed project. Clearly, such an approach also offends against the principle that the *status quo* is not a neutral condition.

However, given the socio-economic and environmental realities of the receiving environment (Table 5.1); the costs of the no-go alternative appear to outweigh its potential benefits. Based on the above, the "no-go" alternative is not deemed to be the preferred alternative but will be taken forward and indirectly considered within the EIA Phase as this alternative will serve as the baseline against which the potential impacts associated with the project are assessed.

5.2 ALTERNATIVES FOR THE GENERATION OF ELECTRICITY FROM A NON-RENEWABLE RESOURCE

Where the "activity" is the generation of more than 20 MW of electricity from a non-renewable resource, possible reasonable and feasible land-use alternatives for the proposed properties include coal-based electricity generation.

5.2.1 Coal-Based electricity generation

Coal has traditionally dominated the energy supply sector in South Africa, from as early as 1880 when coal from the Vereeniging area was supplied to the Kimberly diamond fields. Presently, about 77% of our country's primary energy needs are provided by coal. South Africa produces an average of 224 million tonnes of marketable coal annually, making it the fifth largest coal producing country in the world. 25% of our production is exported internationally, making South Africa the third largest coal exporting country. The remainder of South Africa's coal production feeds the various local industries, with 53% used for electricity generation.

Coal-based technologies offer a significant fuel price advantage over its natural gas based competitors. On the other hand, natural gas based technologies have a capital cost advantage over coal technologies. Although South Africa has sufficient coal reserves to use for electricity generation well into the foreseeable future; such generation is not desirable from an environmental management perspective. The greenhouse gas (GHG) profile of coal thermal generation compares poorly with that of gas turbines. Burning of natural gas emits approximately 47% less GHGs than burning coal. Given South Africa's commitment to combat climate change, continued reliance of coal-based energy generation is not tenable. Furthermore, the cost of shipping coal from the coal production heartland of South Africa in the north, to the proposed project location in the far south of the country, suggests an unfavourable cost profile when compared with that of natural gas which is expected to be brought ashore at Saldanha Bay. It is also noteworthy that combined

cycle gas turbines are on average 14% more energy efficient than coal fired plants. Finally, the construction lead time for gas turbines is considerably less than that of coal fired plants, with combined cycle gas plants being constructed in approximately 63 months as opposed to an average of 72 months for coal fired plants. Rapid deployment of addition l generation capacity is a noteworthy advantage within the country's current reality persistent power shortages in the medium term.

In light of the above, coal-based electricity generation is not considered as an alternative for this proposed gas-to-power facility.

5.3 TECHNOLOGY ALTERNATIVES

5.3.1 Cooling Technologies

With respect to cooling systems, the proposed combined or open cycle gas turbine plant may either be wet-cooled or dry-cooled. Dry-cooled systems are less water intensive than wet-cooled systems. Due to imperative for water conservation in the region, wet cooling will not be considered further in this EIA. There are two types of equally proven dry cooling systems, namely direct dry cooling and indirect dry cooling. In the direct dry system, the turbine exhaust steam is piped directly to the air-cooled, finned tube, condenser. The finned tubes are usually arranged in the form of an 'A' frame or delta over a forced draught fan to reduce the land area. The steam trunk main has a large diameter and is as short as possible to reduce pressure losses, so that the cooling banks are usually as close as possible to the turbine.

Indirect dry cooling systems, on the other hand, have a condenser and turbine exhaust system with the circulating water being passed through finned tubes in a natural draught cooling tower. The water pipework allows the towers to be sited away from the station. The indirect system also uses a cooling tower and water. Heat is conducted from the water through the "A – frame" bundles of cooling elements arranged in concentric rings inside the tower. The cooling water flows through these elements, cools down as the cold air passes over them and returns to the condenser. This is referred to as a closed system as there is no loss of water due to evaporation.

5.3.2 Air Quality Abatement Technologies

The Gas power plant is considered cleaner burning technology, although some emissions such as oxides of sulphur, oxides of nitrogen and greenhouse gases (e.g. carbon dioxide) may be emitted. The proposed Gas power plant will have appropriate air quality abatement technologies to comply with relevant applicable air quality legislation. To this end, various air quality abatement technologies will be investigated as part of the EIA phase.

5.4 LOCATION ALTERNATIVES OF THE ATLANTIS GAS-TO-POWER PROJECT

CoCT has made two sites available for a green technology ('greentech') hub in Atlantis, Western Cape, for the purpose of developing a gas-to-power facility (Figure 5.1):

- **Site 1- Cape Farm 1183 and Cape Farm 4 Portion 93 and,**
- **Site 2- Cape Farm 1183 portions 1 and portion 4**

5.4.1 Key environmental attributes

As is evident from the positive Environmental Authorisations obtained for energy related activities on Site 1 and Site 2 in 2012; the two sites recommended for the proposed Atlantis gas-to-power facility poses limited risk to biophysical, agricultural and human infrastructure.

Both sites contain remnants of endangered Cape Flats Dune Strandveld (Figure 5.2) and biodiversity offsets have been secured for both sites (**Appendix N**) in order to compensation for any potential loss of endangered vegetation resulting from subsequent development. Neither of the 2 sites contains any Critical Biodiversity Areas (CBAs), although Site 2 houses an artificial NFEPA wetland.

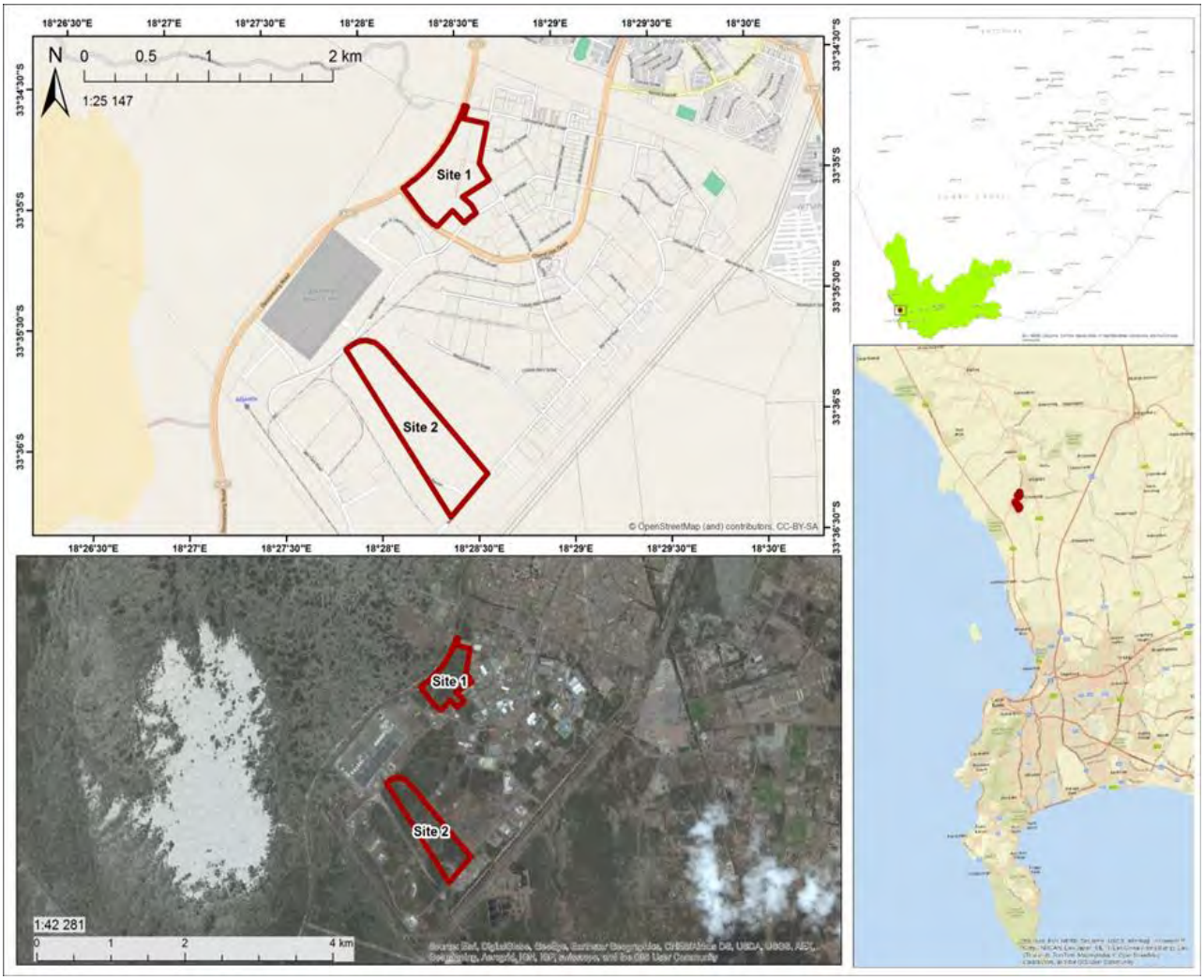

Figure 5.1: Locality of the proposed Atlantis gas-to-power sites (Site 1- Cape Farm 1183 and Cape Farm 4 Portion 93 and Site 2- Cape Farm 1183-4-1)

This wetland will however not be disturbed during the course of the proposed development and will subsequently remain intact. From a purely environmental perspective, Site 1 and Site 2 are identical.
Given the environmental similarity of the proposed sites, it is necessary to focus on the human-centred characteristics of Site 1 and Site 2 in order to make an informed decision as to site selection.

5.4.2 *Spatial character*

Both sites fall within an area earmarked by CoCT for the development of future green technology hub. Furthermore, both sites are located in an area zoned for industrial development and are in close proximity to the existing Ankerlig CCGT and its supporting infrastructure. As a result, development of the proposed gas-to-power facility on either of the two sites will be in keeping with the existing development character and zoning of the area. Also, a gas-to-power facility on either Site 1 or Site 2 can utilise the existing

electrical transmission infrastructure currently being used by the Ankerlig CCGT; thereby avoiding the unnecessary duplication of transmission infrastructure.

The alternatives selection process has identified Site 2 as being the preferred site for this proposed facility. This is due to its location and proximity to Ankerlig (see below sensitivities map). The layout of the facility has taken into cognisance the specialist studies, but more importantly, the fact that there has been a biodiversity offset secured for this site, meaning the layout of the facility did not need to take into consideration the avoidance of any CI ecological species, as these have been offset. Please see Appendix J and R for more information on this. It must be noted, however, that the artificial NFEPA wetland in the bottom left hand corner of the site will be completely avoided. Please see Chapter 2 for the layout map.

5.4.3 *Proximity to sensitive human structures*

It is apparent that development on Site 2 will impact less on potential sensitive human features present in the area, such as local community structures, purely as a result of it being located further away from these structures (Table 5.2). This is a noteworthy consideration both in terms of potential noise and air emission, but also in terms of the inherent human health risk associated with the handling and use of natural gas. The proposed development of the project may have a visual impact on sensitive visual receptors (e.g. members of the public and visitors to protected areas). However, the landscape has already been altered by industrial infrastructure (e.g. Ankerlig power station), and therefore limited visual impacts are anticipated from the proposed Atlantis SEZ development.

Table 5.2: Potentially sensitive features considered for determining the preferred location of the Atlantis gas-to-power site.

Human infrastructure		Distance (km)	
		Site 1	Site 2
Community centre	Atlantis Thusong Service Centre	3.47	5.31
	Avondale Hall and Library	1.71	3.55
	Rebecca Van Amsterdam Hall	2.32	3.66
	Robinvale Hall	2.81	4.23
	Saxonsea Hall	3.82	5.76
	Saxonsea Minor Hall	3.80	5.74
Education	Atlantis Secondary School	2.11	3.87
	Avondale Primary School	1.57	3.31
	Berzelia Primary School	1.91	3.50
	Kerria Primary School	2.47	3.99
	Parkview Primary School	2.23	3.73
	Protea Park Primary School	2.48	4.07
	Proteus Secondary School	2.50	4.00
	Reygersdal Primary School	2.69	4.11
	Robinvale High School	3.30	4.84
	Saxonsea Primary School	3.29	5.20
	Wesfleur Primary School	1.73	3.46
Government	Department Of Home Affairs - Atlantis Service Point	2.95	4.49
	Department of Justice and Constitutional Development - Atlantis	2.59	4.34
Medical	Ampath Private Hospital - Atlantis Depot	2.77	4.53
	Atlantis Pharmacy	2.75	4.53
	G R Pharmaceuticals (1967)	0.75	1.95
	Medirite Pharmacy Atlantis	2.80	4.64
	Medirite Pharmacy Atlantis	2.80	4.64

Human infrastructure		Distance (km)	
		Site 1	Site 2
	Protea Park Clinic - Atlantis	2.11	3.62
	Saxon Sea Clinic	3.28	5.19
	Town Centre Pharmacy	3.04	4.82
	Wesfleur Hospital	2.66	4.43
	Wesfleur Hospital Pharmacy	2.77	4.54
	Wesfleur Private Clinic	2.77	4.53
Other MIH	Ankerlig power station	1.64	1.25
Place of worship	New Apostolic Church-Cape - Atlantis - Avondale	1.42	3.31
	New Apostolic Church-Cape - Atlantis - Protea Park	2.20	3.69
	New Apostolic Church-Cape - Atlantis - Robinvale	2.79	4.48
	New Apostolic Church-Cape - Atlantis - Saxonsea	3.86	5.79
	Old Apostolic Church Of Africa - Atlantis - Avondale	1.69	3.59
	Old Apostolic Church Of Africa - Atlantis - Robinvale	2.62	4.08
Services	Atlantis fire station	1.06	2.15
	Atlantis SAPS Station	2.62	4.41
	Avbob - Atlantis	2.66	4.43
	Dassenberg Post Office	0.80	2.17
	Reygersdal Post Office	2.85	4.63
Sportsgrounds	Avondale Sports Field	1.42	3.18
	Protea Park Sports Field	1.95	3.23
	Robinvale Sports Complex	3.22	4.66
	Wesfleur Sports Complex	3.04	4.92
	Wesfleur swimming pool	2.92	4.82
Tourism	Blaauwberg Tourism Bureau - Robinvale	3.02	4.51

5.4.4 *Preferred site alternative and site selection matrix*

The preferred site location for the Atlantis gas-to-power facility is Site 2 (Cape Farm 1183-1-4). Site 2's suitability over that of Site 1 has been determined in terms of the site selection requirements associated with gas-to-power facilities and discussed above; namely: (i) key environmental attributes; (ii) spatial character; and (iii) proximity to sensitive human structures (Table 5.3). Sensitive features will be additionally identified through specialist investigations during the EIA phase to avoid impacts on sensitive features as far as possible. No other site alternatives will therefore be considered in the EIA Phase.

Table 5.3: Site selection matrix for determining the preferred location of the Atlantis gas-to-power site.

Site considered	Key environmental attributes	Spatial character	Proximity to sensitive human structures	Site selected (Y/N)
Site 1- Cape Farm 1183 and Cape Farm 4 Portion 93	• Endangered Cape Flats Dune Strandveld • No CBAs on site • No NFEPA wetlands on site • Biodiversity offset in place	• Zoned for industrial use • Located in area earmarked for future green technology hub • Close proximity to Ankerlig CCGT	Comparatively closer to sensitive human structures than Site 2	No
Site 2- Cape Farm 1183	• Endangered Cape Flats Dune	• Zoned for industrial use	Comparatively further away from sensitive	Yes

portions 1 and 4	Strandveld • No CBAs on site • Artificial NFEPA wetland on site, but will not be impacted by development • Biodiversity offset in place	• Located in area earmarked for future green technology hub • Close proximity to Ankerlig CCGT	human structures than Site 1	

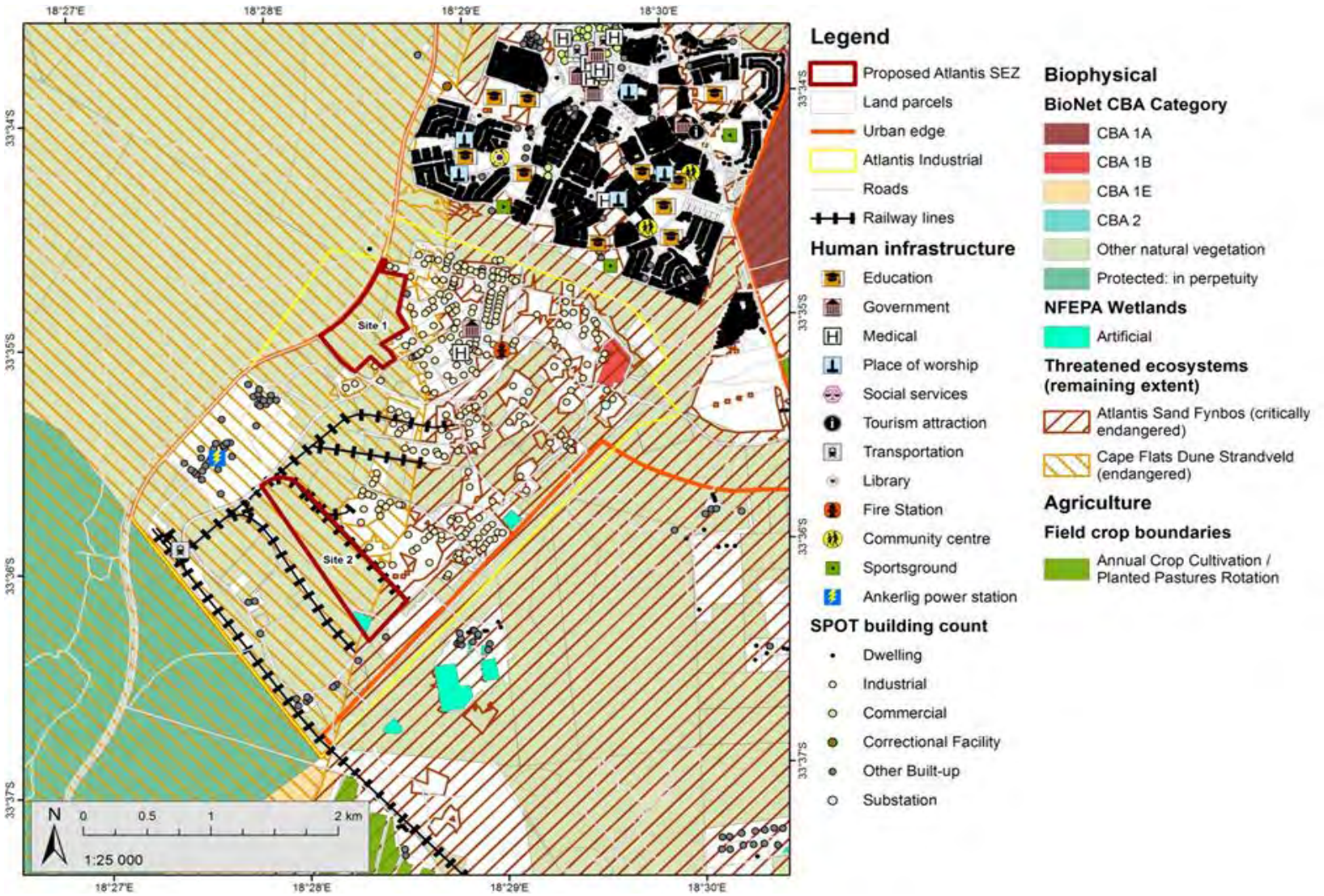

Figure 5.2: Preferred location of the proposed Atlantis facility on Cape Farm 1183-4-1 (Site 2) being taken forward in the EIA Phase

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

Based on the aspects considered in this chapter, the following concluding statement has been provided in terms of the preferred alternatives that have been considered in the EIA Phase:

- Development of the proposed Atlantis gas-to-power project, using either Combined Cycle Gas Turbines or Open Cycle Gas Turbines up to an expected maximum output of 1500 MW on preferred site (CA 1183-4-1/ERF 277), close to the Eskom Omega-Sterrekus substation. The final layout of the facility has been informed by specialist studies during the EIA Phase to avoid environmental sensitivities as far as possible.

In summary, the following alternatives have been taken forward into the EIA Phase:

- **No-go Alternative:**
  - The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Atlantis gas-to-power facility. This alternative would result in no environmental impacts on the site or surrounding local area, as a result of the facility. It provides a baseline against which other alternatives can be compared to and considered during the EIA Phase.

- **Land Use Alternative:**
  - No other energy technologies were deemed to be appropriate for the site and therefore these technologies will not be further assessed during the EIA Phase. The implementation of a gas-to-power facility at the proposed project site is more favourable than other alternative energy facilities due to the following:
    - The potential gas resources available nearby the project site are better and represent a greater potential yield than other energy resources available across the same site;
    - Other energy facilities (i.e. renewables/coal etc.) require significant space and specific layout formats. The implementation of a gas-to-power facility would make optimum use of the land which is available due to the fact that the facility is compact and can be configured to fit this specific site in order to make maximum use of the land available; and
    - The proposed facility currently falls within the Atlantis SEZ in Atlantis Industrial, which has been identified by the City of Cape Town Municipality as being of strategic importance for industrial development (as discussed in Chapter 1 and Chapter 2 of this EIA Report). In addition, the proximity of the proposed facility to the Ankerlig Power Station and its corresponding infrastructure makes sense from a logistical and planning perspective, as the infrastructure (i.e. busbar and powerline routes) can be aligned to ensure that the most minimal impact is received by the environment.

- **Preferred Site and Site Location:**
  - The preferred site for the project is Cape Farm 1183-4-1, now changed to ERF 277; and
  - The available development area of each of the above location is 38.65 ha, which is the approximate area required for the gas to power project.

- **Technology Alternatives:**
  - Applicable and relevant technology options are described in Chapter 2 of this EIA Report, such as those relating to either CCGT or OCGT, and dry vs. wet cooling systems.

- **Layout Alternatives:**
  - Layout alternatives for the project were determined following the input from the various specialists by establishing the Development Footprint. The studies did not particularly identify any environmental sensitivities present on the preferred site that need to be avoided (such as CI ecological species) due to the fact that the site has a biodiversity offset and is in a heavily transformed area. It must be noted that the layout alternatives have taken into account the small artificial wetland on site and this will be avoided completely. Additional information regarding the development envelope and the layout of the facility is provided in Chapter 2 of this EIA Report.

As noted in Chapter 1 of this EIA Report, the 2014 EIA Regulations (Appendix 3 of the GN R982) have certain requirements in terms of the selection of the preferred site location for the proposed activity. Table 5.4 below indicates the requirements of the 2014 EIA Regulations in terms of the process leading to the preferred site and location alternatives. Table 5.4 also includes a response from the EAP showing how the requirements of the 2014 EIA Regulations have been addressed in this report.

Table 5.1: Requirements for the consideration of Alternatives in the EIA Phase

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
1.	Appendix 3 – (2)	The objective of the EIA Process is to, through a consultative process:	Refer to responses below.
2.	Appendix 3 – (2) (c)	▪ identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.	As noted in the preceding chapters of this EIA Report, the preferred site for the proposed project extends approximately 38.65 ha. However, the proposed facility and associated infrastructure requires a development area of approximately 32-34 ha only. To assess the worst case scenario, the larger area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility. This is discussed further in Chapter 7 of this EIA Report, which includes an environmental sensitivity map. The significant environmental features identified by the relevant specialists have been mapped and overlain by the project area (of approximately 34 ha). The buffers and exclusion areas that need to be applied to the sensitive areas (as identified in the specialist studies) have also been mapped, however, it must be noted that due to the fact that the site is zoned General Industrial, the buffers are within the limits of such a zoning. The remaining areas outside of the sensitive areas and buffers are then regarded as the areas available for development (i.e. the Development Envelope). Therefore, a suitable layout within the Development Envelope for the site has been

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
			determined (as discussed in Chapter 7 of this EIA Report), ensuring that the areas that have a high environmental sensitivity will be avoided by the proposed siting of the proposed facility. A single suitable location for the proposed site has been identified based on the sensitivity mapping and the Development Envelope. Therefore, the overall impact of the proposed project on the sensitive features is expected to be low. Chapter 7 of this report includes a detailed discussion on the Development Envelope of the project. With regards to avoiding sensitivities on site, it must be noted that the site will not avoid any sensitive fauna species, as a Biodiversity offset has been secured for the entire Atlantis SEZ, which will mitigate the loss of these species and provide a gain for biodiversity conservation. Please refer to Appendix J and R for more information on this. As noted above, a worst case scenario was adopted by the specialists in terms of the area of assessment. The specialist studies included in Appendices J to P of this EIA Report therefore include an impact assessment process (inclusive of cumulative impacts) and by default, a ranking process of the identified development footprint (i.e. the Development Envelope) focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
3.	Appendix 3 – (2) (d)	▪ determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated.	The specialist studies included in Appendices J to P of this EIA Report include a description and assessment of the nature, significance, consequence, extent, duration and probability of the identified impacts for the preferred alternatives. The specialist studies also include the assessment of the reversibility and irreplaceability of the potential identified impacts, as well as the degree to which the identified impacts can be avoided, managed or mitigated.
4.	Appendix 3 – (2) (e)	▪ identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.	Refer to the proposed layout and sensitivity mapping approach described in Point 2 above.
5.	Appendix 3 – (2) (f)	▪ identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity.	The specialist studies included in Appendices J to P of this EIA Report include a description, identification and assessment of identified

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
			impacts that the proposed facility will impose on the preferred location of the proposed plant.
6.	Appendix 3 – (2) (g)	▪ identify suitable measures to avoid, manage or mitigate identified impacts.	The specialist studies included in Appendices J to P of this EIA Report include an identification of suitable measures to avoid, manage or mitigate identified impacts.
7.	Appendix 3 – (2) (h)	▪ identify residual risks that need to be managed and monitored.	The specialist studies included in Appendices J to P of this EIA Report include an identification of residual risks that need to be managed and monitored.
8.	Appendix 3 - (3)(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including - ▪ (i) details of the development footprint alternatives considered; ▪ (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; ▪ (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; ▪ (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and ▪ (x) a concluding statement indicating the preferred alternative development location within the approved site.	Refer to the layout determination and sensitivity mapping approach described in Point 2 above.
9.	Appendix 3 – (3) (l)	An environmental impact statement which contains (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Refer to the layout determination and sensitivity mapping approach described in Point 2 above.
10.	Appendix 3 – (3) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Refer to the layout determination and sensitivity mapping approach described in Point 2 above.

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DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Scoping and Environmental Impact Assessment for the proposed Atlantis Gas-to-Power facility on Portion 1 of Portion 4 of Cape Farm 1183, Western Cape

CHAPTER 6:

Impact Assessment

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6 IMPACT ASSESSMENT

The issues and impacts presented in this chapter have been identified via the environmental status quo of the receiving environment (environmental, social and heritage features present on site - as discussed in Chapter 3 of this EIA Report), a review of environmental impacts from other similar projects and input from specialists that form part of the project team.

The risk assessment approach followed incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change. The approach is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria (Figure 6.1).

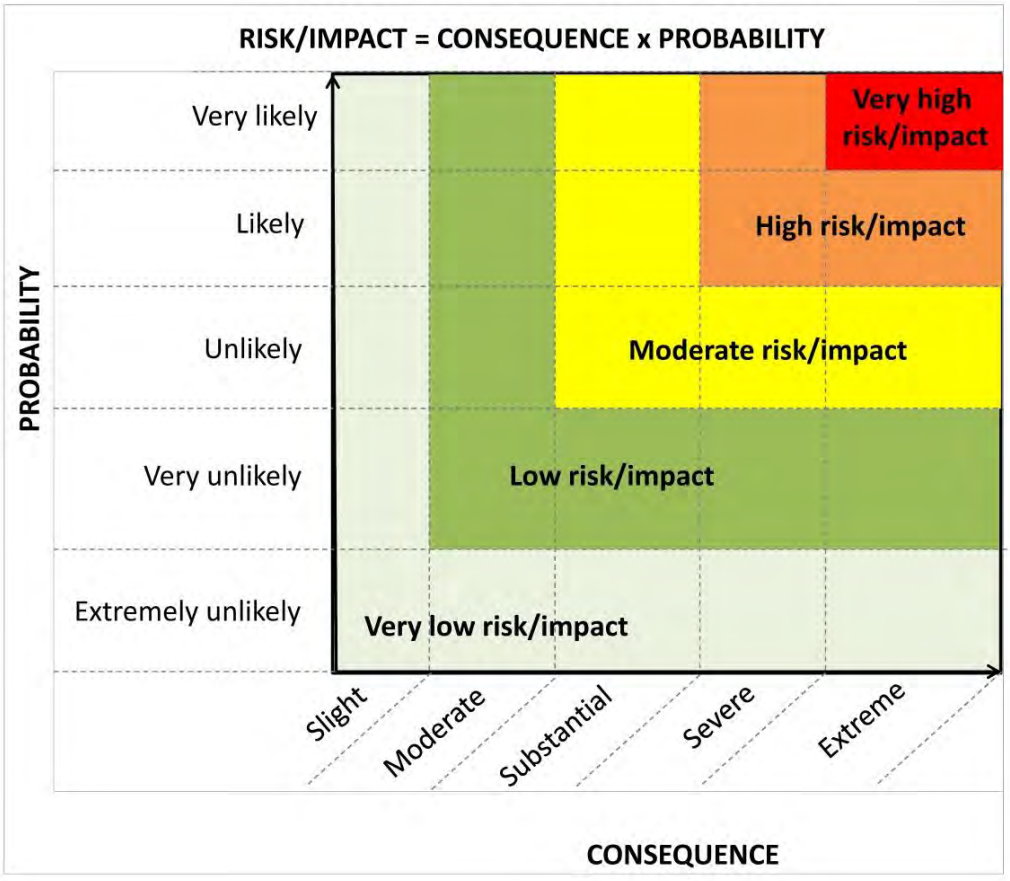

Figure 6.1: Guide to assessing risk/impact significance as a result of consequence and probability.

The following criteria have been considered in the assessment of risk/impacts of the location alternatives:

- **Status** - Whether the risk/impact on the overall environment will be:
  - Positive - environment overall will benefit from the impact; or
  - Negative - environment overall will be adversely affected by the impact.

- **Spatial extent** – The size of the area that will be affected by the risk/impact:
  - Site;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).

- **Duration** – The timeframe during which the risk/impact will be experienced:
  - Very short term (instantaneous);
  - Short term (less than 1 year);
  - Medium term (1 to 10 years);
  - Long term (the impact will occur for the project duration); or
  - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).

- **Consequence** – The anticipated consequence of the risk/impact:
  - Slight;
  - Moderate;
  - Substantial;
  - Severe; and
  - Extreme.

- **Probability** – The probability of the impact occurring:
  - Very likely;
  - Likely;
  - Unlikely;
  - Very unlikely; and
  - Extremely unlikely.

- **Reversibility** of the Impacts - the extent to which the risks/impacts are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
  - Yes: High reversibility of impacts (impact is highly reversible at end of project life);
  - Partially: Moderate reversibility of impacts; or
  - No: Impacts are non-reversible (impact is permanent).

- **Irreplaceability** of Receiving Environment/Resource Loss caused by risk/impacts – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
  - Moderate irreplaceability of resources; or
  - Low irreplaceability of resources.

The **significance** of the risk/impact is then determined through a combination of the consequence and probability and is rated qualitatively as follows:

- Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);

- Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
- High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
- Very high (the impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

Please note that impacts with a positive status (e.g. employment opportunities and diversified economy) may also be indicated as having high or very high. In these cases high and very high ratings are desirable and indicate benefits to the particular receiving environment.

With the implementation of mitigation measures, the residual impacts/risks are **ranked** as follows in terms of significance:

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

A Scoping Phase impact assessment was conducted by the CSIR project team based on existing information (i.e. sourced from existing specialist studies as part of the Basic Assessment that has been undertaken on the site in 2012). The results of this high-level preliminary impact assessment have been verified by relevant specialists during the EIA Phase (current). Chapter 7 of the Scoping Report highlighted the EIA Plan of study (PoS) and Terms of Reference for a list of proposed specialist studies which was approved by DEA in February 2017.

Important note on original specialist studies (Appendices J, K, L)

The specialist findings presented in this chapter represents a summary of the detailed and original specialist studies as contained in the relevant appendices to this report. The current summary of specialist findings is provided in the interest of brevity and with a view to facilitating public participation; as contemplated in the NEMA principles. The Competent Authority, with its mandate of substantive review of the EIA report, is therefore urged to also read the original specialist studies in the relevant appendices to this report with the aim of discharging its decision-making function. Should any discrepancy occur between this summary, and the relevant detailed specialist study; the detailed specialist study will prevail.

6.1 EIA PHASE IMPACT ASSESSMENT

6.1.1 *Terrestrial Ecology*

6.1.1.1 *Findings of the botanical assessment*

. An assessment of the terrestrial ecology on the proposed site was conducted by Bergwind Tours and Surveys (2012) and attached as **Appendix J**. The impacts assessed in the specialist study will be considered in this Environmental Impact Assessment. The findings of this study will be discussed below.

According to the Vegetation Map of South Africa, Lesotho, and Swaziland (Mucina, Rutherford and Powrie, 2005) there are two vegetation units within the study area (Figure 6.2). These are:

1. Cape Flats Dune Strandveld (CFDS): an ENDANGERED ecosystem, covering almost the entire site; and
2. Atlantis Sand Fynbos (ASF): a CRITICALLY ENDANGERED ecosystem, covering a small section along southern boundary.

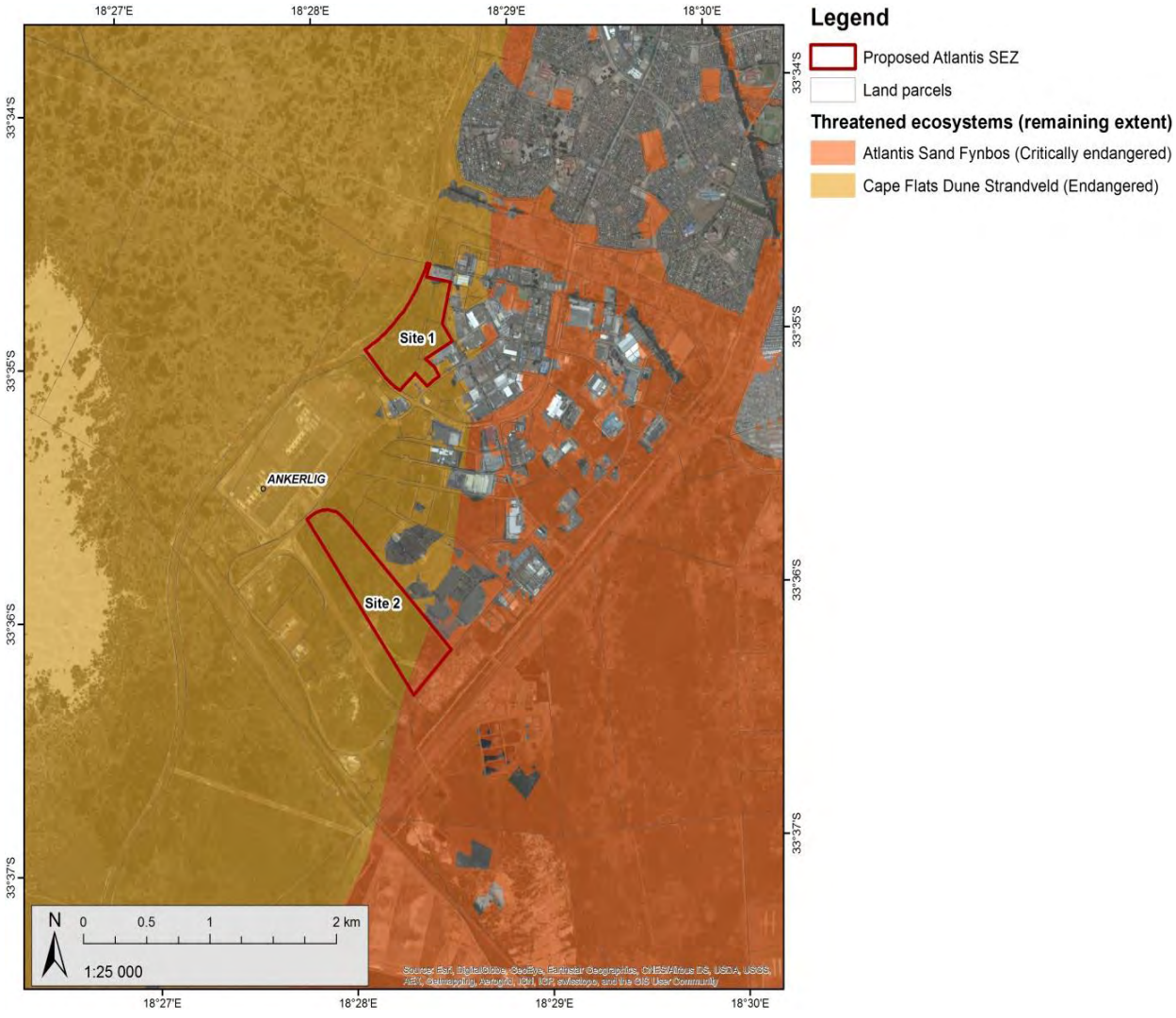

Figure 6.2: Vegetation types present on site – site 2 being the proposed location (VegMap SA)

Approximately two thirds of the site has been transformed by invasive aliens vegetation (mainly Port Jackson Willow, with lower cover of rooikrans), which, in some areas – particularly the southern portion – is almost impenetrable due to high densities of 3 – 4m staplings. The remainder of the site contains intact, good quality CFDS and ASF. The remnants of CFDS are dominated by the small tree known as the Dune Olive (*Olea exasperate)*. For a list of species present in the CFDS biome on site, please see page 12 of Appendix J.

In terms of the ASF along the southern boundary of the site, it is partially disturbed and of medium quality. The population is red flag due the species declining. A list of the species associated with this population can be found on Page 12 in Appendix J. Figure 6.3 below shows the good quality vegetation on site indicated by the yellow shading (Cape Flats Dune Strandveld) and orange shading (Atlantis Sand Fynbos) whereas the remaining areas consist of heavy alien infestations of Port Jackson Willow and rooikrans. The red icons show the distribution of clumps of the ENDANGERED Malmesbury pincushion (*Leucospermum parile*). The blue shading indicates wetlands/retention ponds.

Artificial wetlands

Two artificial wetlands or retention ponds were located. These included a small excavated pond (location: 33°36'3.65"S; 18°28'13.48"E) towards the middle of the site and a larger retention pond at the south-eastern corner located at waypoint 054: 33°36'14.68"S; 18°28'18.61"E). Both ponds are covered with bulrush (*Typha capensis*) and are surrounded by alien vegetation. The possible presence of a wetland located at 33°36'1.72"S; 18°28'13.99"E was checked and found to be a grassy area with alien vegetation. It is important to note that the wetland areas on site will be completely avoided (as per the site layout in Chapter 2).

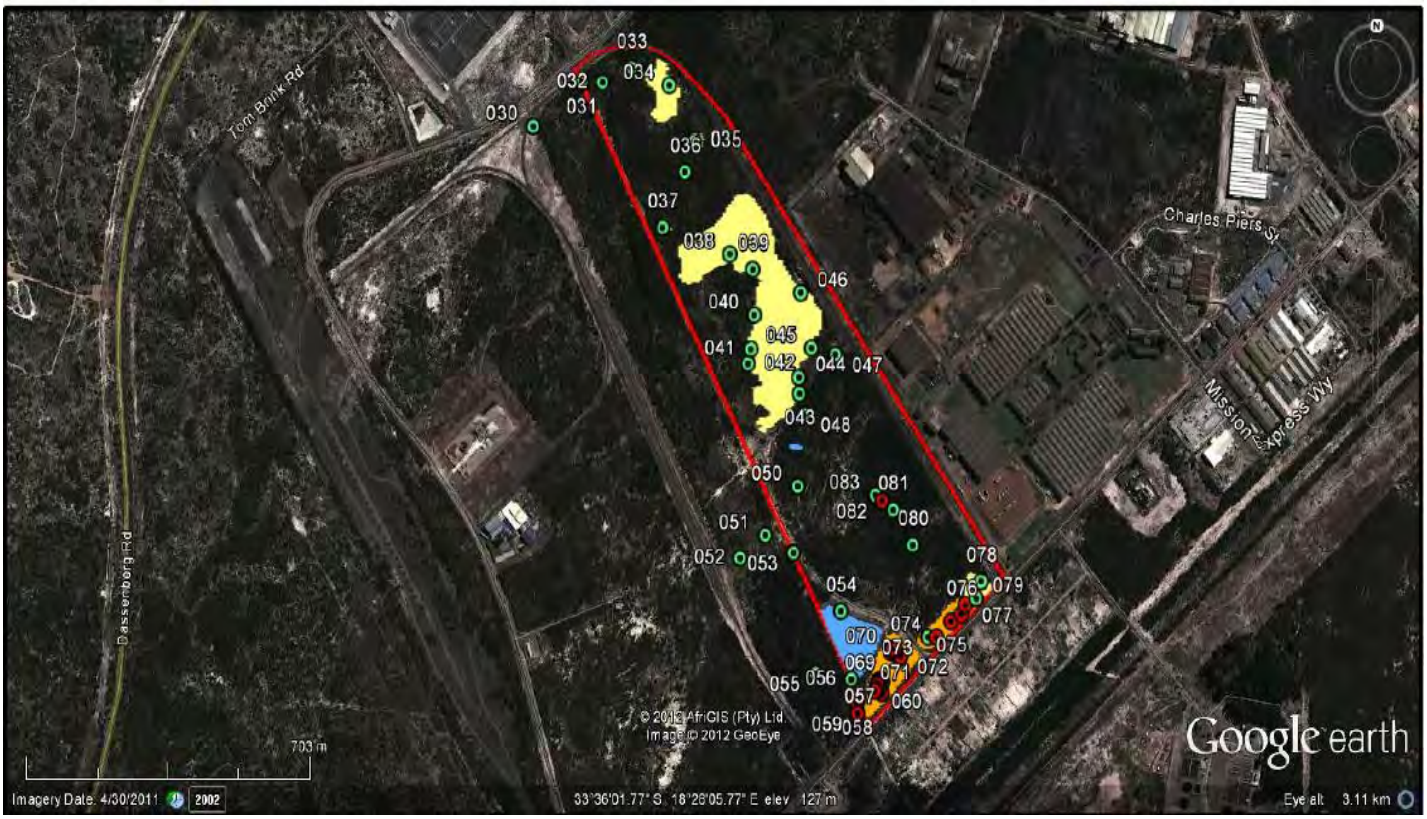

Figure 6.3: Google earth image of the site for the proposed development with the sample waypoints (green dots) and areas with good quality CFDS vegetation (yellow) and AFS (orange)

Biodiversity offset

There has been a biodiversity offset secured and implemented 9with regular audits by CapeNature) for the entire Atlantis SEZ, including the site for this proposed gas-to-power facility. This was deemed necessary as the area has been ear-marked for development, which meant measures needed to be taken o ensure that species of special concern were not lost. The full report on the details of the Biodiversity Offset (known as the **Klein Dassenberg Nature Reserve)** can be found as **Appendix R.**

The Klein Dassenberg Nature Reserve is situated about 45 km from Cape Town's Central Business District (CBD), immediately east of Atlantis and directly adjacent to Pella on the northern boundary, Western Cape, South Africa (Map 1 – Appendix R). The approximate coordinates are (Google Earth, 2013):

- 18°30'29.888"E
- 33°32'26.044"S

The Reserve is currently 371.97 ha in extent consisting of the farm Klein Dassenberg No 20/9 and farms No 7, 8, 10 and an unregistered portion of 1502 Cape road and Cape Farm No 17/1. Portion 3 of the farm Papekuil Outspan No 6 is currently unregistered state land and is being managed as part of the current reserve network. This portion is 183.5218ha in extent.

The Botanical specialist assessment took this information into account in the impact assessment, stating that the proposed offset is supported since this would ensure the conservation of an unfragmented area **greater than the existing site** that will be lost and it would become a well-managed conservation area. Thus although the impacts would be HIGH NEGATIVE these would more than adequately compensate in the offset scenario - **a gain for biodiversity conservation**. It is also stated that the offset option is thus considered the only feasible mitigation option available.

6.1.1.2 Impact Assessment

Direct impacts are impacts occurring directly on the vegetation of the site that would result from the proposed development. In this instance there would be loss of intact vegetation and species of importance in addition to loss of degraded, alien-infested vegetation. The impacts on the two classes of vegetation and habitat due to the proposed construction are considered according to two identified potential impacts which are:

- Loss of vegetation type – including intact vegetation, ecologically important species and species of conservation concern:
    - Development of the site will result in loss of all vegetation on the site, as the entire site is being cleared for the proposed gas-to-power development. The loss of all portions of intact vegetation and important species (Appendix J) would therefore result in HIGH NEGATIVE IMPACT for the design, construction and operational phases of the proposed project and LOW to MEDIUM NEGATIVE IMPACT for degraded, alien-infested vegetation. Furthermore the impacts would have the same rating when considering the proposed mitigation (i.e. offset option). It would be difficult to avoid the intact vegetation since the largest patch occurs near the centre of the site.
- Loss of ecological processes – associated with the loss of intact vegetation, ecologically important species and species of conservation concern:

- Loss of ecological processes is expected to be similar to impacts associated with the loss of vegetation. Ecological processes are difficult to assess since these are mostly unseen, however, based on the makeup, quality, size and connectivity of the habitat, such processes can be assumed to correlate with occurrence of patches of natural vegetation. The associated loss of ecological processes is therefore expected to result in HIGH NEGATIVE IMPACT for intact vegetation (e.g. Cape Flats Dune Strandveld and Atlantis Sand Fynbos) and species of conservation concern (e.g. *Leucospermum parile*) and LOW to MEDIUM NEGATIVE IMPACT for degraded, alien-infested vegetation.

Please see the table below for the full impact assessment for terrestrial ecology for each phase of the activity.

The cumulative loss of vegetation within the Atlantis Industrial Area has led to extensive loss of two vegetation types, namely Atlantis Sand Fynbos (CRITICALLY ENDANGERED) and Cape Flats Dune Strandveld (ENDANGERED). The further loss of intact Cape Flats Dune Strandveld and Atlantis Sand Fynbos on the study site would result in a HIGH NEGATIVE CUMULATIVE IMPACT. In terms of mitigation, the biodiversity offset of 1:1 ha for ENDANGERED Cape Flats Dune Strandveld pertains to most of the site, whereas the ratio 2:1 ha for CRITICALLY ENDANGERED Atlantis Sand Fynbos would apply to the strip of land along the southern boundary. The offset option, as described above, is thus considered the only feasible mitigation option available.

Conclusions:

- The proposed gas-to-power development would impact on two vegetation types, which includes a large portion, and several smaller portions, of ENDANGERED, good quality Cape Flats Dune Strandveld within the northern half of the site, with high numbers of the ENDANGERED mesemb *Ruschia indecora* present. The second portion of vegetation occurs along the southern boundary in a relatively narrow strip, comprising CRITICALLY ENDANGERED, medium quality, Atlantis Sand Fynbos. This area harbours about 80 individuals of the ENDANGERED Malmesbury Pincushion (*Leucospermum parile*).
- The transitional area - where the soil interface gives rise to a changeover and interchange of species between the vegetation types is of high conservation importance since such ecotones usually drive speciation and are important in terms of ecological processes.
- Both vegetation types, in particular the large portion of Cape Flats Dune Strandveld and the population of *Leucospermum parile* are of high conservation importance. However, these occur within an area overtaken by alien vegetation and with limited connectivity to the Atlantis dune area. Restoration, although possible, is unlikely to occur in the near future, which means that the land will undergo further degradation through alien invasion. In order for the land to hold any conservation value in the future, the alien vegetation would have to be eradicated and biodiversity corridors created to link with the Atlantis dune area.
- The offset (Appendix R) is supported by the specialist since this would ensure the conservation of an unfragmented area greater than the existing site that will be lost and it would become a well-managed conservation area. Thus although the impacts would be HIGH NEGATIVE these would more than adequately compensate in the offset scenario which could be a gain for biodiversity conservation.

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE DIRECT IMPACTS													
Internal access roads and vehicular activities on site	**Habitat and species loss**	Negative	Site	Long-term	Moderate	Very likely	Yes (rehabilitation after Construction)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	High	Medium - Low (biodiversity offset)	4	High
	Exposed soil susceptible to erosion	Negative	Site	Medium-term	Moderate	Likely	Yes (rehabilitation after Construction)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High
Site Preparation	**Habitat and species (critically endangered) loss**	Negative	Site	Long-term	Substantial	Very likely	Yes (rehabilitation after Construction)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	High	Medium – Low (biodiversity offset)	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
	Exposed soil susceptible to erosion	Negative	Site	Medium-term	Moderate	Likely	Yes (rehabilitation after Construction)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High
	Loss of Ecological Processes	Negative	Site	Long-term	Substantial	Very likely	Yes (rehabilitation after Construction)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	High	Medium – Low (biodiversity offset)	4	High
CONTRUCTION PHASE INDIRECT IMPACTS													
Construction of surface infrastructure and preparation	**Habitat and species loss**	Negative	Site and surroundings	Long-term	Substantial	Very likely	Yes (rehabilitation after Construction)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	Moderate	Low	4	High
	Exposed soil susceptible to erosion	Negative	Site and surroundings	Medium-term	Moderate	Likely	Yes (rehabilitation after Construction)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
Soil disturbance resulting in the spread of alien plant species on site	**Spread of Alien plant species**	Negative	Site and surroundings	Long-term	Moderate	Likely	Yes (rehabilitation after Construction)	Moderate	Alien plant Management Plan (EMPr)	Low	Very low	5	High
	Exposed soil susceptible to erosion	Negative	Site and surroundings	Medium-term	Moderate	Likely	Yes (rehabilitation after Construction)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATIONAL PHASE DIRECT IMPACTS													
Access control and fencing	**Fencing in, or out certain grazers**	Negative	Site	Long-term	Substantial	Very likely	Yes (with mitigation measures)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	Moderate	Low	4	Medium
	Over or under grazed veld	Negative	Site	Medium-term	Moderate	Likely	Yes (rehabilitation after decommissioning)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High
Post-construction impacts	**Undertake site remediation**	Positive	Site	Medium-term	Moderate	Likely	Yes (rehabilitation after decommissioning)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Disassemble components	**Damage of vegetation and habitat types**	Negative	Site	Short-term	Moderate	Very likely	Yes (with mitigation measures)	Moderate (endangered vegetation)	Biodiversity Offset in place (Appendix J)	Moderate	Low	4	Medium

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Clearing of vegetation, including other projects in the greater Atlantis SEZ area	**Habitat and species loss**	Negative	Site	Long-term	Substantial	Very likely	Yes (with mitigation measures)	Moderate (endangered vegetation)	Biodiversity offset secured for the entire SEZ	High	Medium – Low (biodiversity offset for the whole SEZ in place)	4	Medium
	Exposed soil susceptible to erosion	Negative	Site	Medium-term	Moderate	Likely	Yes (with mitigation measures)	Moderate	Erosion Management Plan (EMPr)	Low	Very low	5	High

6.1.2 Palaeontology, Archaeology and Heritage

6.1.2.1 Findings of the Palaeontological and Archaeological studies

Palaeontology

An assessment of the paleontology (Archaeozoology, Stone Age Archaeology and Quaternary Palaeontology) of the proposed site was conducted by Graham Avery (2012) and attached as **Appendix K.** The impacts assessed in the specialist study will be considered in this Environmental Impact Assessment. The findings of this study will be discussed below.

A review of published sources and personal observations indicates that the proposed development falls on land under which deposits of potential palaeontological significance may exist. The area is within the Duinefontyn Dune Plume where wind erosion has in other parts exposed deeper sediments that underlie the Holocene (<10 000 year old (10 ka) Witzand Formation. Vegetation comprises a mix of indigenous Strandveld and alien Acacia species. Absolute dates place some fossil material at 330 ka, but there are even older known marine fossiliferous deposits dating back to at least 5 Ma (Million years ago) at the coast. Sparse scatters of stone artefacts of probable Early Stone Age occur with some of the fossils; Middle and Later Stone Age artefacts also occur, the latter on or within the Witzand Formation and most likely the result of activities of Khoekhoe herders, who arrived in the Western Cape some 2000 years ago. Similar occurrences may have been located during the archaeological survey of the proposed area.

Collaboration between the contractor and a suitably-qualified palaeontologist (or archaeologist with appropriate experience) will be required during excavations for foundations and infrastructure so that information and/or material can be recorded appropriately. Prior access to geotechnical information and accurate foundation depths would help to determine the likelihood of this and the best strategy. Provided that the recommendations of this assessment are complied with, there is no palaeontological reason why the erection of the proposed development should not proceed. The recommendations from the specialist are as follows:

- Excavations for foundations/infrastructure should be monitored by an appropriate palaeontologist. The frequency of this to be worked out a priori with the contractor to minimize time spent on site.
- If possible, geotechnical information, together with the proposed depths of excavations for foundations and/or infrastructure, should be provided prior to the commencement of construction. This may enable a better estimation of the time(s) when monitoring will take place and even the extent of recovery work.
- Protocols for dealing with palaeontological monitoring/mitigation must be included in the Environmental Management Plan (EMP). Any such material is likely to be fragile and due care must be exercised.
- Any material recovered will be lodged in the collections of Iziko South African Museum.

Archaeology

A survey of the archaeology of the proposed site was conducted by ACO Associates CC (2012) and attached as **Appendix L.** The impacts assessed in the specialist study will be considered in this Environmental Impact Assessment. The conclusions and recommendations from the specialist pertaining to the lack of necessity for further archaeological studies will be discussed below.

The terrain is largely flat and there are a number of dune fields (see Figure 2 in Appendix L). Where agriculture is not taking place, alien plant species have taken over. Previous archaeological surveys have described the poor visibility due to dense ground cover of alien vegetation. A large number of Heritage and Archaeological Impact Assessments have been conducted in this area, including a survey by Hart et al. (2007) which also covered the two sites identified for the current development (Figure 2 in Appendix L). He reported that no significant archaeological material was recovered.

A literature survey of the Atlantis area strongly suggests that the likelihood of uncovering any significant archaeological remains on the Farm CA1183-4-1 which is proposed for the gas-to-power development are minimal. Prior surveys have been conducted on the same property which has been identified for the current proposed gas-to-power development. No significant archaeological remains were reported. The current development proposals are supported and no further archaeological studies are required prior to the commencement of the proposed activity. However, human remains can occur anywhere on the landscape. In the event that human remains are uncovered, certain protocols must be observed. The area around the burial should be cordoned off and both Heritage Western Cape and the police must be notified. No further construction should take place until the authorities have investigated the remains and made their recommendations.

Heritage

The primary heritage legislation that needs to be considered is The South African Heritage Resources Act 25 of 1999 and regulations (details at www.sahra.org.za). All heritage material, including burials, is included. Clearance in terms of the National Heritage Act of 1999 will be required before the development can proceed. Locally, a permit will be required from Heritage Western Cape; in the event of a burial being exposed, SAHRA is the organization to contact along with the South African Police Services, but no bones should be further moved until an archaeologist or palaeontologist has assessed them. Although not required by the Act, it is suggested that, to obviate possible delays should fossil material be encountered, a permit be applied for before any excavation is initiated. This would enable the monitor to readily recover material, should it be encountered during construction activities. Please see **Appendix Q** from Heritage Western Cape detailing the heritage importance of the site and the support from HWC.

6.1.2.2 Impact Assessment

From the above, it is clear that the proposed development is in an area under which potentially important palaeontological remains may occur. Such palaeontological remains are likely to be rare and sparsely distributed but, if encountered, must be carefully exposed and recorded by an appropriately qualified person. Provided that the recommendations in the specialist report (Appendix K and L) are followed, current information indicates that the proposed development will not impact significantly on palaeontological remains. Appropriately conducted the development may in fact provide opportunities to access rare fossil material and to better understand the local geological sequence. From the palaeontological perspective the development can be allowed to proceed.

A literature survey of the Atlantis area strongly suggests that the likelihood of uncovering any significant archaeological remains on Portions 1 & 4 of the Farm CA1183 are minimal. Prior surveys have been conducted on the same property which has been identified for the current proposed development. No significant archaeological remains were reported. The Table below shows the impact assessment undertaken for palaeontogy, archaeology and heritage for the proposed gas-to-power facility.

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CONSTRUCTION PHASE DIRECT IMPACTS													
Clearing of site	**Destruction of palaeontological resources**	Negative	Local	Permanent	Substantial	Unlikely	Non-reversible	Irreplaceable	➢ A palaeontologist should inspect the pre-construction geotechnical report to evaluate potential impacts and the need for any further work; and ➢ Appoint a palaeontologist to check for sensitive features prior to construction.	Low	Very low	5	High
Clearing of site	**Destruction of archaeological resources**	Negative	Site	Permanent	Moderate	Very likely	Non-reversible	Irreplaceable	➢ Avoid sites with a buffer of 20 m from GPS co-ords; or ➢ Archaeological excavation to be undertaken by a professional archaeologist; and ➢ Ensure all works occur inside approved development footprint.	Low	Very low	5	High
Clearing of site and construction of facility	**Alteration of the cultural and natural landscape**	Negative	Local	Long term	Moderate	Very likely	High	Moderate	➢ Use earthy-coloured paint on built elements; and ➢ All staff and vehicles to remain in authorised project footprint.	Low	Very Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
OPERATION PHASE DIRECT IMPACTS													
Operation of facility	**Alteration of the cultural and natural landscape**	Negative	Local	Long term	Moderate	Very likely	High	Moderate	➢ All staff and vehicles to remain in authorised project footprint	Low	Very Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
DECOMMISSIONING PHASE DIRECT IMPACTS													
Removal of facility (i.e. construction vehicles, etc.)	**Alteration of the cultural and natural landscape**	Negative	Local	Long term	Moderate	Very likely	High	Moderate	➢ All staff and vehicles to remain in authorised project footprint.	Low	Low	4	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Clearing of site	**Destruction of palaeontological resources**	Negative	Local	Permanent	Substantial	Unlikely	Non-reversible	Irreplaceable	➢ A palaeontologist should inspect the pre-construction geotechnical report to evaluate potential impacts and the need for any further work; and ➢ Appoint a palaeontologist to check for sensitive features prior to construction.	Moderate	Very low	5	High
Clearing of site	**Destruction of archaeological resources**	Negative	Local	Permanent	Moderate	Very likely	Non-reversible	Irreplaceable	➢ Avoid sites with a buffer of 20 m from GPS co-ords; or ➢ Archaeological excavation to be undertaken by a professional archaeologist; and ➢ Ensure all works occur inside approved development footprint.	Low	Very low	5	High
Clearing of site	**Destruction of graves**	Negative	Site	Permanent	Extreme	Very unlikely	Non-reversible	Irreplaceable	➢ Avoid graves (if any) with a buffer of at least 5 m from actual graves.	Low	Very low	5	High

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/resource	Potential mitigation measures	Significance of impact/risk = consequence x probability		Ranking of impact/risk	Confidence level
										Without mitigation /management	With mitigation /management (residual risk/impact)		
CUMULATIVE IMPACTS													
Clearing of site and construction of facility	**Alteration of the cultural and natural landscape**	Negative	Regional	Long term	Substantial	Very likely	High	Moderate	➢ Use earthy-coloured paint on built elements; ➢ All staff and vehicles to remain in authorised project footprint.	Low	Low	4	High

6.1.3 Air Quality and Climate Change

6.1.3.1 Findings of the Air Quality assessment

The Air Quality and Climate Change Impact Assessment was conducted by uMoya-Nilu (**Appendix M).** The Findings of this study will be discussed below.

Combustion facilities using liquid fuels or gas primarily for steam raising for electricity generation are classified as Listed Activity in terms of Section 21 the NEM: AQA and GN 893, if the design capacity of the individual generating units is equal to or greater than 50 MW heat input (Category 1, sub-category 1.2 (liquid), sub-category 1.4 (gas). The following Minimum Emission Standards apply:

Substance	Minimum emission standard (mg/Nm^3 at 3% O_2, 273 K and 101.3 kPa)
Particulate matter	50[1] or 10[1]
Sulphur dioxide (SO_2)	500[1] or 400[2]
Oxides of nitrogen (NO_X) expressed as NO_2	250[1] or 50[2] mg/Nm^3

1: Applies to liquid fuels
2: Applies to gas combustion

The storage and handling of petroleum products with a storage capacity of more than 10 000 m3 is also classified as a Listed Activity (Category 2, sub-category 2.4). Fixed roof tanks vented to the atmosphere or pressure vacuum vents are required for products with a vapor pressure up to 14 kPa, such as diesel. The National Ambient Air Quality Standards (NAAQS) (GN 1210 of 24 Dec 2009 and GN 486 of 29 June 2012) aim to protect human health from inhalation exposure. They consist of a *limit value* and a *tolerance* or permitted frequency of exceedance. The limit value is the fixed concentration level aimed at reducing the harmful effects of a pollutant. The permitted frequency of exceedance is the 99th percentile and represents the tolerated exceedance of the limit value. Liquid Natural Gas (LNG) will be the primary fuel used for electricity generation in the GreenCape Power Project, but diesel will be used in emergency situations. Emissions of pollutants from the power plant will depend on the fuel used. Pollutants emitted from LNG combustion include oxides of nitrogen (NOX = NO + NO2) and carbon dioxide (CO).

Pollutants emitted from LNG combustion include oxides of nitrogen (NO_X = NO + NO_2) and carbon monoxide (CO). Pollutants emitted from diesel combustion include sulphur dioxide (SO_2), NO_X, CO, benzene and particulates, including respirable PM_{10} and $PM_{2.5}$. The combustion of both fuel types also results in CO_2 emissions, which is a Greenhouse Gas. CO_2 emissions for the facility were estimated at 246592.5 tons per annum for the LNG scenario, and 351954.7 tons per annum for the diesel scenario. An application for an Atmospheric Emission License (AEL) and a supporting Atmospheric Impact Report (AIR) is a requirement of the authorisation process for all Listed Activities. The AIR is also fundamental to the EIA process. The AEL has been applied for and will be streamlined to the final authorization (if granted).

The physical data for the stacks at GreenCape Atlantis Gas to Power Facility are listed in Table 6.1. Emission concentrations and emission rates for proposed production levels are shown in Table 6.2.

NB. Emission release temperature and Emission exit velocity were not provided and a reasonable assumption of design parameters was made.

Table 6.1: Point sources at GreenCape Atlantis Gas to Power Facility

Source Description	Stack height (m)	Stack diameter (m)	Latitude of centre (UTM)	Longitude of centre (UTM)	Emission release temperature (K)	Emission exit velocity (m/s)
Stack 1	30	5	265227	6279395	800	25
Stack 2	30	5	265158.5	6279493	800	25
Stack 3	30	5	265180.3	6279462	800	25
Stack 4	30	5	265203.9	6279428	800	25

Emission concentrations for NO_2, SO_2, PM_{10}, CO and benzene for this scenario are listed in Table 6.2. Emission concentrations are only presented for pollutants to which minimum emission standards apply, viz. SO_2, NO_X, and PM_{10}.

NB. Volumetric flow rate was not supplied and an assumed flow rate of 2 188 620 Nm^3/hour was used to calculate emission concentrations.

Table 6.2: Average proposed emission concentrations (mg/Nm^3) and rates (tons/year) at GreenCape Atlantis Gas to Power Facility

	LNG							
	Emission rate (tons/annum)					Emission concentration (mg/Nm^3)*		
	SO_2	NO_X	PM_{10}	CO	Benzene	SO_2	NO_X	PM_{10}
Stack 1	1.9	55	3.7	8.4	0.007	0.1	2.9	0.19
Stack 2	1.9	55	3.7	8.4	0.007	0.1	2.9	0.19
Stack 3	1.9	55	3.7	8.4	0.007	0.1	2.9	0.19
Stack 4	1.9	55	3.7	8.4	0.007	0.1	2.9	0.19

	Diesel							
	Emission rate (tons/annum)					Emission concentration (mg/Nm^3)*		
	SO_2	NO_X	PM_{10}	CO	Benzene	SO_2	NO_X	PM_{10}
Stack 1	18	493	6.7	1.8	0.031	1.0	25.7	0.35
Stack 2	18	493	6.7	1.8	0.031	1.0	25.7	0.35
Stack 3	18	493	6.7	1.8	0.031	1.0	25.7	0.35
Stack 4	18	493	6.7	1.8	0.031	1.0	25.7	0.35

***** Reference conditions are 15% O_2, 273 K and 101.3 kPa

CO_2 emissions for the facility were estimated at 246592.5 tons per annum for the LNG scenario, and 351954.7 tons per annum for the diesel scenario.

6.1.3.2 Fugitive emissions

No fugitive emissions are expected from the engines.

Two scenarios were assessed, viz. the CCGT process running on LNG or on diesel fuel. Predicted ambient concentrations of pollutants emitted for each scenario are presented in Figures 6.4 to 6.5 as isopleths in µg/m^3.

The effect of the prevailing southeasterly and northwesterly winds at Atlantis is evident in the annual dispersion pattern of SO_2 (Figures 6.4 and 6.5), extending along these axes. Evidence of southwesterly winds extending the dispersion pattern northeastwards is also seen. Ambient concentrations for hourly SO_2 are predicted to be very low for both scenario's (Figure 6.4). The predicted SO_2 concentrations are an order of magnitude greater when diesel is used. For both scenario's, the predicted concentrations are well below the NAAQS of 350 µg/m^3 throughout the modelling domain.

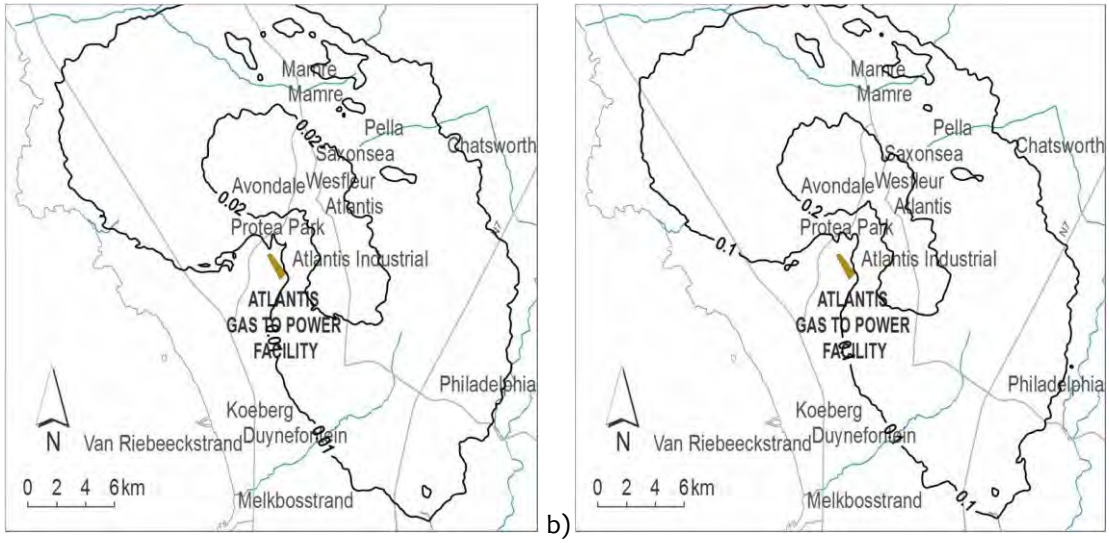

Figure 6.4: Predicted maximum 1-hour SO2 concentrations for a) LNG and b) diesel

Predicted hourly ambient concentrations of NO_2 are low for both fuel type scenario's, with diesel scenario values being an order of magnitude higher (Figure 6.5). A similar dispersion pattern is observed, with maximum ambient concentrations to the north of the site. The predicted concentrations are compliant with the NAAQS of 200 µg/m^3.

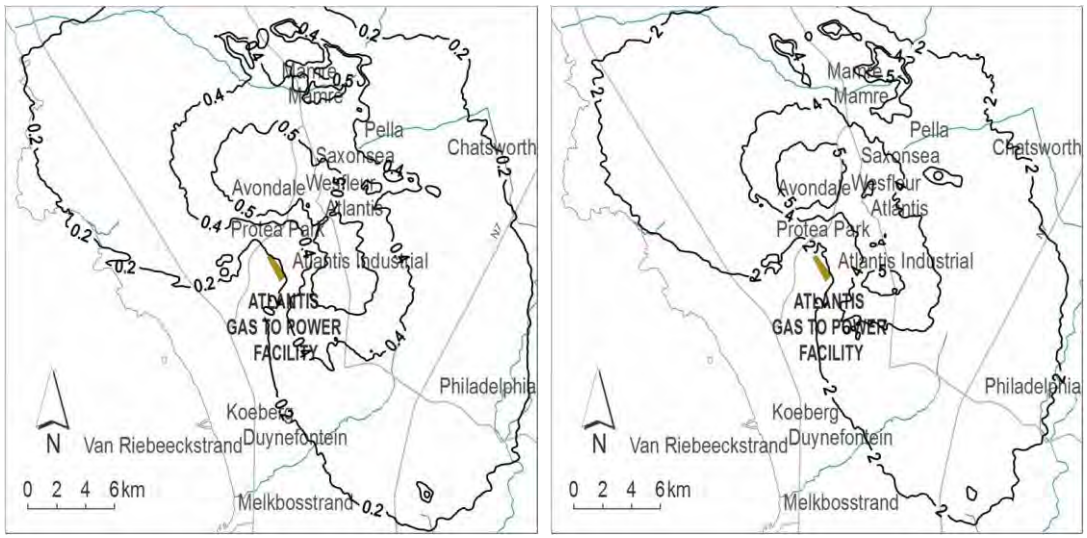

Figure 6.5 Predicted maximum 1-hour NO_2 concentrations for a) LNG and b) diesel

Predicted daily ambient concentrations of PM_{10} are very low (Figre 6.6), and are compliant with the NAAQS of 75 µg/m^3. Dispersion of pollutants extends in a northerly direction from the plant.