DRAFT ECOLOGICAL IMPACT ASSESSMENT REPORT

PROPOSED GAS ASSOCIATED INFRASTRUCTURE WITHIN THE COEGA SPECIAL ECONOMIC ZONE (SEZ) AND PORT OF NGQURA (CDC/277/22)

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

PROPOSED GAS ASSOCIATED INFRASTRUCTURE WITHIN THE COEGA SPECIAL ECONOMIC ZONE (SEZ) AND PORT OF NGQURA (CDC/277/22)

ECOLOGICAL IMPACT ASSESSMENT

PREPARED FOR:

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DECEMBER 2022

REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Ecological Impact Assessment for the proposed gas associated infrastructure within the Coega Special Economic Zone (SEZ) and Port of Ngqura (CDC/277/22)		
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Status:	Draft		
Issue Date:	October 2022		
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Report Distribution	***Circulated to***	***No. of hard copies***	***No. electronic copies***
	CDC	0	1
	DFFE	0	1
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	October 2022		

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SPECIALIST TEAM

Ms Elena Reljic, Ecological Specialist and Lead Report Author (SACNASP Reg No. 129001)

Elena obtained her MSc in Zoology (*Cum Laude*), BSc Honours in Environmental Sciences and a BSc in Geography. The focus of her postgraduate research was on coastal dune forest restoration in Richards Bay, KwaZulu-Natal, where she studied tree, bird, and millipede communities. She also has done a great deal of zoological work in remote regions of South Africa, including the Succulent Karoo and Kalahari Desert, and has worked with a wide range of fauna including birds, reptiles, and small mammals. Moreover, Elena was part of a 14-month research expedition team to the sub-Antarctic Marion Island where her focus was on seabird research. This is complemented by her strong knowledge of managing and analysing large ecological databases, the programming language R, and GIS software.

Since her employment at CES in 2021, Elena has been involved in several Terrestrial Biodiversity Impact Assessments, with specific focus on the faunal component, and other Faunal Specialist Surveys, particularly within the renewable energy sector. She has also been involved in the Basic Assessment Processes and Public Participation Processes for smaller developments.

Ms Nicole Wienand, Botanical Specialist and Co-Author *(SACNASP Reg No. 130289)*

Ms Nicole Wienand (SACNASP Reg No. 130289) is an Environmental Consultant with over 3 years' experience based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela University (NMU) in December 2018. She also holds a BSc Degree in Environmental Management (*Cum Laude*) from NMU. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth and for her undergraduate project she investigated dune movement in Sardinia Bay. Since her employment with CES in January 2019, Nicole has specialised in the field of ecology and botanical specialist assessments, ensuring that these specialist assessments are undertaken and prepared in accordance with the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320), Plant Species and Animal Species (GN R. 1150). Nicole has undertaken numerous Ecological Impact Assessments for a range of developments including Wind Energy Facilities (WEFs), Overhead Lines (OHL) and infrastructure, working closely with developers to ensure a development which is environmentally sustainable as well as financially and technically feasible.

Luc Strydom, Project EAP, Botanical Specialist and GIS Mapping

Luc has over 13 Years of experience and has developed his skills and expertise over the years as he has been involved in a wide spectrum of projects and activities ranging from general environmental assessment work such as Basic Assessments, Full Scoping and EIA reports, ESIAs and EMPrs, environmental permitting (WULAs, trans-relocation permits, waste permits), geo-hydrological sampling, auditing (ECO & Performance Assessments) as well as specialist studies including freshwater impact assessments (wetlands and river

assessments), terrestrial biodiversity assessments, vegetation impact assessments, botanical surveys, and related management plans (invasive alien species management plans, biodiversity management plans, rehabilitation plans).

Dr Ted Avis, Report Reviewer

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale ESIAs to international standards, especially those of the International Finance Corporation (IFC). From 1997 to 2005 Ted acted was principle environmental consultant to Corridor Sands Limitada, managing all environment aspects of the US$1,2billion Corridor Sands Project, including five ESIA's, associated ESMPs, and the RAP. He has managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia, and South Africa. Ted also has experience in large scale Strategic Environmental Assessments in southern Africa and has been engaged by the IFC on a number of projects.

Between 1994 and 1996 Ted was instrumental in establishing the Environmental Science Department at Rhodes University, whilst a Senior lecturer in Botany at that time. This resulted from his experience running honours modules in EIA practice and environmental management, as well as the applied research he undertook in these disciplines. He was an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes between 1998 and 2003. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2002. He has delivered papers and published in the field of EIA, Strategic Environmental Assessment, and Integrated Coastal Zone Management, and has been a principal of CES since its inception in 1990 and Managing Director since 1998.

Most of the ESIA work Ted has been involved in has included the preparation of various Environmental & Social Management Plans, Resettlement Action Plans and Monitoring Plans. These ESIA's cover a range of sectors including infrastructure, mining (heavy minerals, graphite, tin, copper, iron), agri-industrial, forestry, resorts and housing development, energy, ports, and coastal developments.

Ted holds a PhD in Botany and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled "Coastal Dune Ecology and Management in the Eastern Cape". Ted is a Certified Environmental Assessment Practitioner (since 2002) and a professional member of the South African Council for Natural Scientific Professionals (since 1993).

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ACRONYM LIST

AOO	Area of Occupancy
ADU	Animal Demography Unit
BA	Basic Assessment
BI	Biodiversity Importance
BSP	Biodiversity Sector Plan
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CDC	Coega Development Corporation
CES	Coastal and Environmental Services
CI	Conservation Importance
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EN	Endangered
EMPr	Environmental Management Programme
EOO	Extent of Occurrence
ESA	Ecological Support Area
FI	Functional Integrity
FSRU	Floating Storage Regasification Unit
GIS	Geographical Information System

GN	Government Notice
HWM	High-Water Mark
IBA	Important Bird Area
IDZ	Important Development Zone
IUCN	International Union for Conservation of Nature
LC	Least Concern
LNG	Liquefied Natural Gas
MOSS	Metropolitan Open Space System
NBA	National Biodiversity Assessment
NBSAP	National Biodiversity Strategy and Action Plan
NBF	National Biodiversity Framework
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:PA	National Environmental Management: Protected Areas Act
NFEPA	National Freshwater Ecosystem Ancillary Areas
NMBM	Nelson Mandela Bay Municipality
NNHR	No Natural Habitat Remaining
NPAES	National Protected Areas Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
NT	Near Threatened
ONA	Other Natural Areas
PA	Protected Area
PNCO	Provincial Nature Conservation Ordinance
PoN	Port of Ngqura
POSA	Plants of Southern Africa
PVS	Project Vegetation Specification
RLE	Red List of Ecosystems
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professionals
SA NLC	South African National Land Cover

SCC	Species of Conservation Concern
SC&A	Scherman Colloty & Associates
SOTER	Soil and Terrain
S&R	Search and Rescue
SS	Substation
QDS	Quarter Degree Square
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Areas Database
SEA	Strategic Environmental Assessment
SEI	Site Ecological Importance
SEZ	Special Economic Zone
SWSA	Strategic Water Source Area
TLB	Tractor Loaded Backhoe
TOPS	Threatened and Protected Species
VU	Vulnerable

DEFINITIONS

Alien Invasive Species refers to an exotic species that can spread rapidly and displace native species causing damage to the environment.

Biodiversity is the term that is used to describe the variety of life on Earth and is defined as "*the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*" (Secretariat of the Convention on Biological Diversity, 2005).

Habitat Fragmentation occurs when large expanses of habitat are transformed into smaller patches of discontinuous habitat units isolated from each other by transformed habitats such as farmland.

Natural Habitat refers to habitats composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological function and species composition.

Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values**.** *(IUCN Definition 2008).*

Species of Conservation Concern all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare].

SPECIALIST CHECK LIST

The contents of this specialist report comply with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 (Table 1), Terrestrial Plant Species (GN R. 1150) (Table 2) and Animal Species (GN R. 1150) (Table 3).

Table 1: Minimum Report Content requirements for environmental impacts on terrestrial biodiversity (GN R. 320).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page iv to vi
	3.1.2	A signed statement of independence by the specialist;	Appendix 6
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Sections 1.4 and 2.3
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Table 4.1, Section 7.1 and Section 7.3
	3.1.7	Additional environmental impacts expected from the proposed development;	Section 2.7.1
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Section 2.7.1
	3.1.9	The degree to which the impacts and risks can be mitigated;	Section 2.7.1
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 7.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having	Section 5.1

		a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 7.1 and Section 7.3
	3.1.15	Any conditions to which this statement is subjected.	Section 7.3 and Section 7.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.		✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		✓

Table 2: Minimum Report Content requirements for environmental impacts on terrestrial plant species (GN R. 1150).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 1150			SECTION OF REPORT
3.1	The Terrestrial Plant Species Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page iv to vi
	3.1.2	A signed statement of independence by the specialist;	Appendix 6
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.4 & Section 2.3
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
	3.1.6	A description of the mean density of observations/number of samples sites per unit area of site inspection observations;	Section 2.3
	3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 3.2.3 and Section 3.2.5
	3.1.8	The online database name, hyperlink and record accession numbers	iNaturalist (www.inaturalist.org);

		for disseminated evidence of SCC found within the study area;	
	3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	
	3.1.10	A discussion on the cumulative impacts;	Section 6.1
	3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 7.2
	3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	Section 7.3
	3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.	Section 4.2.3 & Section 4.5
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		✓

Table 3: Minimum Report Content requirements for environmental impacts on terrestrial animal species (GN R. 1150).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 1150			SECTION OF REPORT
3.1	The Terrestrial Animal Species Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page iv to vi
	3.1.2	A signed statement of independence by the specialist;	Appendix 6
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.4 & Section 2.3
	3.1.4	A description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 2
	3.1.5	A description of the mean density of observations/number of sample sites per unit area and the site inspection observations;	Section 1.4
	3.1.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data;	Section 2.3

	3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 3.2.3 and Section 3.2.5
	3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	iNaturalist (www.inaturalist.org);
	3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	Table 4.1, Section 7.1 and Section 7.3
	3.1.10	A discussion on the cumulative impacts;	Section 6.1
	3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 7.2
	3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	Section 7.3
	3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.	Section 4.2.3 & Section 4.5
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		✓

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1 INTRODUCTION AND PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION AND LOCALITY

GAS INFRASTRUCTURE PROJECT

The Coega Development Corporation (CDC) proposes to develop a Gas to Power project, including three power plants and associated infrastructure, within the Coega Special Economic Zone (SEZ). Figure 1.1 shows the location of the proposed development within the Coega SEZ while Figure 1.2 presents the respective zoning within the SEZ.

An Environmental Impact Assessment process (EIA) was undertaken in 2020/2021 (DFFE Ref: 14/12/16/3/3/2/1131) for the Coega Gas to Power Infrastructure project, and the Final Scoping Report was accepted by the Department of Forestry, Fisheries and the Environment (DFFE) on 6 January 2021. However, Environmental Authorisation (EA) was refused due to incorrect proof of landowner consent and insufficient information within the (Environmental Impact Report) EIR for the Department to decide.

The overall project would broadly involve the following components:

- A Liquefied Natural Gas (LNG) terminal, consisting of a berth with off-loading arms within the Port of Ngqura (PoN), cryogenic pipelines, storage and handling facilities and re-gasification modules (both on- and offshore);
- Gas and LNG pipelines and distribution hub, for the transmission, distribution and reticulation of natural gas within the Coega SEZ and Port of Ngqura - the subject of this Ecological Impact Assessment;
- Three Gas to Power plants, each with a 1000 W generation capacity (specific generation technologies may vary); and
- Electricity transmission lines to evacuate electricity to the previously approved 400 kV lines in the SEZ.

The overall/ultimate proposed project will comprise of three power plants with power generation capacities of up to 1000 MW each. A total power generation capacity of up to 3000 MW will therefore be available once the full extent of the project has been developed (which may be spread over a number of phases in a modular fashion, each with a generation capacity of approximately 500 MW, which may also be broken down into smaller sub-phases), the timing of which is unknown at this stage and is dependent on the CDC securing successful clients for the development of each component.

This Draft Ecological Impact Assessment Report deals only with the construction and operation of the gas infrastructure components of the project, facilitating the supply of gas to the power plants, and the transmission of gas and LNG to third party off-takers. Figure 1.3 presents the infrastructure layout of the proposed development.

Figure 1-1: Location of the proposed Gas Infrastructure Project within the Coega SEZ and PoN, EC Province (SRK, 2021)

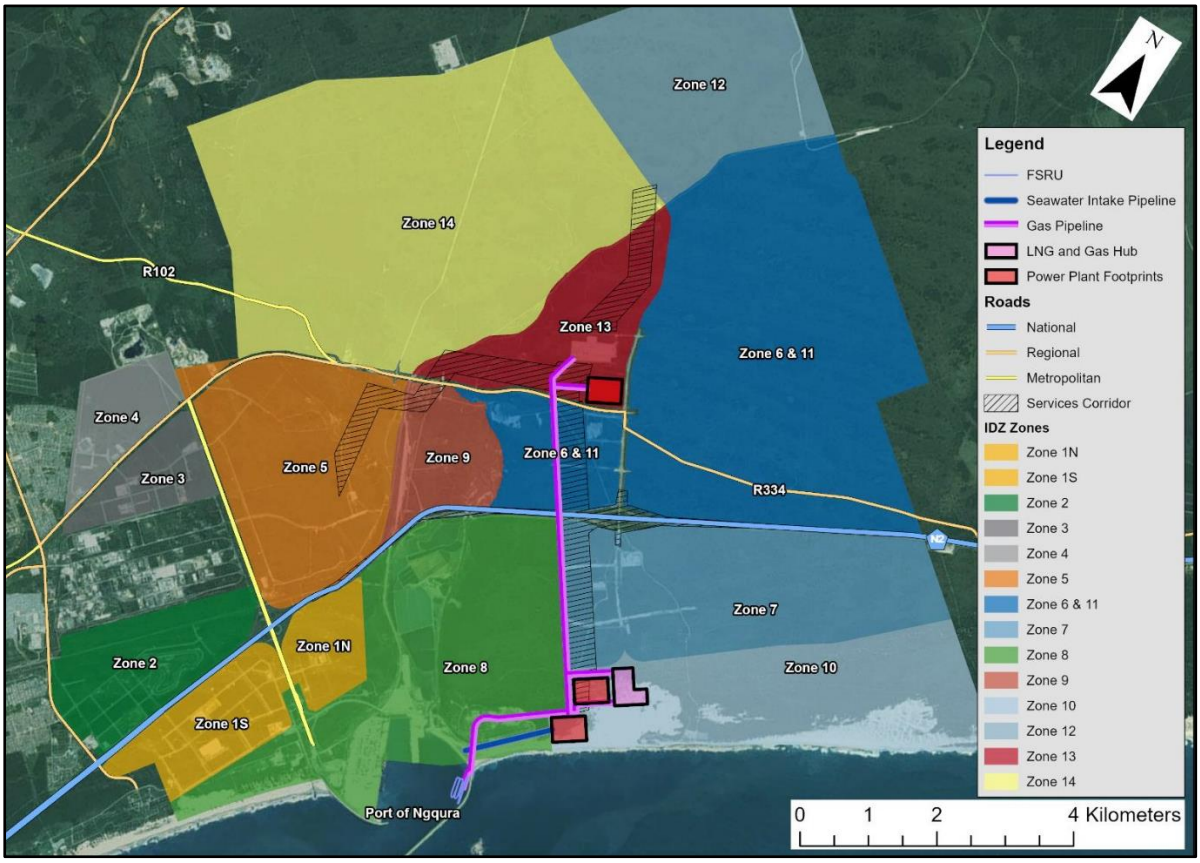


Figure 1-2: Coega SEZ Zone Layout (SRK, 2021)

1.2 SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020) and Terrestrial Animal and Plant Species (GN R. 1150), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration, as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements.

According to the results of the Screening Report generated for the proposed development, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH due to the development occurring within a Critical Biodiversity Area (CBA) 1 and 2, Ecological Support Area (ESA), FEPA subcatchment, National Forestry Inventory, Vulnerable Ecosystem, Protected Area Expansion Strategy and a Strategic Water Source Area. The Animal Species Theme and Plant Species Theme are classified as HIGH.

According to Section 3 (1) of GN R. 320, '*an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment'*.

Due to the very high terrestrial biodiversity sensitivity rating of the site, a full **Ecological Impact Assessment** (this report) has been undertaken as part of the full Scoping and EIA Processes undertaken for the proposed Gas Infrastructure Project.

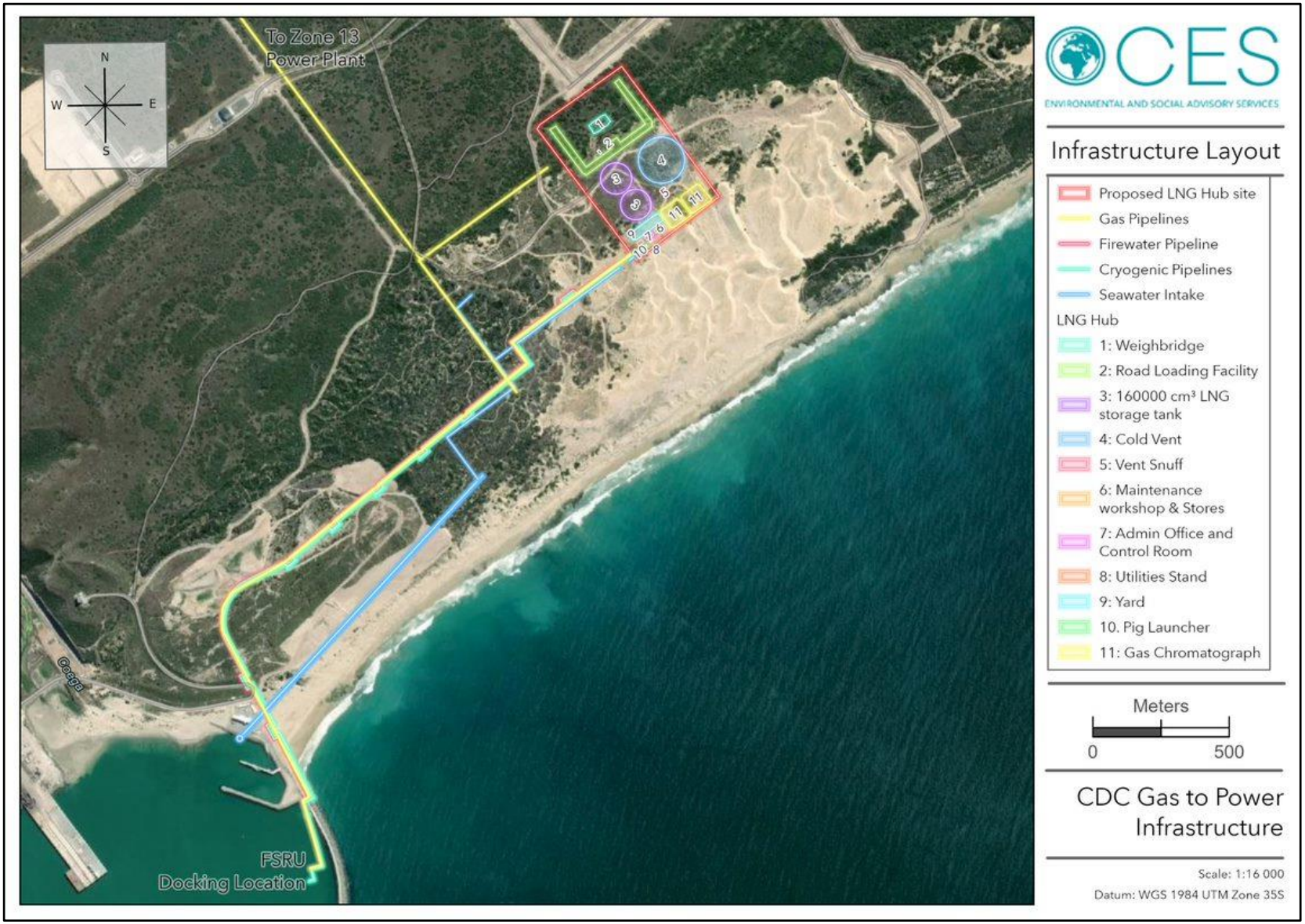


Figure 1-3: Layout of the proposed development.

1.3 Objectives and Terms of Reference

The objectives for the ecological impact assessment are as follows:

- Describe and map the habitat types in the study area.
- Describe the biodiversity and ecological state of each habitat type.
- Establish and map sensitive areas showing the suitability for development and no-go areas.
- Identify plant and animal Species of Conservation Concern (SCC).
- Identify alien plant species, assess the invasive potential, and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation, and degradation of key ecosystems and, where feasible, provide mitigation measures to reduce these impacts.
- Identify and assess the impacts of the development on local, regional, and national level biodiversity plans and spatial priorities.

1.4 Limitations and Assumptions

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- This report is based on the project description received from the applicant.
- The faunal site investigation relied on opportunistic sightings in the field using a Visual Encounter Survey method spanned over one day.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is likely that additional SCC will be found during the construction and operation phases of the development.
- Sampling was conducted in September 2022, which falls within the optimal survey period for the Albany Thicket Biome according to the Species Environmental Assessment Guideline (SANBI, 2020).
- The site survey was undertaken in one (1) day.
- Despite the abovementioned limitations, the time available in the field and information gathered during the survey and that from previous surveys (CES has completed a number of surveys in the study area) was sufficient to provide enough information to determine the status of the affected areas, the anticipated impacts associated with the proposed development, and to identify impact management actions and outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr).

1.5 REPORT STRUCTURE

The Ecological Impact Assessment Report is structured as follows:

Chapter 1 - Introduction and Project Description: Provides a detailed description of the proposed project (including the proposed locality and layout), outlines the objectives and terms of reference for the Ecological Impact Assessment, as well as the limitation and assumptions associated with the assessment.

Chapter 2 – Methodology: Outlines the approach to the assessment including the sampling protocol and an overview of the key resources consulted to inform the Ecological Impact Assessment.

Chapter 3 – Overview of Project Area and Description of the Environment: This chapter provides a brief overview of the physical and biological characteristics of the project area and elaborates on the receiving environment for each component of the proposed project. The Chapter has been subdivided into three (3) section: Section 3.1 relates to the physical characteristics of the project area, Section 3.2 relates to biological characteristics of the project area, and Section 3.3 elaborates on the receiving environment for each component of the proposed project.

Chapter 4 – Biodiversity Assessment: This chapter assesses the proposed development against local, regional, and national level biodiversity plans and spatial priorities.

Chapter 5 - Site Sensitivity: This chapter classifies the Site Ecological Importance (SEI) in terms of the Species Environmental Assessment Guideline (SANBI, 2020).

Chapter 6 – Impact Identification and Assessment: Identifies all potential ecological impacts and issues posed by the proposed development.

Chapter 7 – Impact Statement, Conclusions and Recommendations: Discusses the key findings of the Ecological Impact Assessment and the recommendations for the way forward regarding the proposed development.

2 METHODOLOGY

2.1 THE ASSESSMENT

The assessment involved a preliminary desktop assessment, including a literature review of previous ecological reports concerning the survey region, followed by a one-day site survey conducted on the 30th of September. The purpose of the site survey was to assess the site-specific ecological conditions and current land-uses of the project area, as well as to identify potential sensitive ecosystems and/or sensitive plant and animal species that may be impacted by the proposed project activities.

Key resources consulted during the assessment process include the following:
National level:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- South African Vegetation Map (SA VEGMAP) (Mucina *et al*., 2018);
- Red List of South African Plants (SANBI, 2020);
- South Africa's Terrestrial Red List of Ecosystems (RLE): Technical report on the revision of the list of terrestrial ecosystems that are threatened and in need of protection (SANBI, 2021);
- Red List of Ecosystems (RLE) for terrestrial realm for South Africa (SANBI, 2021);
- National Biodiversity Management: Biodiversity Act (NEM:BA) Alien and Invasive Species Lists (2014);
- NEM:BA: List of Threatened or Protected Species (TOPS) (2007);
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (2014);
- The National Biodiversity Assessment (NBA, 2018): Inland Aquatic Ecosystem Assessment;
- The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM:PAA);
- The National Biodiversity Strategy and Action Plan (NBSAP) (2015-2025);
- The National Spatial Biodiversity Assessment (NSBA) (2018);
- The National Biodiversity Framework (2018) (NBF);
- NBA (2018): Terrestrial Ecosystem Assessment;
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- The National Protected Areas Expansion Strategy (NPAES, 2010);
- South African Protected Areas Database (2021, Q4);
- South African Conservation Areas Data (2021, Q4);
- Council for Geoscience (2013);
- Soil and Terrain (SOTER) Database of South Africa (2008);
- South African National Land Cover (SA NLC, 2020);
- iNaturalist (www.inaturalist.org);
- Plants of Southern Africa (POSA) database – Quarter degree square level;
- The Animal Demography Unit (ADU) – Quarter degree square level;

- Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter *et al*., 2004);
- Red Listing the Amphibians of South Africa (Measey, 2010);
- Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research (Measey, 2014); and
- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Minter *et al*., 2014;
- Red Data Book of Southern African Mammals: A Conservation Assessment (EWT, 2016 & 2020 updates);
- Convention on International Trade in Endangered Species (CITES);
- International Union for Conservation of Nature (IUCN);

Provincial level:

- Provincial Nature Conservation Ordinance (PNCO);
- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019);
- Nelson Mandela Bay Municipality (NMBM) Metropolitan Open Space System (MOSS) (2009);
- NMBM Bioregional Plan (2014); and
- Coega Open Space Management Plan (OSMP, 2014)

2.2 Species of Conservation Concern

A list of 'Species of Conservation Concern' (SCC) was drawn up for the project area based on the known distribution and conservation status of species. According to the Species Environmental Assessment Guideline (SANBI, 2020), the term 'SCC' refers to all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare]. These species may be impacted significantly by the proposed activity. Species that are afforded special protection, notably those that are protected by NEM:BA (Act No. 10 of 2004), PNCO (Act No. 15 of 1974), the List of Protected Tree Species under the National Forest Act (Act No. 84 of 1998), or which occur on the South African Red Data List as SCC, fall within this category.

2.3 Sampling Protocol

Using aerial imagery and available spatial data, the project area was visually examined to identify different uniform vegetation units. These units were surveyed on foot using a random meandering walk method to record data. This method involves walking through identified units and creating a species list. Random meanders were made until no new plant species were recorded (Figure 2.1). This data was used to determine the floristic composition of each unit, based on the dominant set of plant species. The desktop faunal assessment was supported by opportunistic on-site observations. Reptiles and amphibians were searched for using a visual encounter survey method. All birds heard and seen were recorded. Plant species records were uploaded to iNaturalist (www.inaturalist.org).

Figure 2.1: Sampling protocol for the site ecological survey (Google Earth Imagery).

2.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) was established to "*provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before*." The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SANBI Vegetation map informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP project has two main aims:

1. To determine the variation in and units of Southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
2. To compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason, the collective expertise of vegetation scientists from various universities and state departments were harnessed to make this project as comprehensive as possible.

The map and accompanying book describe each vegetation type in detail, along with the most important species, including endemic species and those that are biogeographically important.

In this assessment, the SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site survey and related data gathered on the ground, as well as the NMBM

Metropolitan Open Space System (MOSS, 2009) vegetation map (2011). The latter shows the distribution and extent of fifty-eight (58) vegetation types in the municipality.

Since 2012, the SA VEGMAP has been updated to include forty-seven (47) additional vegetation types, most of which cover the NMBM vegetation types, including those relevant to the project area.

2.5 BIODIVERSITY ASSESSMENT

This section of the assessment aims to describe and partition biodiversity plans and spatial priorities relevant to the project area, particularly the Coega OSMP (2014).

The OSMP (2014) was approved by the Department of Environment, Forestry, and Fisheries (DEFF), formerly the Department of Environmental Affairs (DEA), and was developed as a mandatory requirement in terms of the legislative framework applicable to the Coega IDZ and PoN. The OSMP is based on the findings of the first Strategic Environmental Assessment (SEA) undertaken for the Coega IDZ and is updated occasionally, depending on the changing needs of the Coega IDZ and the availability of revised biodiversity information. The data used to inform the biodiversity assessment in this report is based on the 2014 OSMP – the latest, most up to date version of the Coega OSMP.

The aim of the Coega OSMP is to:

- Identify and map Critical Biodiversity Areas (CBAs) in the Coega IDZ and PoN.
- Provide associated management guidelines which aim to maintain the integrity of these biodiversity features.

The objectives of the OSMP are to:

- Promote preservation of the environment where natural systems and/or specific habitats require it.
- Manage and preserve the cultural resources within the open spaces of Coega IDZ.
- Manage and preserve land for its aesthetic or passive recreational value, for active recreational use, and for its contribution to the quality of life of the concessionaires, tenants, and the public.
- Meet recreation space demands as well as provide natural amenities for the IDZ working population.
- Ensure proper management of open space areas.
- Ensure that linkages to neighbouring open space areas are maintained.
- Use education to promote and accomplish the goals of the environmental vision for Coega IDZ.
- Address the social & cultural needs of workers and families if and where desired.
- Promote educational opportunities within the IDZ and enhance the level of environmental awareness of the workers within the IDZ.
- Improve environmental quality by means of development guidelines to ensure the IDZ can compete with other alternative locations on a global scale.

Key resources consulted for the biodiversity assessment include the following:

- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019);
- NMBM Bioregional Plan (2014);
- Nelson Mandela Bay Municipality (NMBM) Metropolitan Open Space System (MOSS) (2009); and
- Coega Open Space Management Plan (OSMP, 2014)

2.6 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity, and receptor resilience (Table 2.1). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 2.1: Criteria for establishing Site Ecological importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	*The importance of a site for supporting biodiversity features of conservation concern present e.g., populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.7 ECOLOGICAL IMPACT ASSESSMENT

2.7.1 Impact Rating Methodology

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardized rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 and 3 of the NEMA EIA Regulations (2014 and subsequent 2017 & 2021 amendments).

The details of this rating scale are included in Appendix 4.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 OVERVIEW OF THE PHYSICAL CHARACTERISTICS OF THE PROJECT AREA

Vegetation types are influenced by a range of biotic and/or abiotic factors at different spatial and temporal scales, which together influence the distribution, composition, structure, and diversity of plant communities (Rodrigues et al. 2018). Among the abiotic factors influencing vegetation types, climate, topography (landform), geology, and soils are considered four of the major factors determining habitat heterogeneity and species diversity.

3.1.1 Climate

The Eastern Cape Province has a complex climate. There are broad variations in temperature, rainfall and wind patterns, mainly because of movements of air masses, altitude, mountain orientation and the proximity of the Indian Ocean.

The Gqeberha region has a warm temperate climate, and the temperature range is not extreme, although high temperatures can occur during summer. Averages of daily minimum, maximum and mean temperatures for the period 1961 – 1990 are presented in Figure 3.1 with accompanying wind data presented in Figure 3.2. Very high temperatures may be experienced during berg wind conditions when maximum temperatures my exceed 30°C.

Rain occurs throughout the year, brought about by convective summer rain and winter rain associated with the passage of frontal systems. The area receives an annual average rainfall of 624 mm. Monthly average rainfall data for Port Elizabeth Airport for the period 1961 – 1990 is presented in Figure 3.1.

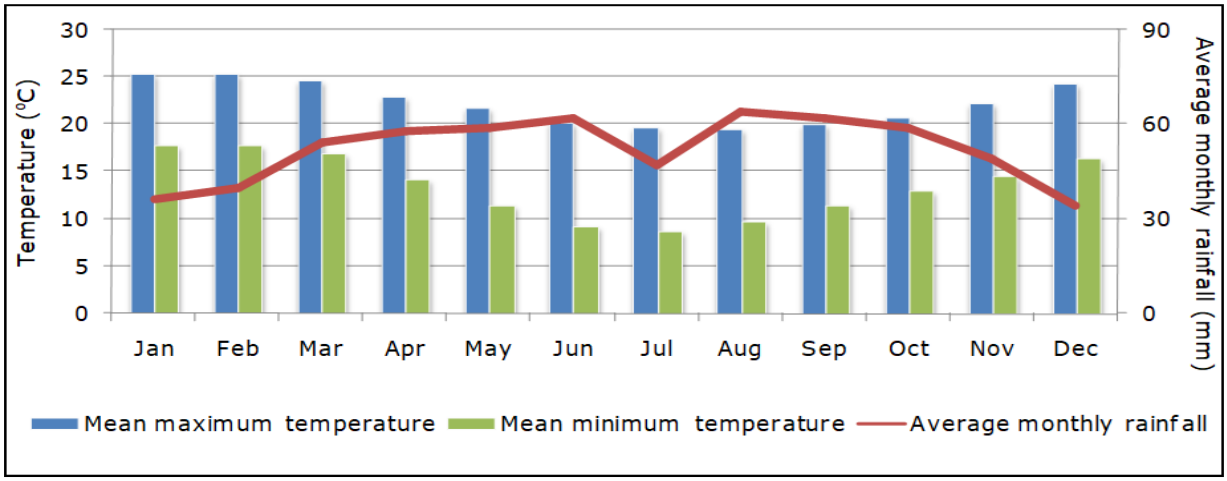


Figure 3-1: Average of daily minimum, maximum and mean temperatures (°C) and average monthly precipitation (mm) at Port Elizabeth Airport for the period 1961 – 1990.

Prevailing wind tends to follow the coastline and the prevailing winds in the Port Elizabeth area are west-southwesterlies and east-northeasterlies. Wind roses are presented for Port Elizabeth Airport, Amsterdamplein (in the Coega SEZ), Motherwell and Saltworks in Figure 3.2.

The airport at Port Elizabeth is the most climatologically representative of the sites and is well exposed to the prevailing synoptic-scale winds, showing a high frequency of winds from the sector west to southwest (more than 50% of all winds). These are also the strongest winds. There is some occurrence of wind from the northeast and east at this site. The annual average wind speed here is 5.7 m/s.

The winds at Amsterdamplein, Motherwell and Saltworks (all in the Coega area) also indicate the occurrence of reasonably strong west to south-westerly synoptic scale winds. At Amsterdamplein, winds are fairly equally spread from the southwest, southeast, northwest, north and north-northeast, with an average wind speed of 4 m/s. At Motherwell, winds are predominantly from the northwest to southwest and east-southeast, with an average wind speed of 3.4 m/s. At Saltworks, winds are mainly from the west-northwest to southwest, north and east, also with an average wind speed of 3.4 m/s.

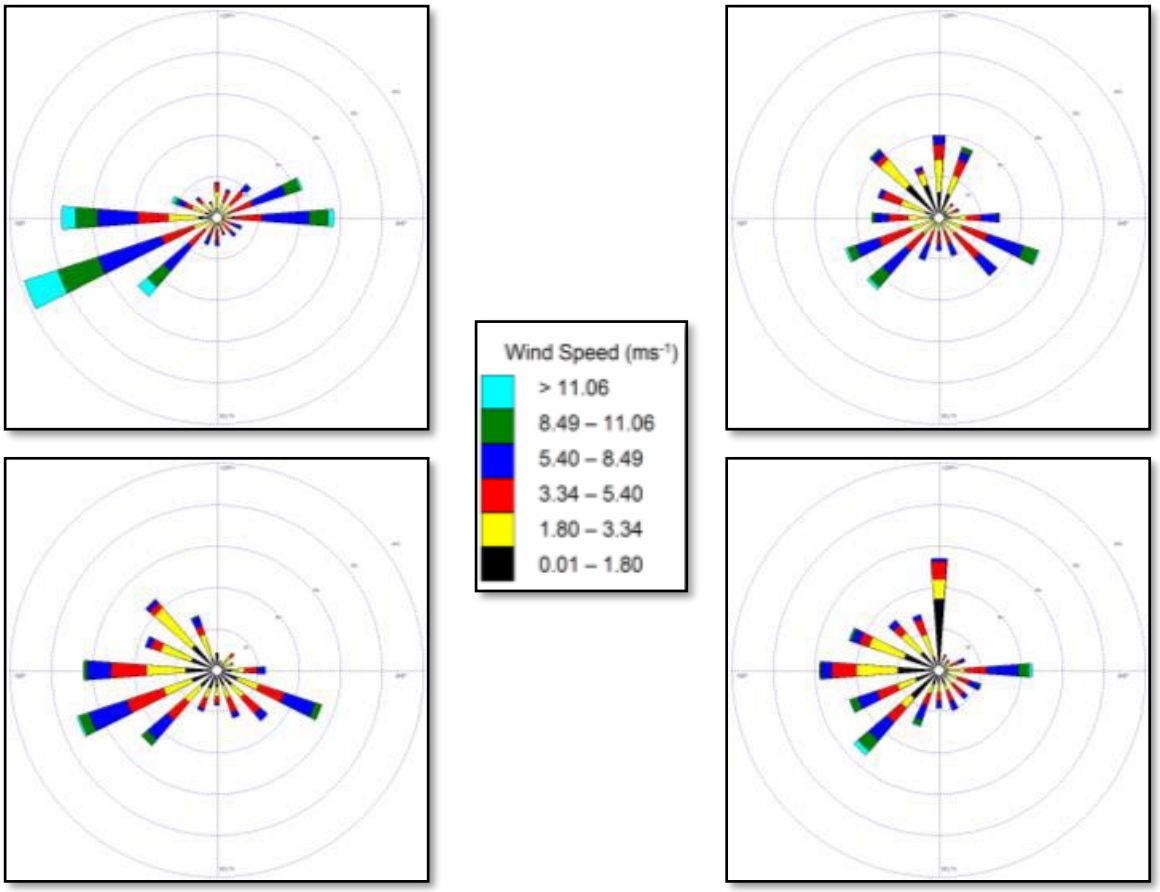


Figure 3.2: Annual wind roses for Chief Dawid Stuurman International Airport, Amsterdamplein, Motherwell and Saltworks for 2009-2011.

3.1.2 Topography

The SEZ is situated on a coastal platform that descends towards the sea in a series of gentle steps parallel to the existing coastline. This platform has been incised by the Coega River, which flows towards the sea across the western and south-western parts of the SEZ. The site in Zone 10 is largely covered by dunes and rises to approximately 60 m above sea level.

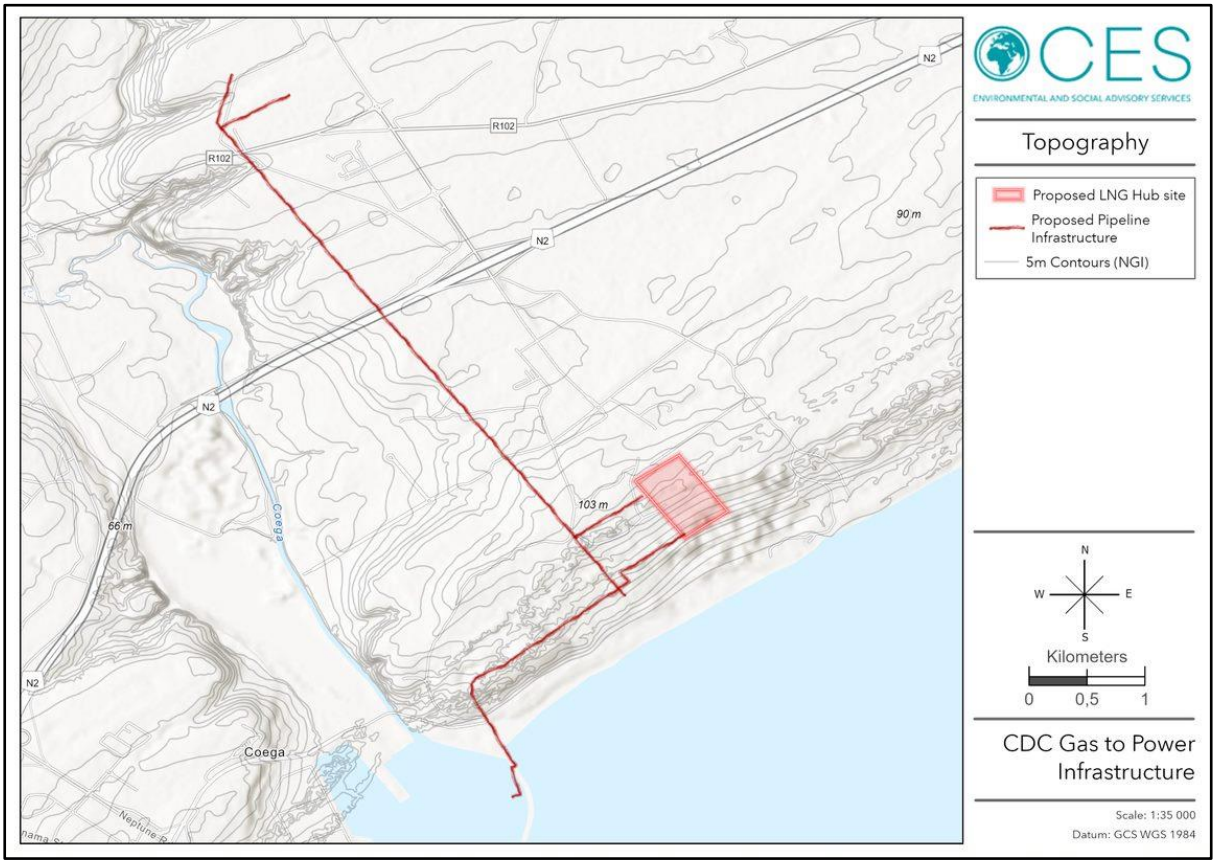


Figure 3.3: Contour Map of the project area.

3.1.3 Geology

The bedrock around Port Elizabeth is characterised by the Peninsula Formation sandstones of the Table Mountain Group. This formation consists of coarse-grained super-mature quartzitic sandstone and is relatively resistant to erosion. It forms the bedrock of Algoa Bay and emerges as outcrops in the bay as the islands of St Croix, Jahleel, Bird and Brenton. The areas between these islands are filled with recent marine deposits (Alexandria Formation), which directly overlie the mudstones of the Kirkwood Formation. The geology of the Coega SEZ is characterised by coastal limestone, overlaid by calcareous sands blown onshore.

The Coega SEZ is underlain by a wide spectrum of sedimentary rocks spanning an age range of some 470 million years. These sediments are assigned to the Palaeoozic Table Mountain Group, the Mesozoic Uitenhage Group, and the Caenozoic Algoa Group. Levels of bedrock exposure within the Coega SEZ are generally very low due to extensive cover by superficial drift (e.g., soil, alluvium, in situ weathering products) as well as by surface calcrete (pedogenic limestone) (Almond, 2010).

The Coega Fault extends west of the Groendal Dam eastwards towards the coast, dipping at between 30° and 60° for about 120 km. It is a normal tensional fault with a vertical southward throw of 500 m to 100 m. A map showing the geology of the area is provided in Figure 3.4.

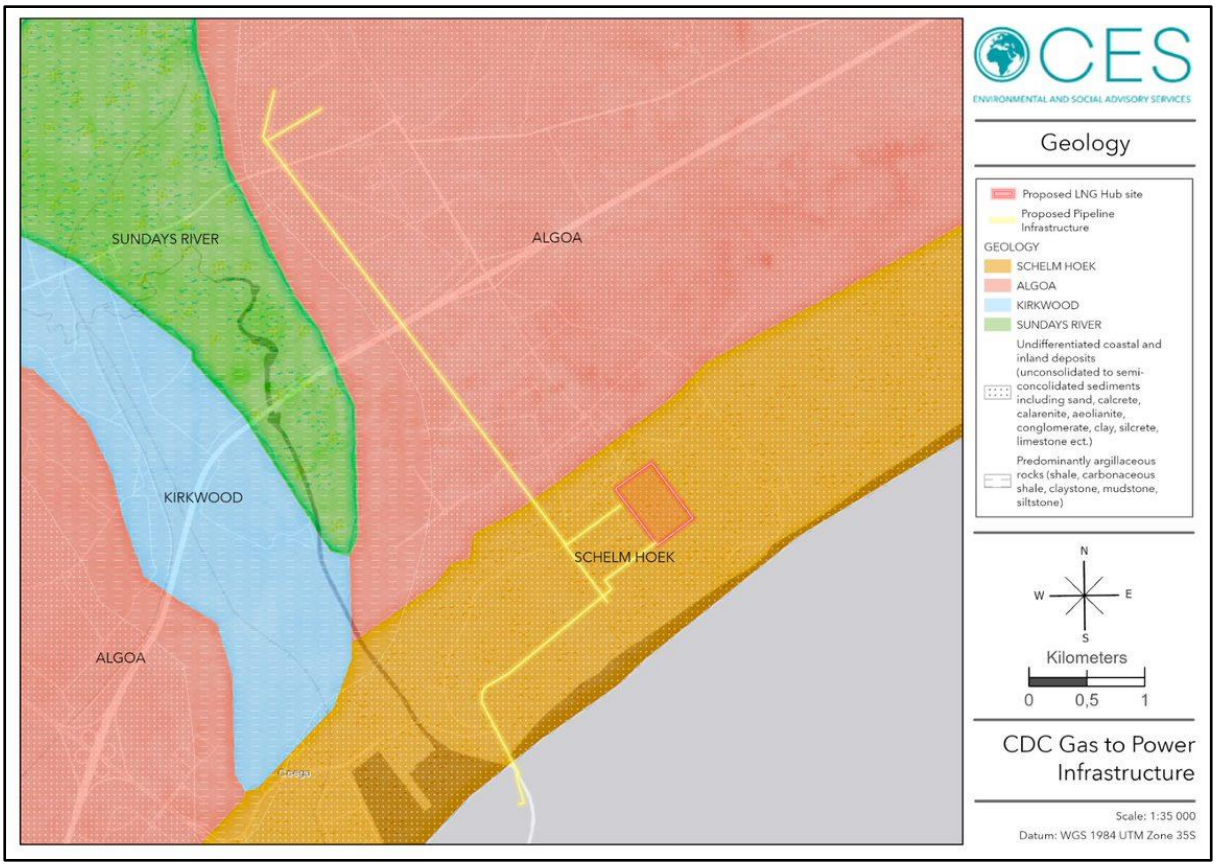


Figure 3.4: Geology Map of the project area.

3.1.4 Soils

The site predominantly occurs on shallow clay, often lime-rich soil on the Bluewater Bay, Alexandria, and Nanaga Formations. The most important land types are Fc and Ae. Lithology of the site is described as undifferentiated coastal deposits (unconsolidated to consolidated sediments including sand, calcrete, conglomerate, clay, limestone, etc.). According to the National Soils Database (SANBI, BGIS) soils on the site are described as shallow soils on hard or weathering rock with a restricted soil depth with limestone generally present within the landscape.

According to the South African Soil Classification System (1991)**,** the LNG Hub, cryogenic pipelines, firewater pipeline and seawater intake pipeline are underlain by soils of ***Soil Class A/B***. These soils have low-moderate runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission. While the majority of the gas pipeline alignment is underlain by soils within ***Soil Class C*** – “infiltration rate is slow or deteriorates rapidly and permeability is restricted”. Group C soils are classified as having a Moderately High runoff potential. A map showing the soils of the area is provided in Figure 3.5.

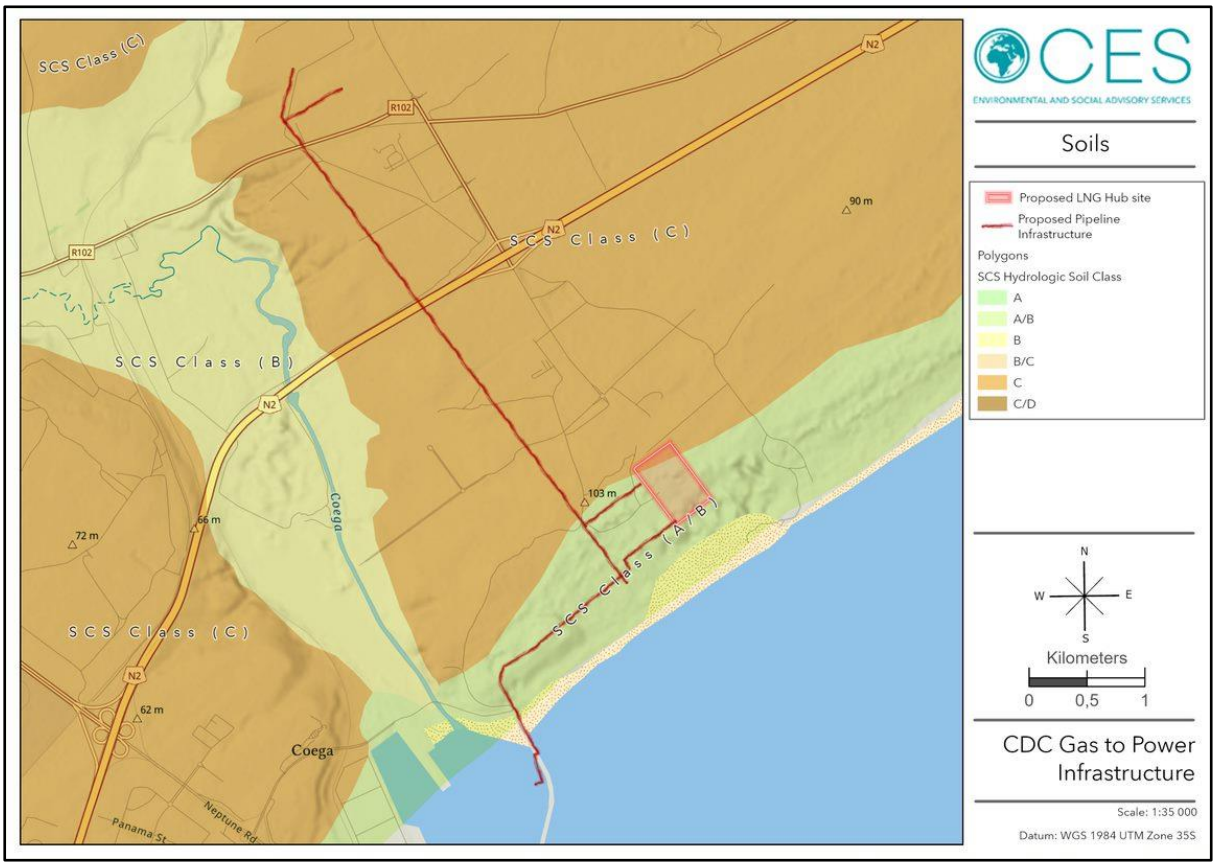


Figure 3.5: Soil Map of the project area.

3.1.5 Surface Water Features

The Coega River, which is a relatively small sand-bed river, is the most significant surface water feature associated with the Coega SEZ and flows to the west of the project site. The Coega catchment area is approximately 45 km long, 15 km wide and has a total area of about 550 km². The Coega River classification, based on preliminary river classification guidelines, ranges from moderately modified (i.e., C classification) in the upper reaches to critically modified (i.e., F classification) in the lower reaches at the Saltworks facility.

The SEZ is underlain by calcrete, sand and gravel deposits that overlie low permeability clays. These clays limit the vertical infiltration of rainwater and induce a horizontal groundwater flow towards the Coega River channel. Consequently, rapid run-off takes place following precipitation. Due to the limited infiltration of rainfall, a significant fluctuation in groundwater level does not occur, although groundwater levels can fluctuate by 3-4 metres with rainfall. Any contaminants originating from the gas infrastructure could therefore infiltrate the sandy subsurface and eventually emanate in seepage in the Coega River and beach environments. A map showing the surface water features of the area is provided in Figure 3.6.

The National Freshwater Ecosystem Priority Areas (NFEPA) identifies several wetlands in the project area (Figure 3.6). Wetlands are protected in terms of the National Water Act and any activity within 500 m of a wetland needs a Water Use Authorisation in terms of Section 21 of the Act. As per the NFEPA spatial dataset, the Coega River/Estuary (port) and one wetland falls within 500 m of the proposed pipeline servitude (Figure 3.6). However, this is an artificial

wetland from the now a defunct Coega Marine Growers facility. Additionally, it should be noted that no natural wetlands were observed during the ecological site survey.

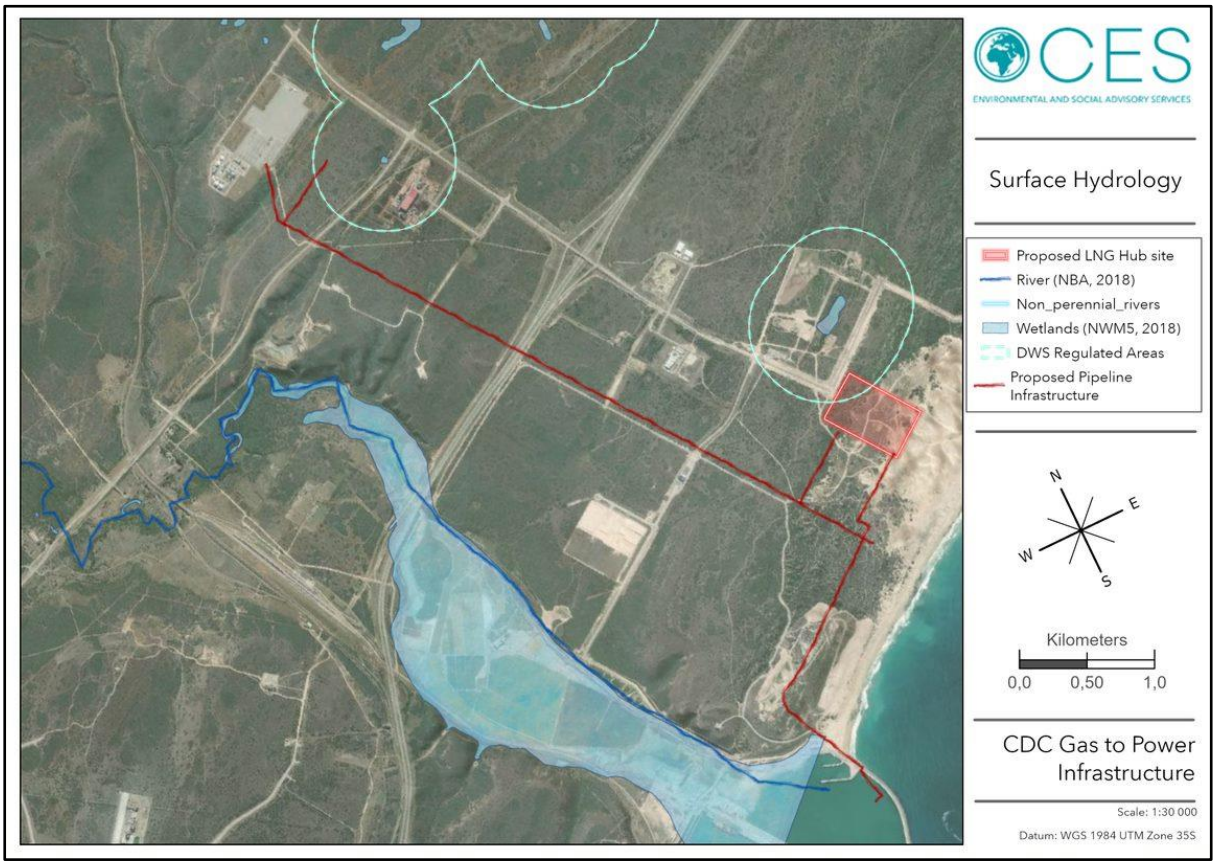


Figure 3.6: Surface Hydrology Map of the project area.

3.1.6 National Land Cover

According to the South African National Land-Cover (2021) spatial dataset, the major land classes that cover the proposed Gas Infrastructure Project are a mixture of 'Grassland', 'Thicket', 'Open Shrubland', and 'Forest'. The first three represent the main indigenous vegetation types in the area, namely *Grassridge Bontveld* and *St Francis Dune Thicket* (both Least Concern). As there are no indigenous forest occurring here, the forest class most likely represents dense stands of *A. cyclops* interspersed within grassland/thicket. Other natural areas include some small wetlands plus the Coega River, and of course the sand dunes, which comprise *Cape Seashore Vegetatio*n. Some major anthropogenic land uses include 'Artificial Surface Water', 'Industry', 'Mine', 'Residential', 'Commercial' and 'Fallow Land'. Besides fallow land, these land uses represent the infrastructure, harbour facilities, industrial & commercially developed land characteristic of the Coega SEZ. A map showing the landcover of the area is provided in Figure 3.7.

The Coega SEZ consists of approximately 11,000 hectares of sector specific zoned land with purpose-built infrastructure and is earmarked for industrial development. Land uses in the Coega SEZ presently consist of infrastructure, harbour facilities, industrial & commercially developed land, and vacant land. Vacant land is destined for a combination of future industrial land and open spaces, as per the CDC's Open Space Management Plan (OSMP). The OSMP

has identified environmental No-Go areas that are to be protected from development. These No-Go areas have varying functions from natural areas, where emphasis is on conservation of areas to protect special vegetation types and preserve ecological processes, to recreational and visually attractive open space areas for relief in the built environment, screening off industrial buildings and softening the development.

The sites identified for the proposed Gas Infrastructure predominantly lie within Zone 8 (port), and Zone 10 of the Coega SEZ (see Figure 1.2). The Coega OSMP (2014) has identified Zone 10 for the mariculture and aquaculture industries, as well as Gas to Power plants.

The proposed location for the Floating Storage Regasification Unit (FSRU) is in the PoN, the area of influence also extends to the marine environment which includes Algoa Bay and the islands of St Croix, Brenton, Jahleel (offshore of the port) and Bird Island, Seal Island and Stag Island (offshore of Woody Cape). Jahleel Island is located less than 1 km from the eastern breakwater of the PoN and falls under the Greater Addo Elephant National Park as do Bird and St. Croix Islands. The Addo Elephant National Park Marine Protected Area (MPA) has recently been gazetted and incorporates approximately 120,000 ha from the eastern breakwater of the port to Cape Padrone to the east, as shown in Figure 4.6.

A small, controlled use MPA exists around each of the islands, to protect important marine wildlife, while the remaining area of the MPA is designated as restricted use.

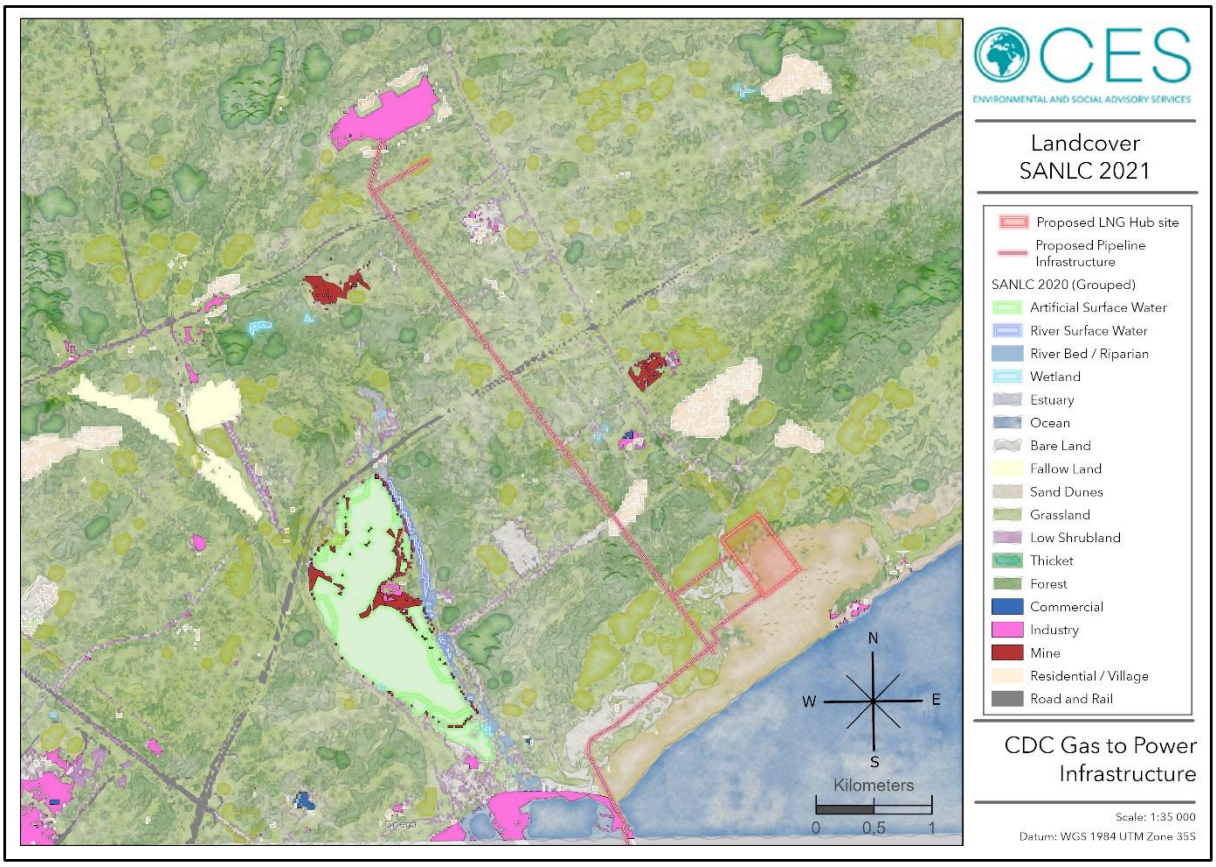


Figure 3.7: South African National Land-Cover Map of the project area.

3.2 Overview of the Biological Characteristics of the Project Area

3.2.1 Biomes of the Project Area

The proposed Gas Infrastructure Project falls within the **Albany Thicket Biome** (Mucina *et al*., 2006-2018). This biome represents a species-rich, evergreen scrubland that covers an estimated 2.2% of South Africa's total land surface area, making it the smallest biome in the country. It occurs throughout most of the Eastern Cape Province, particularly in incised river valleys. The distribution and structure of this biome is influenced by a range of abiotic and biotic factors, including topography, aspect, geology, geomorphology, temperature rainfall and herbivory (CEN, 2019).

Despite its small surface area, this biome is of significant conservation importance due to its high species richness (Carvalho, 2018). The Albany Thicket Biome has the highest number of endemic species of all biomes in the Eastern Cape and forms the core of the Albany Centre of Endemism (CEN, 2019). Unfortunately, this biome has become severely degraded due to clearing for cultivation and its poor ability to regenerate once disturbed (SANBI, 2021).

Approximately 60% of the Albany Thicket biome has been severely degraded, 7% of it has been transformed, and only 11% remains in pristine condition (Mucina *et al*., 2006-2018). Furthermore, approximately 19.8% of the remaining areas are classified as threatened (Skwono & Manyeki, 2021). Land degradation of thicket is due to factors such as cultivation, invasive alien vegetation, overgrazing, and urbanisation is an emergent threat (Loyd *et a*l., 2002). Specifically, in the Coega region, the development of the IDZ has attracted large populations of people to the surrounding areas, placing increasing pressure on Albany Thicket vegetation types such as *Coega Bontveld,* hereafter referred to as Grassridge Bontveld n line with most recent descriptions*,* and *Sundays Thicket*, with the former comprising most of the project area.

3.2.2 Vegetation Types within the Project Area

National Vegetation Map (SA VEGMAP, 2018)

The South African Vegetation Map (SA VEGMAP) of 2018 is an important resource for biodiversity monitoring and conservation management in South Africa. Under the custodianship of the South African National Biodiversity Institute (SANBI) the SA VEGMAP, (2018) was updated to '*provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before*'. The map provides a detailed description of each of South Africa's unique vegetation types along with a comprehensive list of the important species associated with each, including endemic and biologically important species.

According to SANBI's National Vegetation Map (2018), the vegetation types affected by the two (2) components of the proposed project include the following (**Error! Reference source n ot found.**):

- → **Pipeline Infrastructure:** Grassridge Bontveld, Sundays Valley Thicket, St Francis Dune Thicket, and Cape Seashore Vegetation.
- → **LNG Hub Site:** Cape Seashore Vegetation and St Francis Dune Thicket.

The vegetation types listed above are described below.

Grassridge Bontveld

This vegetation type occurs on lime-rich shallow clays on moderately undulating plains and consists of a mosaic of low thicket (2-3m) encompassing bush clumps and grassy dwarf-shrubland. Within the grassy-shrubland there are fynbos, karroid and grassland elements, with *Themeda triandra* often dominant (Grobler *et al*., 2018). It is restricted to shallow stony soils on ridges strongly influenced by an underlying calcareous substrate (Carvalho, 2018). This uncommon soil and geological structure, along with the local climate, has given rise to a unique, semi-arid habitat that includes several rare and endangered localised endemics, and a host of SCC, often in the form of small succulents and geophytes (Grobler *et al*., 2018).

Thicket clumps are generally restricted to doline karsts created through the dissolution of limestone aggregations by rainfall and groundwater creating round depression which accumulate deeper soils allowing the establishment and growth of bigger thicket shrubs (Carvalho, 2018). Succulent patches are generally located on calcrete outcrops with shallow soils and a significant gravel component. Grassy shrubland comprises the remainder of the vegetation unit.

Important endemic and/or threatened species naturally occurring in Grassridge Bontveld Thicket include *Sideroxylon inerme* (LC), *Aloe africana* (LC) *Crassula ericoides* (LC), *Euphorbia globosa* (EN), *Rhombophyllum rhomboideum* (EN), *Berkheya heterophylla* (LC), *Acmadenia obtusata* (LC), *Blepharis procumbens* (LC), *Walhenbergia tenella* (LC), *Euryops ericifolius* (EN), *Achyranthemum recurvatum* (EN), *Zygophyllum divaricatum* (EN), *Ruschia congesta* (LC), *Crassula calcarea* (not assessed) *Trichodiadema intonsum* (LC) and *Ficinia truncata* (LC).

Sundays Valley Thicket

Sundays Valley Thicket occurs primarily in the lower Sundays River Valley region, from near Kleinpoort in the west toward Paterson and Colchester in the east and centred around Uitenhage in the lower Coega and Swartkops River Valleys. It occurs on undulating plains, low foothills, and mountain slopes. Medium-sized to tall (3-5m) dense thicket in which the woody tree and shrub component, and the succulent component, are well developed, with many spinescent species. There are no distinct strata in the vegetation as the lower and upper canopy species intertwine, often with a wide variety of lianas linking the understorey with the canopy. This vegetation type is characterised by a dominant plant species, *Portulacaria afra* (Mucina *et al*., 2006-2018).

St Francis Dune Thicket

St Francis Dune Thicket occurs from about the mouth of the Tsitsikamma River eastwards, up to the Sundays River mouth and is largely restricted to the Schelm Hoek Formation (Grobler *et al*., 2018). Its structure and dynamics are like those of the Gouritz Dune Thicket, but it differs in having a richer assemblage of woody species present in the Thicket vegetation. Some of these are localised endemics (e.g., *Gymnosporia elliptica*) or near endemics (e.g., *Aloe africana*, *Rapanea gilliana*, etc.) that only also occur in the Albany Dune Thicket. This vegetation type also contains many highly localised endemics, several of which are critically endangered or already extinct, such as *Aspalathus cliffortiifolia, Lampranthus algoensis, Pentaschistis longipes, Selago polycephala, Selago zeyheri*, etc., due to urban development and invasion by alien vegetation in this region (Mucina *et al*., 2006-2018).

St Francis Dune Thicket occurs on flat to moderately undulating coastal dunes from Tsitsikama River Mouth to Sundays River Mouth within the Eastern Cape Province. It is characterised by a mosaic of low (1-3m) thicket and asteraceous fynbos. The thicket component is dominated by small bush clumps, consisting of small trees and woody shrubs, which are best developed in fire-protected dune slacks while the fynbos component occurs on dune slopes and crests. The fynbos component becomes less prominent towards the eastern distribution of this vegetation type. The geology underlying this vegetation type is mainly restricted to the Schelm Hoek Formation (Grobler *et al*., 2018).

St Francis Dune Thicket is classified as poorly protected, with a Conservation Target of 19%. Approximately 14.13% of this vegetation type has been transformed due to mining, alien invasion by Acacia cyclops, urban sprawl, and erosion (Grobler *et al*., 2018).

Cape Seashore Vegetation

Cape Seashore Vegetation is characterised by mobile sand and high salt loading and can be described as open, grassy sub-shrub vegetation on beaches, coastal dunes, dune slacks and coastal cliffs often dominated by a single pioneer species. Various plant communities reflect the age of the substrate and natural disturbance regime (moving dunes), distance from the upper tidal mark and the exposure of dune slopes (leeward versus seaward) (Mucina, *et al*., 2006-2018).

NMBM MOSS (2009) Vegetation Types

The NMBM MOSS (2009) recognises the same four (4) vegetation types affected by the proposed development, including *Grassridge Bontveld*, *Sundays Valley Thicket*, *St Francis Dune Thicket*, and *Cape Seashore Vegetation*, as described in the SA VEGMAP (2018).

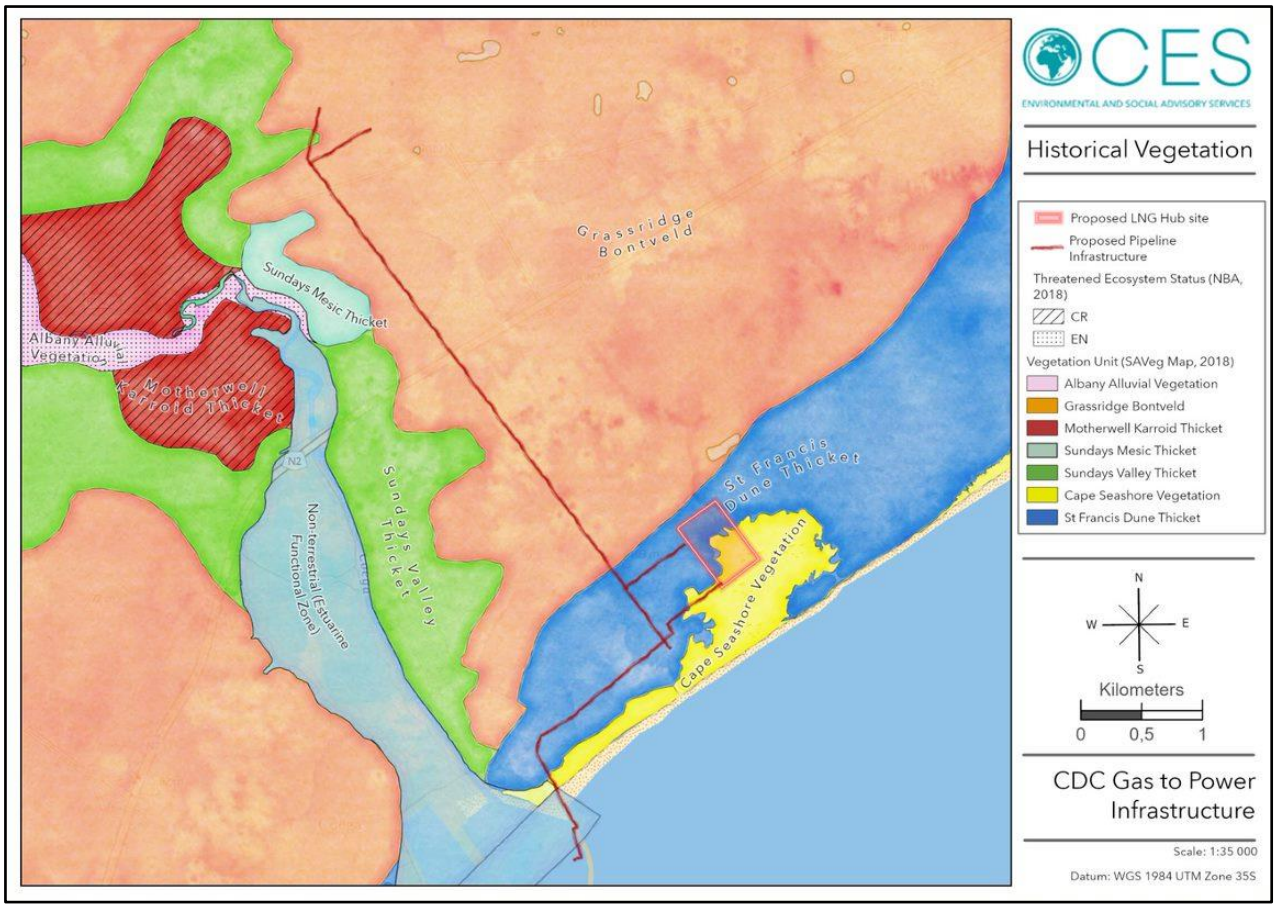


Figure 3.8: National Vegetation Map of the project area.

3.2.3 Botanical Species of Conservation Concern

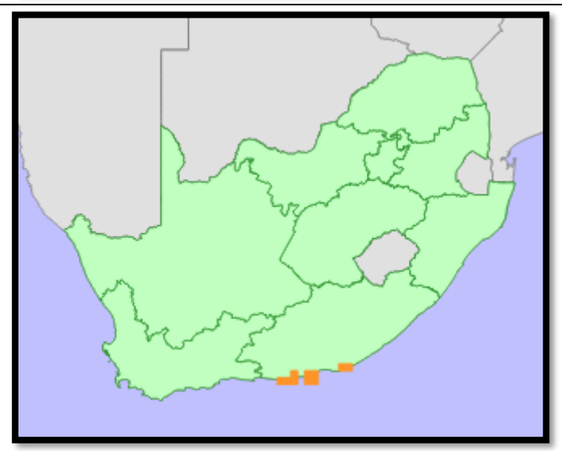
The below species list has been compiled using records obtained from the National Screening Report, the list of species recorded for each vegetation type (Mucina *et al*., 2006-2018), as well as the list of Red Data Plant Species known to occur, or likely to occur, within the Coega IDZ (OSMP, 2021). The likelihood of each species occurring within the development footprint is assessed in Table 3.2 below.

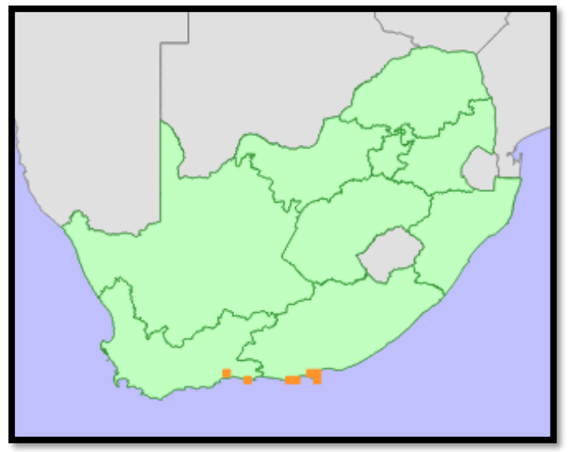
A list of thirty-four (34) threatened SCC was compiled for the site, of which eight (8) were confirmed during the site assessment. The probability of occurrence on site for five (5) of these species was classified as very high, eighteen (18) were classified as medium, and three (3) were classified as low. Additionally, although not regarded as 'threatened', several species recorded during the site survey are protected in terms of the Nature and Environmental Conservation Ordinance 19 of 1974 (refer to Appendix 1).

A full list of species found at the site has been included in Appendix 1.

Table 3.2: List of plant SCC likely to occur within the development footprint(s).

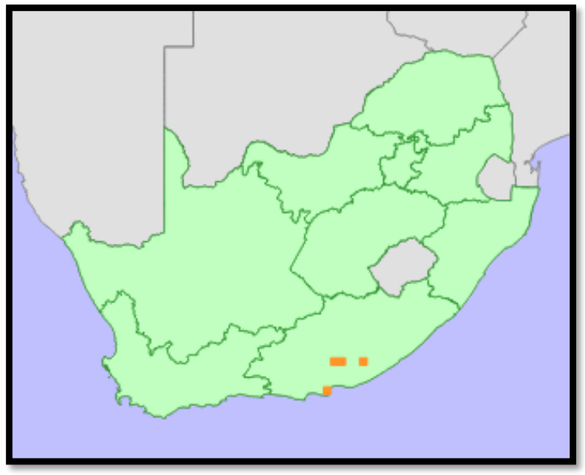
Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Ericaceae	*Erica chloroloma*	VU B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)	-	-	-	South African Endemic. EOO <9225 km², AOO <800 km² between 10 and 15 severely fragmented subpopulations continue to decline due to ongoing habitat loss and fragmentation, as well as competition from unmanaged alien invasive plants. Historical distribution between Wilderness to the Fish River Mouth in Coastal Dune Fynbos Habitats, including Algoa Sandstone Fynbos, St Francis Dune Thicket, Kasouga Dune Thicket, and Goukamma Dune Thicket. Around Gqeberha, most subpopulations are now locally extinct due to habitat loss to urban expansion, although a few subpopulations survive on limestone formations along the N2 to the north-east of Gqeberha. These are threatened by dense, unmanaged alien plant infestations. To the east of Port Elizabeth, the species is known from scattered records, even though large sections of coastal dune habitat is well-protected in this area, particularly in the coastal sections of the Addo Elephant National Park.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, as well as considering the level of historical disturbance within the area (particularly mining and farming activities).	NO
Ericaceae	*Erica zeyheriana*	VU A4bc; B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	-	-	-	Eastern Cape endemic. EOO and AOO < 900 km², with approximately 10 remaining locations. Historical distribution between Oyster Bay and Gqeberha on Remnant lowland grassy fynbos on sand. Major habitats include Algoa Sandstone Fynbos, Kouga Sandstone Fynbos, St Francis Dune Thicket (and other southern cape dune fynbos habitats). Population trend is decreasing. Threats include invasive alien species (direct effects), habitat loss, habitat degradation, pollution (affecting habitat and/or species).		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly mining and farming activities).	NO

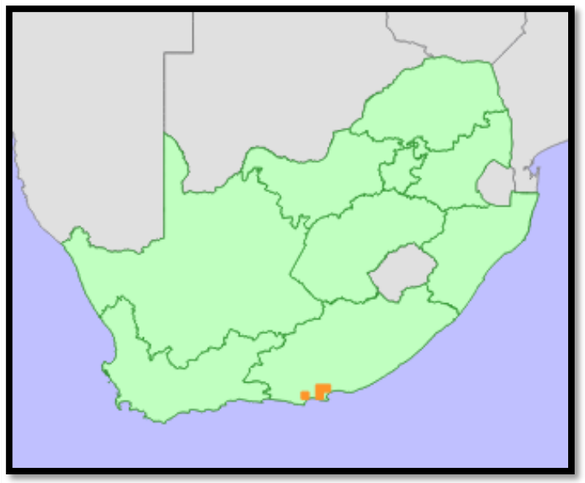
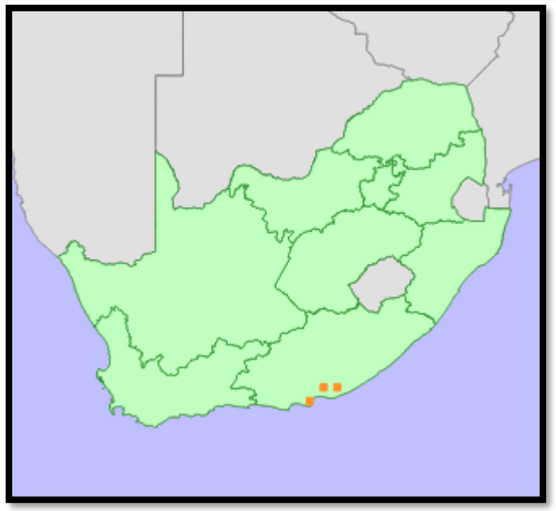
Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Asteraceae	*Acyranthemum sordescens*	VU B1ab(ii,iii,iv,v)	-	-	-	Eastern Cape endemic. Known from less than 10 locations, from a restricted range (EOO 730 km²). Declining due to coastal development and invasive alien plants Historical distribution between Cape St Francis and Alexandria on dunes and sandy slopes. Major habitats include Cape Seashore Vegetation, St Francis Dune Thicket and Kasouga Dune Thicket. Population trend is decreasing. Threats include invasive alien species (direct effects), habitat loss, habitat degradation, harvesting [gathering].		**Confirmed**.	YES
Myrsinaceae	*Rapanea gilliana*	EN B1ab(ii,iii,iv,v)	Schedule 4	-	-	Eastern Cape endemic. Known from 15 small, severely fragmented subpopulations between St Francis Bay and Port Alfred along the coast. The populations continue to decline continue to decline due to coastal development, alien plant invasion, and industrial development at Coega. Historical distribution between St Francis Bay and Port Alfred on coastal sand dunes. Major habitats include Algoa Sandstone Fynbos, St Francis Dune Thicket, Hamburg Dune Thicket, Sundays Mesic Thicket, Kasouga Dune Thicket, Grass Ridge Bontveld.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly mining and farming activities).	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Amarylladaceae	*Brunsvigia littoralis*	EN B2ab(iii,v)	-	-	-	South African endemic. Occurs as small, severely fragmented subpopulations and is restricted to coastal flats. The total area of available habitat is <250 km². Continuing decline due to habitat loss for coastal development. Historical distribution between Great Brak and Gqeberha on coastal sands. Major habitats include Humansdorp Shale Renosterveld, Algoa Sandstone Fynbos, Cape Seashore Vegetation, St Francis Dune Thicket, Sundays Mesic Thicket, and Goukamma Dune Thicket. Coastal development is a moderate to severe ongoing threat throughout this species' range. Invasive alien plant species are a slight to moderate ongoing threat throughout this species range.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly mining and farming activities).	NO
Geraniaceae	*Pelargonium suburbanum subsp. suburbanum*	VU B1ab(ii,iii,v)	-	-	-	Eastern Cape endemic. Known from less than 10 populations. Historical distribution between Humansdorp and Gqeberha between low scrub and sand dunes on lowland flats. Major habitats include Algoa Sandstone Fynbos, Kouga Grassy Sandstone Fynbos, Tsitsikamma Sandstone Fynbos, Southern Cape Dune Fynbos, St Francis Dune Thicket, and Kasouga Dune Thicket.		The probability of occurrence on the site is classified as **Low** based on the known distribution (no recorded populations east of Cape Recife) as well as the level of historical disturbance within the area.	NO
Geraniaceae	*Pelargonium reniforme*	NT A4bd	-	-	-	South African endemic. Fairly widespread from Knysna to Mthatha on dry flats, open grassland and grassy fynbos. Major habitats include Albany Thicket habitats, Grassy Fynbos habitats and Nama Karoo habitats. It is a slow growing geophytic herb (20-year lifespan) undergoing a decline due to medicinal harvesting.	Not Available	**Confirmed**	YES

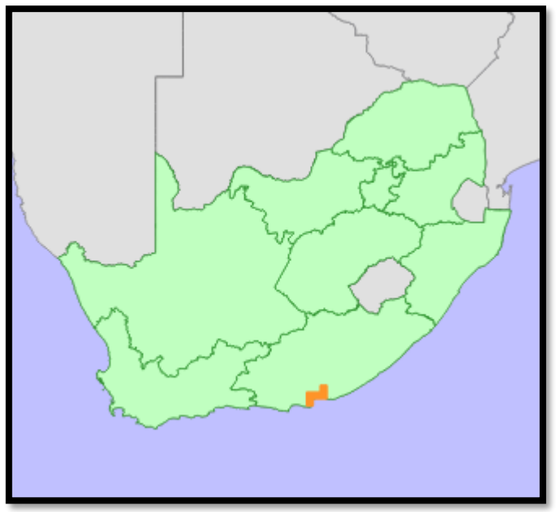
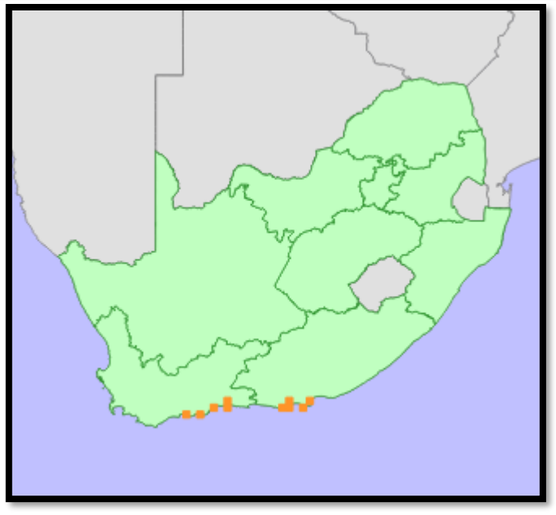
Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Aizoaceae	*Bergeranthus addoensis*	NT B1ab(iii)+2ab(iii)	o-	-	-	An Eastern Cape endemic which has a restricted range, with an extent of occurrence (EOO) of 2018 km², and an area of occupancy (AOO) of <2000 km². This species historically occurs between Gqeberha, Kariega, Kirkwood and Darlington Dam where it is localized to open patches on deep, lime-rich sand and clay loams in mesic and xeric succulent thicket. Main habitats include Motherwell Karroid Thicket, Sundays Valley Thicket, Albany Alluvial Vegetation, and Grass Ridge Bontveld. Habitat at 12 known locations is declining due to urban and industrial expansion of Gqeberha and Kariega, overgrazing and alien plant invasion.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species. Particularly within areas surrounding thicket clumps where deeper clays are present.	NO
Aizoaceae	*Trichodiadema orientale*	DDT	-	-	-	Known recordings of this species within several Albany Thicket habitats including Motherwell Karroid Thicket, Albany Alluvial Vegetation and Sundays Valley thicket extending from Gqeberha north-eastwards towards Ngqushwa (Peddie). Citizen science recordings (iNaturalist) indicate the species to be fairly common within deep, clay loams in open patches and scrubby hillsides.	Not Available	The probability of occurrence on the site is classified as **highly likely** based on the known distribution and habitat requirements of this species. Particularly within areas surrounding thicket clumps where deeper clays are present.	NO
Aizoaceae	*Trichodiadema rupicola*	DDT	-	-	-	The few known recordings of this species are limited to the area surrounding Kariega (Uitenhage). The general lack of recordings or observations, coupled with the revised species description (Niesler & Hartmann, 2013) suggests that the species is rare, and likely has a small, localised habitat and EOO & AOO.	Not Available	Based on the known distribution and habitat requirements of this species, the likelihood of occurrence is considered **Low**, however this may increase along the pipeline alignment north of the N2 (Zone 13).	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Asphodelaceae	*Aloe bowiea*	EN B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)				This species is an Eastern Cape endemic which has a restricted range (EOO 23-548 km², AOO 20-24 km²) and only remains at four to five locations after extensive habitat loss and degradation between Kariega (Uitenhage) and Coega Kop. It continues to decline due to ongoing habitat loss and degradation across its range. It occurs in subtropical transition thicket, in rocky soils on level to southwest-facing slopes. The largest subpopulation of Aloe bowiea has been significantly reduced as a result of urban expansion and industrial development around Uitenhage, Despatch and Coega (Smith and Van Wyk 1990). Recent (2003-2018) field observations by volunteers of the Custodians of Rare and Endangered Wildflowers (CREW) Programme indicate that two of the three remaining subpopulations occur on severely degraded land on the outskirts of urban areas where it is subjected to overgrazing, illegal dumping, and illegal succulent collecting		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species. The paucity of its stony transitional habitats limits the probability of occurrence as well.	NO
Euphorbiaceae	*Euphorbia globosa*	EN B1ab(ii,iii,v)	-	-	-	This species is endemic to Nelson Mandela Bay, and occurs on low, stony hills not further than 20 km from the coast, in full sun between Gqeberha (Port Elizabeth) and Kariega (Uitenhage). Major habitats include: Albany Alluvial Vegetation, Sundays Valley Thicket, and Motherwell Karroid Thicket. Threats include invasive alien species (direct effects), harvesting [gathering], habitat degradation, pollution (affecting habitat and/or species), and habitat loss.		**Confirmed**	**YES**

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Euphorbiaceae	*Euphorbia meloformis*	NT B1ab(i,ii,iii,iv,v)	-	-	-	Endemic to the Eastern Cape, occurring from Gqeberha (Port Elizabeth) to Makhanda (Grahamstown) and eastwards to Ngqushwa (Peddie) in flat areas, including coastal plains and higher lying plateaus, among scattered, broken surface limestone or calcrete in short open grasslands and openings in succulent thicket. EOO 4030 km² and continuing decline due to urban expansion, removal of mature individuals from the wild by succulent collectors, and habitat degradation as a result of overgrazing and poor rangeland management. There are however more than 10 remaining locations, most of which occur in the area to the north of Grahamstown where they are not severely fragmented.		**Confirmed.**	YES
Aizoacae	*Rhombophyllum rhomboideum*	EN B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	-	-	-	This species is endemic to Nelson Mandela Bay occurring in shallow soils on calcareous outcrops in open areas of Grass Ridge Bontveld. EOO 102 km², AOO<102 km², Four locations are known. The habitat of this range-restricted species is rapidly being transformed by urban and industrial development around Gqeberha, St George's strand, Motherwell and Coega. Threats include pollution (affecting habitat and/or species), invasive alien species (direct effects), habitat loss, habitat degradation, harvesting [gathering].		**Confirmed.**	YES

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Asteraceae	*Achyranthemum recurvatum*	EN B1ab(ii,iii,iv,v)	-	-	-	This species is endemic to the Eastern Cape occurring on isolated calcrete pavements between the Gamtoos River and Coega River. EOO 2700 km², eight severely fragmented subpopulations contine to decline due to cement mining, urban expansion and alien plant invasion. The Coega subpopulation will lose habitat to quarrying as part of the development of the Coega Industrial Zone. The group of plants in the Coega area covers an area of at least 200 hectares, they are very common and probably exceed a million individuals.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly mining and farming activities).	NO
Hyacinthaceae	*Albuca annulata*	VU B1ab(iii)+2ab(iii)				A rare and localized species (EOO 1362 km²), estimated to occur at between five and 10 locations and declining due to ongoing habitat loss. Endemic to the area between Gqeberha (Port Elizabeth) and Makhanda (Grahamstown) in sandy soils at low altitude, 0-300 m. Subpopulations are small, and this species is currently known from only a few records, all of them in protected areas (Martínez-Azorín et al. 2011).		The probability of occurrence on the site is classified as **highly likely** based on the known distribution and habitat requirements of this species. Additionally, a population has been recorded directly north of Dedisa Power Station in Zone 13.	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Hyacinthaceae	*Ornithogalum perdurans*	VU D2				Known from a small area close to Grahamstown, from two locations. Potentially threatened by agricultural activities, especially livestock grazing and trampling. An Eastern Cape endemic species which occurs on shallow, nutrient poor silcrete remnants overlying kaolinized bedrock or on shales, siltstones, calcrete or sandstone. This species is potentially threatened by agricultural activities, especially livestock grazing and trampling as well as industrial development within the Coega SEZ.		The probability of occurrence on the site is classified as **highly likely** due to recent observations and collections from the area directly north of Dedisa Power Station (Zone 13)	NO
	Ledebouria coriacea	CR B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)				A few, small populations numbering fewer than 500 plants continues to decline due to ongoing habitat loss. Locally endemic to the area between Coega and Kariega (Uitenhage) in alluvial sand and fine gravel underlain by calcrete. Plants occur in shaded places under *Pteronia* shrubs. The few known populations of this species are threatened by ongoing habitat loss to urban expansion, particularly uncontrolled expansion of informal settlements. It is also losing habitat to ongoing industrial development – the most well-known population occurs in an area earmarked for large-scale economic development (Coega SEZ).		**Confirmed**	**YES**
Iridaceae	*Tritonia dubia*	NT B1ab(ii,iii,iv,v)				Known from 12 locations from a restricted area of 770 km² between Gqeberha (Port Elizabeth), Kariega (Uitenhage) and Jeffrey's Bay. It has lost over 50% of its habitat in the past 150 years to urban expansion and crop cultivation, these threats are ongoing. In addition, alien plant invasion is causing ongoing degradation to remaining habitat. It occurs on clay slopes in renosterveld and conglomerate alluvial habitats. Large parts of this species' habitat is already transformed for crop cultivation and urban expansion, and loss is ongoing. Furthermore, many remaining subpopulations are threatened by competition from alien invasive plants	Not Available	The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat and recent recordings within nearby areas of the same habitat.	NO

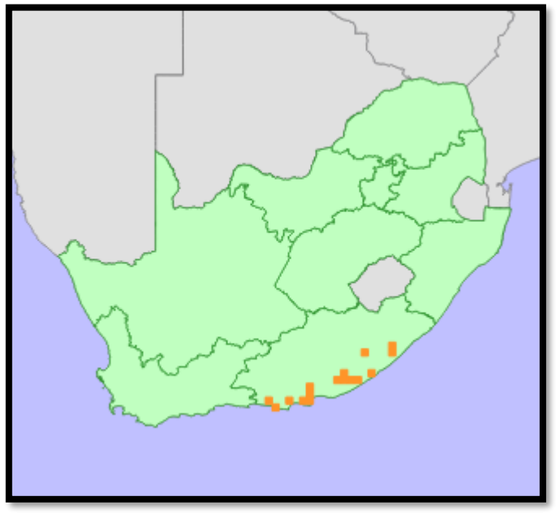
Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Fabaceae	*Argyrolobium barbatum*	VU A2c				There are six known locations, two of which have been lost to urban and industrial development and a large proportion of the subpopulation at another location at Coega Kop declined within the past 100 years. This decline is estimated to represent a 30% reduction in the population over two generations - this is a long-lived resprouter and generation length is suspected to be at least 50 years. It occurs from Paterson and Addo to Gqeberha (Port Elizabeth) in bushveld on limestone outcrops. Threats include pollution (affecting habitat and/or species), invasive alien species (direct effects), habitat loss, and habitat degradation.		The probability of occurrence on the site is classified as **highly likely** based on the known distribution and habitat requirements of this species, particularly the known population recorded directly north of Dedisa Power Station in Zone 13	NO
Crassulaceae	*Crassula calcarea*	Not Assessed				Endemic to Grass Ridge Bontveld, occurring in open patches, near the edges of bush clumps in stony, shallow soils on limestone.	Not Available	**Confirmed**	YES
Fabaceae	*Indigofera tomentosa*	NT B1ab(iii)				This species' distribution range falls within one of South Africa's most popular coastal holiday destinations, where it is threatened by ongoing, rapid habitat loss to development of coastal resorts and holiday houses. At least 50% of this species' lowland coastal habitat is already transformed. It is a South African endemic species and occurs from Mossel Bay to Gqeberha (Port Elizabeth) in coastal fynbos.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly coastal mining activities).	NO

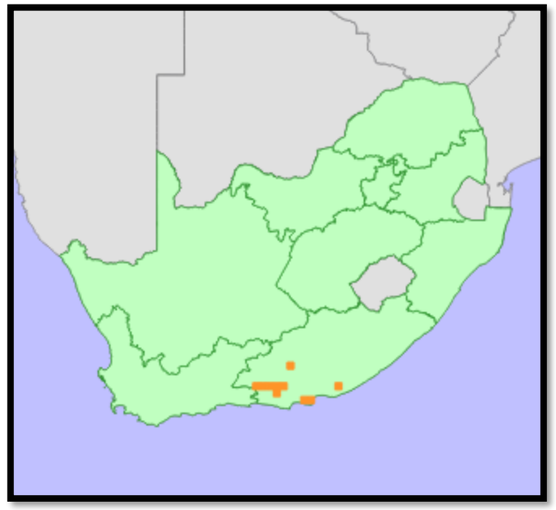
Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Crassulaceae	*Cotyledon adscendens*	EN B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)				EOO and AOO<35 km², three remaining locations continue to decline due to ongoing habitat loss and degradation as a result of coastal development and alien plant invasion. The majority of its remaining habitat has been zoned for housing development and is likely to be lost in the next 10 years. It is a highly localised endemic of Algoa Bay occurring in thicket vegetation behind coastal dunes within 1 km of the sea between Gqeberha (Port Elizabeth) and Sundays River Mouth. Threats include habitat loss, invasive alien species (direct effects), and habitat degradation.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species, considering as well as the level of historical disturbance within the area (particularly coastal mining activities).	NO
Aizoaceae	*Orthopterum coegana*	CR B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)				A highly range-restricted species that only occurs at Coega (EOO <10 km², AOO <1 km²). There were three isolated, severely fragmented subpopulations, but the habitat of one subpopulation was destroyed due to quarrying. Plants from this site were translocated but appear not to have survived the disturbance. The habitat at a second subpopulation is being degraded by dumping, disturbance from vehicles and removal of the quartz rocks on which the plants grow for sale in nurseries and this subpopulation is also declining. A third subpopulation is not threatened.		The probability of occurrence on the site is classified as **Low** based on the known distribution and habitat requirements of this species,	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Aizoaceae	*Delosperma lehmanii*	CR B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)				EOO 70 km², AOO<5 km², six locations are known through herbarium records, but four are now locally extinct due to urban expansion of Gqeberha (Port Elizabeth). Two remaining subpopulations are severely fragmented and continue to decline due to ongoing habitat loss. At one of the remaining locations near Coega >60% of this species' habitat has been lost to mining in the past five years.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO
Scrophulariaceae	*Selago zeyheri*	VU B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)				A rare, range-restricted species (EOO 601 km²), known from fewer than 10 locations and declining due to ongoing habitat loss and degradation. Eastern Cape endemic occurring from Gqeberha (Port Elizabeth) to the Zuurberg (Addo) in Dry stony flats and lower slopes in grassy vegetation. This species is threatened by ongoing habitat loss to urban and industrial expansion around Coega east of Gqeberha (Port Elizabeth). Further inland along the Sundays River it is threatened by habitat loss to agricultural expansion and habitat degradation due to overgrazing.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Scrophulariaceae	*Selago polycephala*	CR (Possibly Extinct)				Confined to the area along the Swartkops River between Uitenhage and Port Elizabeth. Last collected in 1967, all historical sites are either completely transformed or currently under dense stands of invasive alien plants. It is likely that this species is extinct. Selago polycephala is highly likely to be extinct due to the area where it was last collected in 1967 being entirely transformed and degraded due to industrial and urban expansion and alien plant invasion.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO
Asteraceae	*Euryops ericifolius*	EN B1ab(iii)				Known from a highly restricted area between Motherwell and Coega (EOO 119 km²). Declining due to overgrazing of its habitat by cattle. It is also potentially threatened by the expansion of low-cost housing and further infrastructure development at Kouga.		The probability of occurrence on the site is classified as **highly likely** based on the known distribution and habitat requirements of this species, particularly the known population recorded directly north of Dedisa Power Station in Zone 13	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Aizoaceae	*Delosperma hollandii*	CR (Possibly Extinct)				Restricted to open areas in karroid flats, on deeper clays overlying limestone. Threats include urban expansion, industrial developments, grazing and trampling and illegal dumping. Natural vegetation in area where this species is recorded from continues to be lost and degraded due to urban and industrial development, as well as spreading informal settlements. Very little remains intact, and these areas need to be surveyed to relocate this species in the wild		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO
Amaryllidaceae	*Cyrtanthus spiralis*	EN B1ab(i,ii,iii)+2ab(i,ii,iii)				EOO 133 km², AOO < 133 km², four out of eight known locations were lost to urban expansion in the past 50 years, and this species continues to decline. Localised endemic occurring between Gqeberha (Port Elizabeth) and Kariega (Uitenhage) in flats and lower slopes in semi-arid areas.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Zygophyllaceae	*Roepera divaricatum*	EN B1ab(i,ii,iii,iv,v)				EOO 1424 km², historically recorded from six locations, only the subpopulation within the Addo Elephant Park is protected. Between one and three locations are suspected to be extant the remaining locations have been lost to livestock overgrazing, urban expansion of Gqeberha (Port Elizabeth), and the Coega SEZ.		**Confirmed**	**YES**
Asphodelaceae	*Haworthiopsis attenuata*	VU A2cd+4cd				A slow growing, long-lived, range-restricted species (EOO 19 322 km²), that has already declined by at least 30% in the past two generations (generation length 50 years) due to unsustainable exploitation for the traditional medicinal and horticultural trade, as well as habitat loss. With these threats anticipated to continue, it is estimated that the population will decline by at least another 20% within the next 10 years. Endemic to the Eastern Cape, it occurs in karroid scrub, clearings in valley bushveld and steep cliffs from the Gamtoos River eastwards to the Mbashe River. Major habitats include Eastern Valley Bushveld, Sundays Valley Thicket, Motherwell Karroid Thicket, Fish Valley Thicket, Doubledrift Karroid Thicket, Buffels Mesic Thicket, and Albany Valley Thicket. The main threats are: medicinal plant harvesting, habitat destruction, and collection of mature individuals from the wild by succulent collectors		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO

Family	Species	SA Red List	ENCO	Protected Tree	NEMBA	Habitat, distribution and population trend (SANBI Red List)	Distribution Map	Probability of occurrence	Confirmed during site visit (Yes/No)
Celastraceae	*Gymnosporia elliptica*	VU B1ab(ii,iii,iv,v)				Eastern Cape endemic species, EOO 2300 km², known from less than 10 locations. Declining due to agriculture, commercial forestry plantations and urban expansion. Historical range extends from Humansdorp to Gqeberha (Port Elizabeth) on coastal plains. Major habitats include Humansdorp Shale Renosterveld, Algoa Sandstone Fynbos, Kouga Grassy Sandstone Fynbos, and St Francis Dune Thicket.		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species and taking the existing level of disturbance from current mining practices.	NO
Aizoaceae	*Delosperma parviflorum*	DDD				Poorly known species from a small area in the Eastern Cape. It is likely to be threatened by ongoing habitat loss and degradation, but based on currently available data, its risk of extinction cannot be assessed. The type collection is from Uitenhage (Manning and Goldblatt 2012), but the range possibly extends as far as Coega, Willowmore and Grahamstown. Within its general distribution range, there is ongoing loss and degradation of natural vegetation mainly due to urban and industrial expansion around Kariega (Uitenhage), Coega and Gqeberha (Port Elizabeth).		The probability of occurrence on the site is classified as **Medium** based on the known distribution and habitat requirements of this species.	NO

3.2.4 Alien Invasive Species

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats, or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity Ancillary areas. NEM:BA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

The following alien species have been recorded in the broader project area:

Table 3.3: Alien Invasive species recorded within the project area.

Family	Species Name	Common Name	CARA	NEM:BA	Confirmed on site (Yes/No)
Amaranthaceae	*Atriplex semibaccata*	Berry Saltbush	-	-	No
Amaranthaceae	*Atriplex patula*	Common Orache	-	-	No
Amaranthaceae	*Salsola kali*	Saltwort	-	1b	Yes
Asparagaceae	*Furcraea foetida*	Mauritius Hemp	-	-	No
Asteraceae	*Carduus nutans*	Musk Thistle	-	1b	No
Brassicaceae	*Brassica tournefortii*	Saharan Mustard	-	-	Yes
Brassicaceae	*Rapistrum rugosum*	Annual Bastard Cabbage	-	-	No
Cactaceae	*Opuntia ficus-indica*	Prickly Pear	1	1b	Yes
Cactaceae	*Opuntia stricta*	Shell Mound Pricklypear	1	1b	Yes
Cactaceae	*Trichocereus spachianus*	Torch Cactus	-	-	No
Caryophyllaceae	*Spergularia media*	Greater Sea-Spurry	-	-	No
Euphorbiaceae	*Ricinus communis*	Castor Bean	2	2	Yes
Fabaceae	*Acacia cyclops*	Rooikrans	2	1b	Yes
Fabaceae	*Acacia saligna*	Port Jackson Willow	2	1b	Yes
Fabaceae	*Melilotus indicus*	Small Melilot	-	-	Yes
Fabaceae	*Melilotus albus*	White Sweetclover	-	-	No
Fabaceae	*Medicago polymorpha*	Bur Clover	-	-	No

Family	Species Name	Common Name	CARA	NEM:BA	Confirmed on site (Yes/No)
Juncaceae	*Juncus acutus*	Spiny Rush	-	-	No
Onagraceae	*Oenothera drummondii*	Beach Evening-Primrose	-	-	Yes
POACEAE	*Thinopyrum distichum*	Coastal Wheatgrass	-	-	Yes
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	-	-	Yes
Solanaceae	*Cestrum laevigatum*	Inkberry	1	1b	No

NEM:BA Category 1b: Invasive Species

Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- Growing or in any other way propagating any specimen;
- Conveying, moving or otherwise translocating any specimen;
- Spreading or allowing the spread of any specimen; and
- Releasing any specimen.

NEM:BA Category 2: Invasive Species

Category 2 invasive species are regulated by area. A permit is required to import, posses, grow breed, move, sell, buy, or accept as a gift any species listed under Category 2.

CARA Category 1: Declared Weeds

Plants classified as Category 1 in CARA are Declared Weeds. These are prohibited plants, which must be controlled or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

CARA Category 2: Invader Plants

Plants classified as Category 2 are declared Invader Plants and may only be grown under controlled conditions if a permit is acquired. No trade in these plants is permitted.

* All alien and invasive plant species must be controlled during all phases of development according to the recommendations outlined in the Environmental Management Programme (EMPr).

3.2.5 Description of Fauna and Faunal SCC

The Albany Thicket Biome, and particularly the *Grassridge Bontveld* habitat, hosts a variety of endemic, rare and threatened botanical and faunal species. This section provides a brief description of the fauna, specifically herpetofauna and mammals, excluding bats, which may occur within the project area. Avifauna and the associated impact, particularly on the Damara Tern which has a breeding colony next to the proposed hub site, are not assessed in this

report, as a separate Avifaunal Impact Assessment has been conducted for the proposed development (see Knoppersen & Martin, 2021). Accordingly, the Damara Tern breeding habitat in the project area has been assigned in the CBA – IDZ and is regarded as a no-go area.

The following databases were consulted to determine which species may occur within the study area based on the known distribution of species:

- The DFFE screening report for the site;
- ADU's FrogMAP (http://vmus.adu.org.za);
- ADU's ReptileMAP (https://vmus.adu.org.za);
- ADU's MammalMAP (https://vmus.adu.org.za);
- iNaturalist (https://www.inaturalist.org/places/south-africa); and
- IUCN Red List (https://www.iucnredlist.org/)
- Draft Ecological Impact Assessment Report for the proposed Marine Servitude Project, Zone 10, Coega SEZ, Eastern Cape Province, South Africa (CES, 2020).
- Scherman Colloty & Associates (SC&A). 2016. Coega Industrial Development Zone Aquaculture Development Zone, Eastern Cape – Ecological (Terrestrial and Aquatic) Specialist Report.

The following sources were used to assess the Conservation/Threat Status of each species:

- Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter et al. 2004);
- Red Listing the Amphibians of South Africa (Measey 2010);
- Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research (Measey 2014);
- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Minter et al. 2014);
- Red Data Book of Southern African Mammals: A Conservation Assessment (EWT 2016 & 2020);
- Provincial Nature Conservation Ordinance NO. 19 of 1974;
- NEM:BA 10 of 2004;
- TOPS (2007); and
- CITES Appendix I and II.

Herpetofauna

Approximately seventy-nine (79) herpetofauna species may occur within the project area (ADU 2011, SC&A 2016). This includes a total of seventeen (17) amphibian and sixty-two (62) reptile species. Of the amphibian species identified in this report, none are listed as Regionally Threatened nor Near Threatened. In contrast, six (6) of the reptile species are Threatened, while one (1) species is Data Deficient. Of the threatened species, four (4) species are marine (i.e., turtles). The breeding grounds of turtles in South Africa are located outside the province and any records in EC are most likely strandings of juveniles or sightings of migrating adults. Nevertheless, all turtles are protected under the Marine Living Resources Act (1999), CITES,

PNCO, and the Convention for Migratory Species (CMC) to which South Africa is a signatory. Please see Table 3.4 below for a list of terrestrial herpetofauna SCC.

In addition, eight (8) amphibian species are Endemic and one (1) is Near Endemic, while twenty-two (22) reptile species are Endemic and eight (8) are Near Endemic. While most of the herpetofauna identified in this report are classified as Least Concern, all amphibian, turtle, and lizard species, as well as fourteen (14) snake species, are protected by the PNCO (Act No. 15 of 1974). Table 3.4 provides a summary, but please refer to Appendix 2 for all the amphibian and reptile species which may occur within the development footprint, their level of endemism, as well as the relevant provincial legislation and CITES Listing pertaining to these species – Threatened/Near Threatened/Data Deficient species are highlighted in red.

Table 3.4: Herpetofauna SCC which may occur within the development footprint.

NAME	CONSERVATION STATUS	HABITAT (SANBI 2004 and 2014)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Sensitive Species 18	Critically Endangered	-	High
Bradypodion taeniabronchum (Elandsberg Dwarf Chameleon)	Endangered	Uses low bushes and restios, primarily on mountain slopes (Tolley & Burger, 2007) but has also been recorded from wetland vegetation (Burger, personal observations).	Unlikely
Tetradactylus fitzsimonsi (FitzSimons' Long-tailed Seps)	Vulnerable	Occurs in fynbos and grassy vegetation.	Unlikely

Mammals

According to Stuarts' Field Guide to Mammals of Southern Africa (2015), fifty-five (55) mammal species have a known distribution within the project area. All but three (3) of these species are classified as Least Concern. Both *Aonyx capensis* (African Clawless Otter) and *Otomys irroratus* (Vlei Rat) are classified as Near Threatened, while *Chlorotalpa duthieae* (Duthie's Golden Mole) and *Sensitive Species 5* is classified as Vulnerable. Table 3.5 lists the mammal SCC identified as Threatened or Near Threatened; a more comprehensive mammal list for the study site can be found in Appendix 3 (SCC highlighted in red). Fourteen (14) species are protected by PNCO (Act No. 15 1974) and three (3) by NEM:BA (2007). In addition, ten (10) species are Endemic and one (1) is Near Endemic (please refer to Appendix 3 for species names).

Table 3.5: Mammal SCC which may occur within the development footprint.

NAME	CONSERVATION STATUS	HABITAT (SANBI 2004 and 2014)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Chlorotalpa duthieae (Duthie's Golden Mole)	Vulnerable	Known from only nine locations in southern Cape Afrotemperate Forests, clustered in two subpopulations: Port Elizabeth (three locations) and the indigenous coastal forest belt from Wilderness to Tsitsikamma (six locations). This species is restricted to alluvial sands and sandy loams on coastal platforms and scarp forest patches in the Southern Cape Afromontane forests, as well as the Fynbos and moist Savannah biomes. They are predominantly nocturnal and prefer cultivated areas and gardens where they dig shallow subsurface tunnels whilst foraging (Bronner and Benet, 2016). This species is likely to occur in dune woodland habitats (i.e., the St Francis Dune Thicket vegetation of the project area) (SC&A, 2016).	High
Sensitive Species 5	-	Sensitive Species 5 is experiencing a decline in population numbers due to habitat loss because of development along the coastal belt, illegal sand mining and indigenous timber extraction (Hart & Kingdon 2013). However, they predominantly occur in scarp and coastal forests, thickets, or dense coastal bush. According to SC&A (2016), this species is likely to occur within the project area, albeit in low numbers.	Medium

NAME	CONSERVATION STATUS	HABITAT (SANBI 2004 and 2014)	PROBABILITY OF OCCURRENCE (High, Medium, Low, Confirmed)
Aonyx capensis (African Clawless Otter)	Near Threatened	Predominantly aquatic and therefore almost always found close to permanent water bodies. They can occur in both freshwater and marine environments. Freshwater is an important habitat requirement as they rely on it for drinking and cleaning their fur. While rocky shores and thick vegetation stands along rivers and estuaries are preferential habitats, otters can be found in a diverse variety of habitats, from impoundments, estuaries, and mangroves to desert conditions of the upper Doring River in the Western Cape (Okes *et al*., 2016). Based on habitat requirements, previous records, and the documented distribution of this species (Okes *et al*., 2016) it is likely that this species could occur on site.	High
Otomys irroratus (Vlei Rat)	Near Threatened	This species is known from grassland and marshes in fynbos and thicket habitats. It generally occurs in areas of dense vegetation cover and higher moisture content. Vlei rats are exclusively herbivorous, with a diet mainly comprised of grasses (Monadjem *et al*., 2015). This species is likely to occur in grassy areas, such as Bontveld vegetation, of the project area).	Medium

Birds

Martin (2007-2019) has compiled a comprehensive annotated list of all the bird species recorded in the Coega SEZ. According to this list, approximately one-hundred-and-fifty (153) bird species are likely to occur within the project area, ten (10) of which are considered SCC. Seven (7) of the species recorded are associated with the marine and coastal environments. Of the thirty (30) endemic/near-endemic species recorded, twenty-three (23) occur within the thicket and bontveld vegetation types of the project area (Table 3.). Please refer to Appendix 4 for the bird species list compiled by Martin (2019).

Table 3.6. Avifauna SCC which may occur within the project area.

Scientific Name	Common Name	SA Red Data Book (2015)	IUCN Global	TOPS - Terrestrial (No. 27306, 2005)	TOPS - Marine (GN 475, 2017)	PNCO	CITES (28 August 2020)	Recorded SABAP 2 (PENTAD 3345_2540)
Diomedea dabbenena	Tristan Albatross	Critically Endangered	Critically Endangered			Schedule 2		
Gypaetus barbatus	Bearded Vulture	Critically Endangered	Near-threatened	Endangered		Schedule 1	CITES II	
Oceanodroma leucorhoa	Leach's Storm-Petrel	Critically Endangered	Vulnerable		Critically Endangered	Schedule 2		
Sterna balaenarum	Damara Tern	Critically Endangered	Vulnerable		Critically Endangered	Schedule 2		
Belearica regulorum	Grey Crowned Crane	Endangered	Endangered	Endangered		Schedule 2		
Circus maurus	Black Harrier	Endangered	Endangered			Schedule 2		X
Gyps coprotheres	Cape Griffon	Endangered	Endangered	Endangered		Schedule 2	CITES II	
Phalacrocorax capensis	Cape Cormorant	Endangered	Endangered		Endangered	Schedule 2		X
Phoebetria fusca	Sooty Albatross	Endangered	Endangered		Endangered	Schedule 2		
Polemaetus bellicosus	Martial Eagle	Endangered	Endangered	Vulnerable		Schedule 2	CITES II	
Spheniscus demersus	African Penguin	Endangered	Endangered		Endangered	Schedule 1	CITES II	X
Thalassarche carteri	Indian Yellow-nosed Albatross	Endangered	Endangered		Endangered	Schedule 2		
Thalassarche chlororhynchos	Atlantic Yellow-nosed Albatross	Endangered	Endangered			Schedule 2		
Torgos tracheliotos	Lappet-faced Vulture	Endangered	Endangered	Endangered		Schedule 2	CITES II	
Turnix hottentottus	Hottentot Buttonquail	Endangered	Endangered			Schedule 2		
Neophron percnopterus	Egyptian Vulture	Extinct	Endangered	Critically Endangered		Schedule 2		
Diomedea amsterdamensis	Amsterdam Albatross		Endangered			Schedule 2		
Thalassarche salvini	Salvin's Albatross		Vulnerable			Schedule 2		
Diomedea exulans	Wandering Albatross	Vulnerable	Vulnerable		Vulnerable	Schedule 2		
Morus capensis	Cape Gannet	Vulnerable	Endangered		Vulnerable	Schedule 2		
Neotis denhami	Denham's Bustard	Vulnerable	Near-threatened			Schedule 2		

Scientific Name	Common Name	SA Red Data Book (2015)	IUCN Global	TOPS - Terrestrial (No. 27306, 2005)	TOPS - Marine (GN 475, 2017)	PNCO	CITES (28 August 2020)	Recorded SABAP 2 (PENTAD 3345_2540)
Procellaria aequinoctialis	White-chinned Petrel	Vulnerable	Vulnerable			Schedule 2		
Procellaria cinerea	Grey Petrel	Vulnerable	Near-threatened			Schedule 2		
Sagittarius serpentarius	Secretarybird	Vulnerable	Endangered			Schedule 2		X
Stephanoaetus coronatus	Crowned Eagle	Vulnerable	Near-threatened			Schedule 2	CITES II	
Anthropoides paradiseus	Blue Crane	Near-threatened	Vulnerable	Endangered		Schedule 2		X
Oxyura maccoa	Maccoa Duck	Near-threatened	Vulnerable			Schedule 2		
Ardenna carneipes	Flesh-footed Shearwater		Near-threatened			Schedule 2		
Ardenna grisea	Sooty Shearwater		Near-threatened			Schedule 2		
Buteo trizonatus	Forest Buzzard		Near-threatened			Schedule 2		
Calidris canutus	Red Knot		Near-threatened			Schedule 2		
Calidris ferruginea	Curlew Sandpiper		Near-threatened			Schedule 2		X
Campethera notata	Knysna Woodpecker	Near-threatened	Near-threatened			Schedule 2		X
Chaetops frenatus	Cape Rockjumper	Near-threatened	Near-threatened			Schedule 1		
Charadrius pallidus	Chestnut-banded Plover	Near-threatened	Near-threatened			Schedule 2		X
Circus macrourus	Pallid Harrier	Near-threatened	Near-threatened			Schedule 2		
Crithagra leucoptera	Protea Canary	Near-threatened	Near-threatened			Schedule 2		
Limosa lapponica	Bar-tailed Godwit		Near-threatened			Schedule 2		
Monticola explorator	Sentinel Rock-Thrush		Near-threatened			Schedule 2		
Numenius arquata	Eurasian Curlew	Near-threatened	Near-threatened			Schedule 2		
Phoeniconaias minor	Lesser Flamingo	Near-threatened	Near-threatened			Schedule 2	CITES II	X
Thalassarche cauta	Shy Albatross	Near-threatened	Near-threatened			Schedule 2		
Thalassarche steadi	White-capped Albatross		Near-threatened			Schedule 2		
Geocolaptes olivaceus	Ground Woodpecker	Least concern	Near-threatened			Schedule 2		

3.3 Details on the Receiving Environment for each Component of the Proposed Project

3.3.1 Botanical and Faunal

Botanical

While National level vegetation maps have described broad vegetation types, local conditions, and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition. As such, site surveys are critical for the verification of desktop findings and establishing the baseline ecological conditions of a site.

The site visit conducted confirmed that the proposed Gas Infrastructure traverses three main vegetation types, including *Cape Seashore Vegetation*, *St Francis Dune Thicket*, and *Grassridge Bontveld* whilst a small portion of the Gas Pipeline in the north-west of the project area occurs within *Sundays Mesic Thicket* and *Sundays Valley Thicket*.

The south-western portion of the proposed infrastructure occurs within the coastal protection zone (defined as any urban land unit that is completely or partly within 100 m of the High-Water Mark (HWM)). Cape Seashore vegetation occurs along the beach and within the dunes of the project area (Plate 3.1 and Plate 3.2). The foredune was largely dominated by four species including *Scaevola plumieri*, *Carpobrotus deliciosus*, *Tetragonia decumbens*, and *Osteospermum moniliferum*. Scattered herbs and shrubs, including *Gazania rigens*, *Dasispermum suffruticosum*, *Helichrysum tinctum*, *Psoralea repens* (NT), *Chironia baccifera* were also observed and increased in cover and abundance with an increase in distance from the HWM. Large homogenous stands of *Acacia cyclops* are present along the foredune and rear dune, stabilising the transverse dunes and outcompeting indigenous plant species.

Plate 3.1: Cape Seashore Vegetation dominated by *Scaevola plumieri* within the project area.

Plate 3.2: Cape seashore vegetation dominated by *Scaevola plumieri* and *Psoralea repens* with pockets of *Acacia cyclops* along the rear dune within the project area.

A series of mobile transverse dunes occur to the east of the project area. These mobile transverse dunes are moving in an east to south-westerly direction and are characterised by pronounced steep faces, dune slacks and rocky calcrete platforms (Plate 3.3). The rocky flats and dune slacks within the broader project area provide specialised habitat for species such as *Metalasia muricata*, *Passerina rigida*, *Lessertia frutescens*, and *Gomphocarpus physocarpus*, amongst others, while the mobile transverse dunes are vegetated by typical pioneer species that can withstand inundation by sand such as *Tetragonia decumbens*, *Gazania rigens*, *Arctotheca populifolia*, and *Osteospermum moniliferum*.

Plate 3.3: Calcrete platform dominated by Cape Seashore Vegetation within the broader project area.

With an increase in distance from the coast, the Cape Seashore Vegetation transitions into St Francis Dune Thicket (Plate 3.4). The St Francis Dune Thicket occurs as a narrow band between Cape Seashore Vegetation and Grassridge Bontveld. It is characterised by a mosaic of low asteraceous fynbos, and low (1-3 m) thicket bush clumps dominated by small woody trees and shrubs such as *Searsia spp*., *Morella cordifolia*, *Sideroxylon inerme*, *Brachylaena discolour*, *Euclea undulata*, *Tarchonanthus littoralis*, *Brachylaena discolor*, *Olea exasperata*, *Azima tetracantha*, *Passerina rigida*, *Metalasia muricata*, *Osteospermum moniliferum*, *Asparagus spp*., *Helichrysum spp*., *Cussonia thyrsiflora*, *Dicerothamnus rhinocerotis* and *Colpoon compressum*. Vegetation cover is denser in dune slacks. *Acacia cyclops* is abundant within this vegetation type.

Plate 3.4: St Francis Dune Thicket dominated by *Searsia crenata*, *Olea exasperata*, and *Osteospermum moniliferum* within the broader project area.

The majority of the proposed Gas Infrastructure is located within Grassridge Bontveld (Plate 3.5). This is the most extensive vegetation type within Zone 10, 7 and 6 of the SEZ. The Grassridge Bontveld is characterised by a mosaic of thicket bush clumps in a matrix of grassy dwarf-shrubland. The thicket bush clumps are dominated by *Searsia spp*., *Carissa bispinosa*, *Osteospermum moniliferum*, *Asparagus spp*., *Lauridia tetragona*, *Maytenus procumbens*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Euclea undulata*, *Olea exasperata*, *Scutia myrtina*, *Azima tetracantha*, *Sideroxylon inerme*, amongst others. The grassy dwarf-shrubland matrix provides habitat for several protected and threatened plant species including *Crassula calcarea*, *Euphorbia meloformis* (NT), *Euphorbia globosa* (EN), *Ledebouria coriacea* (CR), *Roepera divaricata* (EN), *Rhombophyllum rhomboideum* (EN). Other typical species asteraceous species include *Disparago tortilis*, *Eriocephalus africanus*, *Dimorphotheca cuneata*, *Euryops algoensis*, *Chrysocoma ciliate*, *Helichrysum spp*., *Pteronia incana*, *Crassula ericoides*, *Freesia corymbosa*, *Hermannia spp*., *Acmadenia obtusata*, *Jamesbrittenia microphylla*, *Selago corymbose* while common graminoids include *Digitaria argyrograpta*, *Ehrharta calycina*, *Themeda triandra*, *Cynodon incompletus*, *Eustachys paspaloides*, *Panicum maximum, Eragrostis curvula*, *Helictotrichon capense*, *Ficinia truncata* and *Ficinia lateralis*.

Plate 3.5: Grassridge Bontveld Vegetation within the project area.

Approximately 120 m of the proposed Gas Pipeline traverse Sundays Mesic Thicket just south of Daniel Pienaar Street in Zone 6 of the Coega SEZ while approximately 160 m of the proposed Gas Pipeline traverses Sundays Valley Thicket just south of the substation in Zone 13. The Sundays Mesic Thicket and Sundays Valley Thicket share a few species, however fewer spinescent and succulent species occur in Sundays Mesic Thicket in comparison to Sundays Valley Thicket and the tree component is generally better developed.

The Sundays Mesic Thicket was dense and dominated by *Euclea racemosa*, *Euphorbia caerulescens*, *E. clava*, *E. mauritanica*, *Schotia afra*, *Azima tetracantha*, *Aloe pluridens*, *Scutia myrtina*, *Sideroxylon inerme*, *Hippobromus pauciflorus*, *Pterocelastrus tricuspidatus*, *Brachylaena ilicifolia*, *Maerua cafra* and *Searsia lucida*, amongst others, with *Euphorbia triangularis* emerging above the canopy.

The Sundays Valley Thicket is dense and dominated by *Cussonia spicata*, *Euclea undulata*, *Searsia longispina*, *Ehretia rigida*, *Schotia afra*, *Sideroxylon inerme*, *Asparagus spp*., *Aloe africana*, *Carissa bispinosa*, *Gasteria bicolor*, *Maerua cafra*, *Putterlickia pyracantha*, and *Portulacaria afra*.

Faunal

The herpetological survey was conducted using a visual encounter survey method based on area, where natural cover objects such as logs, rocks, and leaf litter were searched. One (1) reptile species, namely *Trachylepis capensis* (Cape Skink), was found in Cape Seashore Vegetation, and three (3) other reptile species, namely *Pachydactylus maculatus* (Spotted Gecko), *Psammophis crucifer* (Cross-marked Sand Snake), and *Pedioplanis lineoocellata pulchella* (Common Sand Lizard) were observed in Bontveld (Plate 3.6). These species are listed as Least Concern in South Africa. It is important to note that the site visit was restricted to daylight hours where herpetofauna activity is limited, as many species are nocturnal and/or sheltering from the heat. To obtain more representative estimates of species richness within

the development footprint, a combination of terrestrial sampling techniques (e.g., nocturnal surveys, acoustic surveys) is required.

Plate 3.6: Herpetological survey exposed both (left) Cape Skink and (right) Cross-marked Sand Snake within the project area.

The mammal survey relied on spoor and other signs as well as direct visual observation. During the site survey, no mammal SCC were observed. Only Rock Rabbit (LC) was observed in Bonteveld. However, small antelope, including *Raphicerus melanotis* (Grysbok) and *Sylvicapra grimmia* (Common Duiker), have been observed by SC&A in the project area and surrounds. Moreover, numerous tracks were observed within the dunes (Plate 3.7).

Plate 3.7: Spoor and other signs of mammal activity recorded within the project area.

Although the thicket areas consisted of dense stands of *Acacia cyclops*, areas of indigenous vegetation and rocky outcrops still provide valuable habitat to a range of faunal species, including SCC. For example, it is highly likely that *Sensitive Species 18* occurs in the Bontveld areas and for Duthie's Golden Mole to occur in St Francis Dune Thicket.

3.3.2 Current Land Uses

The project site lies within Zone 8 (port) and Zone 10 of the Coega SEZ. The Coega OSMP (2014) has identified Zone 10 for the use of the mariculture and aquaculture industries, as well as Gas to Power plants. Based on observations from the site investigation, sand mining is a prevalent land use along the dunes in Zone 10, while large stands of *Acacia cyclops* infest some of the thicket vegetation. In addition, an extensive road network exists within the project area with vehicular traffic of mostly heavy-duty trucks.

4 BIODIVERSITY AND ENVIRONMENTAL PLANNING AND POLICIES.

4.1 NATIONAL POLICY AND LEGISLATIVE FRAMEWORK FOR BIODIVERSITY

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for the conservation and sustainable use of biodiversity. South Africa is one of the few countries in the world to have a Biodiversity Act and a National Biodiversity Institute.

Key components of the national policy and legislative framework for biodiversity include:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA);
- NEM:BA List of Ecosystems in need of Protection (2011);
- NEM:BA List of Threatened or Protected Species;
- NEM:BA List of Alien Invasive Species;
- The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM:PAA);
- The National Biodiversity Strategy and Action Plan (NBSAP) (2015-2025);
- The National Spatial Biodiversity Assessment (NSBA) (2018);
- The National Biodiversity Framework (2018) (NBF);
- The National Protected Area Expansion Strategy (2008) (NPAES); and
- Important Bird Areas (2015) (IBA).

In addition to national legislation, some of South Africa's nine provinces, including the Eastern Cape, have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996). For instance, the Eastern Cape Biodiversity Conservation Plan (ECBCP) covers Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), and Protected Areas (PA) for both terrestrial and aquatic ecosystems in the province, which is important for assessing proposed developments against biodiversity policies at a regional scale.

Furthermore, some of the municipalities in the EC, including the NMBM, have their own municipal biodiversity legislation, such as the NMBM Bioregional Plan, which is important for assessing biodiversity at a local scale.

This report includes in its assessment of biodiversity within the affected areas of the proposed development, a regional and local scale evaluation of terrestrial biodiversity priority and protected areas, as well as the threat status of ecosystem types, within the project area.

4.2 CRITICAL BIODIVERSITY AREAS

4.2.1 Eastern Cape Biodiversity Conservation Plan (ECBCP)

The ECBCP (2019), which replaces the ECBCP (2007), provides a map of important biodiversity areas which can be used to inform land use and resource-use planning and decision making in the Eastern Cape Province.

The objectives of the ECBCP (2019) are to:

1) Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets, which represent important biodiversity patterns AND ecological processes;
2) Serve as the primary source of biodiversity information for land use planning and decision-making; and
3) Inform conservation and restoration action in important biodiversity areas.

The aim of the ECBCP is to map biodiversity priority areas through a systematic conservation planning process. The main outputs of the ECBCP include Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA) and No Natural Habitat Remaining (NNR) for both terrestrial and aquatic ecosystems.

However, the ECBCP (2019) recognises the NMBM Bioregional Plan (2015) and the Coega CDC's OSMP (2014), which has been mapped at a finer scale with detailed expert input, stakeholder engagement, and is legally enforced and implemented by the responsible agencies. So as not to clash, these local-scale biodiversity plans have been incorporated into the ECBCP without modification. As such, only the ECBCP aquatic CBAs have been mapped in this report (see Figure 4.1 below), followed by NMBM MOSS CBAs and Coega OSMP (2014) Primary Networks (see Figure 4.2 and 4.3, respectively). Primary Networks, now referred to as CBA – IDZ, describe natural areas of high conservation value that serve to protect special vegetation types, as well as preserve ecological processes.

According to the ECBCP (2019), the study area falls within an aquatic ESA 1. The management requirements for these areas are as follows:

"*Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained*".

For areas classified as ESA 1, the following objectives apply:

- These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.
- These systems may vary in condition and maintaining function is the main objective, therefore:
    - Ecosystems still in natural, near natural state should be maintained.
    - Ecosystems that are moderately disturbed/degraded should be restored.

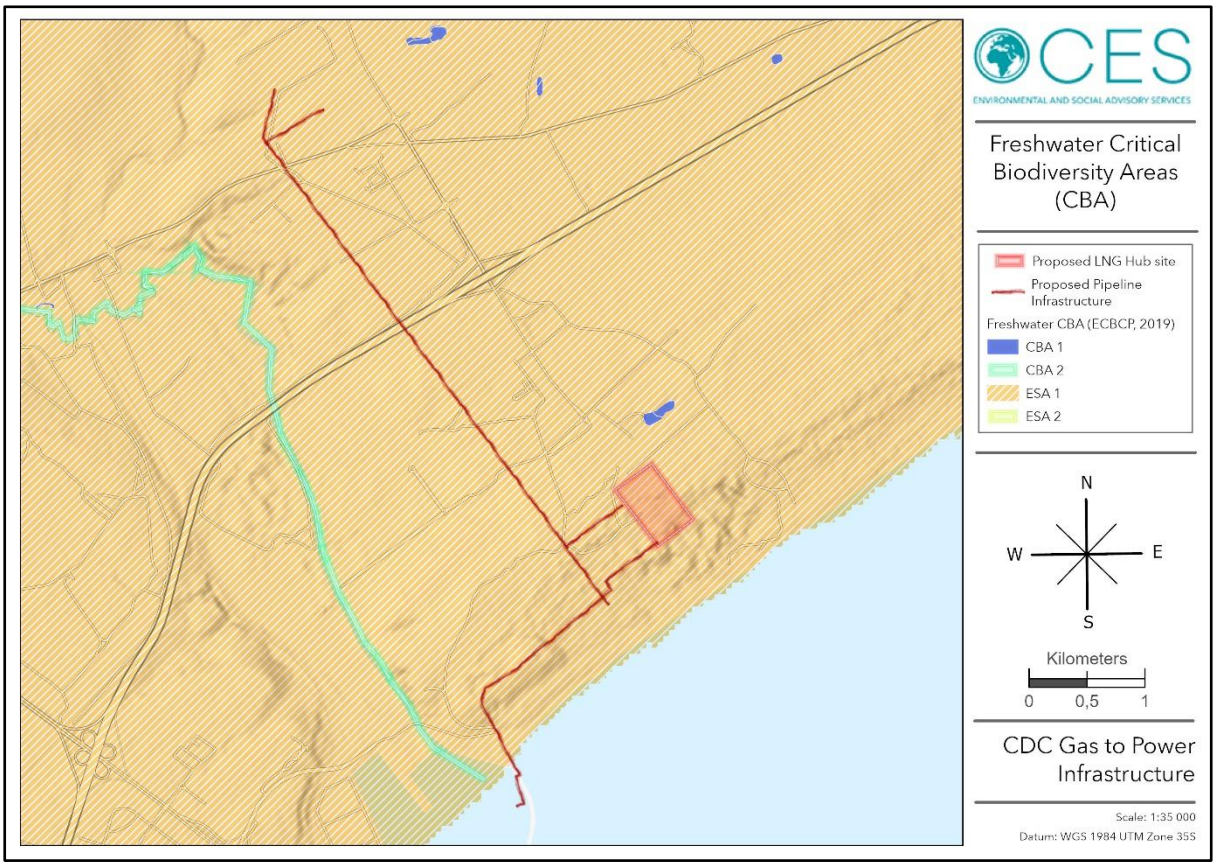


Figure 4.1: ECBCP (2019) Aquatic CBAs within the project area.

4.2.2 NMBM Metropolitan Open Space System (MOSS) Plan (2009) and NMBM Bioregional Plan (2015)

A Conservation Assessment and Metropolitan Open Space System (MOSS) plan was developed for the Nelson Mandela Bay Municipal area in 2009. This plan was used to inform the Nelson Mandela Bay Municipal Bioregional Plan which was gazetted on the 30th of March 2015.

The NMBM Bioregional Plan is based on the assessment of the extent to which various natural features in the municipality, including vegetation types, ecological processes, and SCC, have been irreversibly lost due to different land uses. The remaining extent of these features were thereafter assessed in terms of their conservation value for maintaining native biodiversity and ecosystem function.

From this assessment, a suite of Critical Biodiversity Areas (CBAs) and Critical Ecosystem Support Areas (CESAs) was identified. These are the minimum areas required to meet conservation objectives in the NMBM, and their preservation will facilitate the long-term persistence of a representative proportion of all biodiversity in the municipality.

According to the MOSS plan, the proposed hub site and sections of the pipeline fall within a terrestrial CBA (refer to Figure 4.2). The management requirements for these areas are as follows:

"*Such areas must be managed for biodiversity conservation purposes and incorporated into the protected area system".*

The accompanying spatial dataset has yet to be updated. Thus, the data used to inform the biodiversity assessment in this report is based on the 2009 NMBM MOSS plan, which is outdated in terms of the Coega OSMP. The NMBM CBAs within the Coega IDZ and PoN however were revised in the CDC's Open Space Management Plan (OSMP, 2014), and will be incorporated into the next version of the NMBM Bioregional Plan.

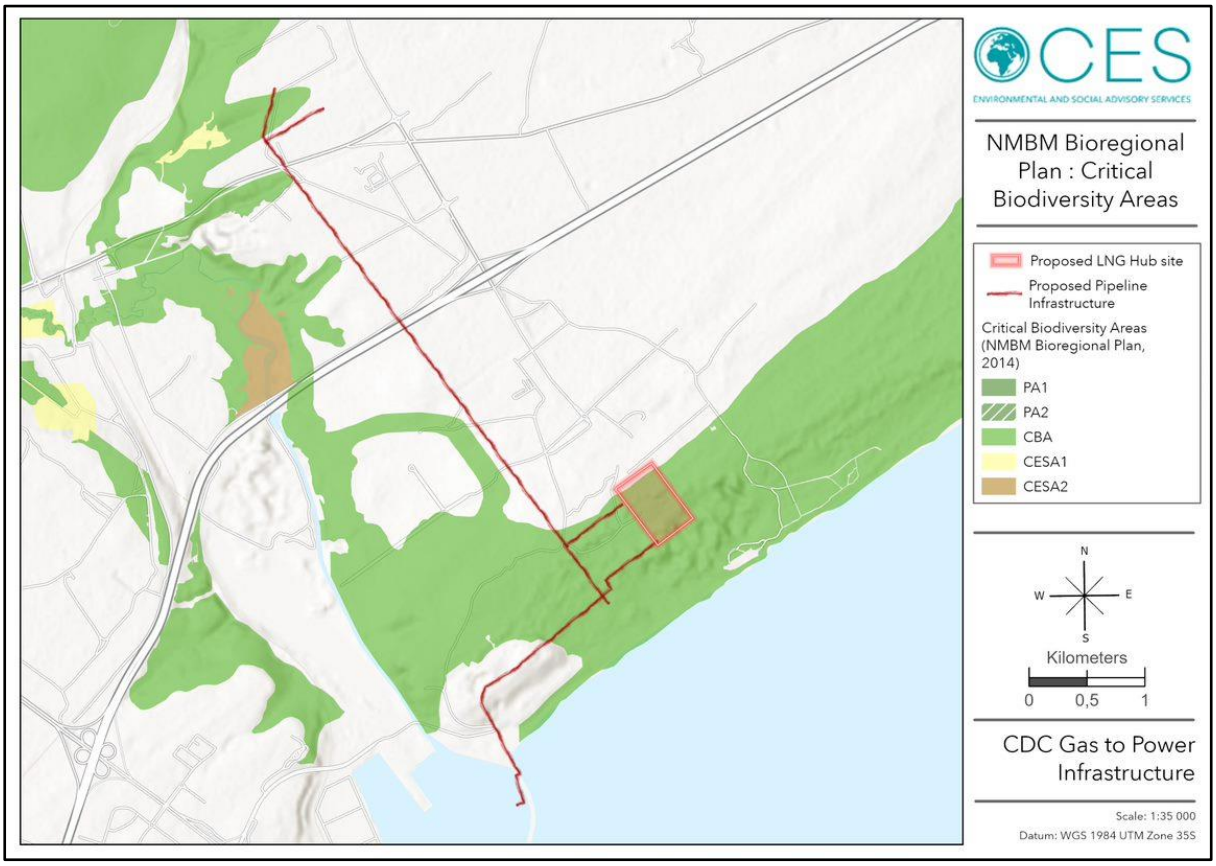


Figure 4.2: NMBM MOSS (2009) Terrestrial CBAs within the Project Area.

4.2.3 Coega Open Space Management Plan (OSMP, 2014)

According to the Coega OSMP (2014), much of the proposed development is located outside a CBA Network, which are areas important for biodiversity conservation. Most of the footprint falls within a Secondary Support Network (see Figure 4.3 below), which refers to non-conservation areas that are open space but do not have intrinsic biodiversity value. It also includes the major transportation and service servitude routes between different open spaces and other land uses within the IDZ. However, the OSMP does identify areas of Species of Special Concern. These are noted in the report and regarded as no-go areas (see next section and Figure 4.4 below).

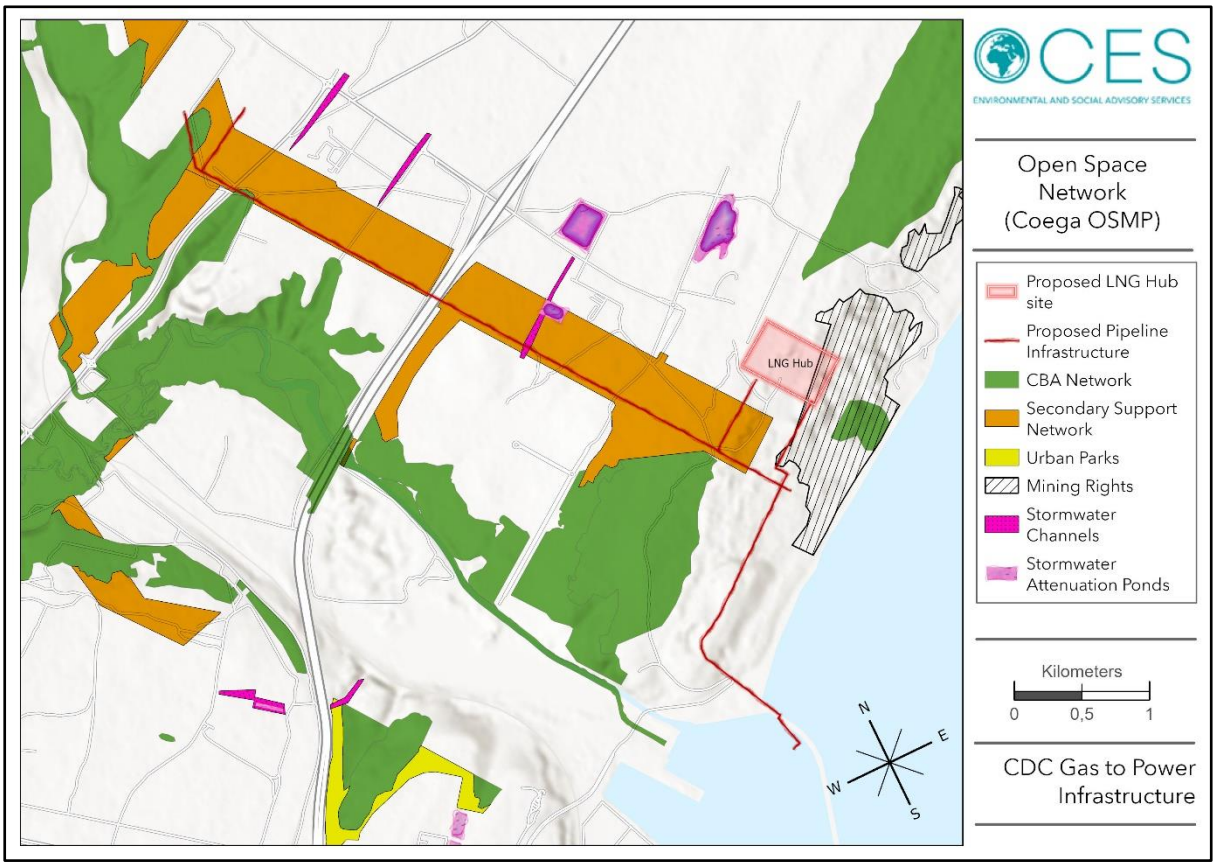


Figure 4.4: Coega OSMP (2014) CBA Network and Secondary Support Network.

4.2.4 Sensitive Species and Habitat (OSMP, 2014)

According to the Coega OSMP (2014), the following ecologically sensitive areas surround the development footprints:

- Rare Butterfly Habitat – protected by a 100 m wide buffer zone, which is fenced off and kept clear of development and public access;
- Damara Tern Colony – breeding habitat earmarked for protection;
- Sensitive Animal Species – including a population of *Aloeides clarki*; and
- Sensitive Plant Species – including a population of *Marsilea schelpeana* a rare aquatic plant species.

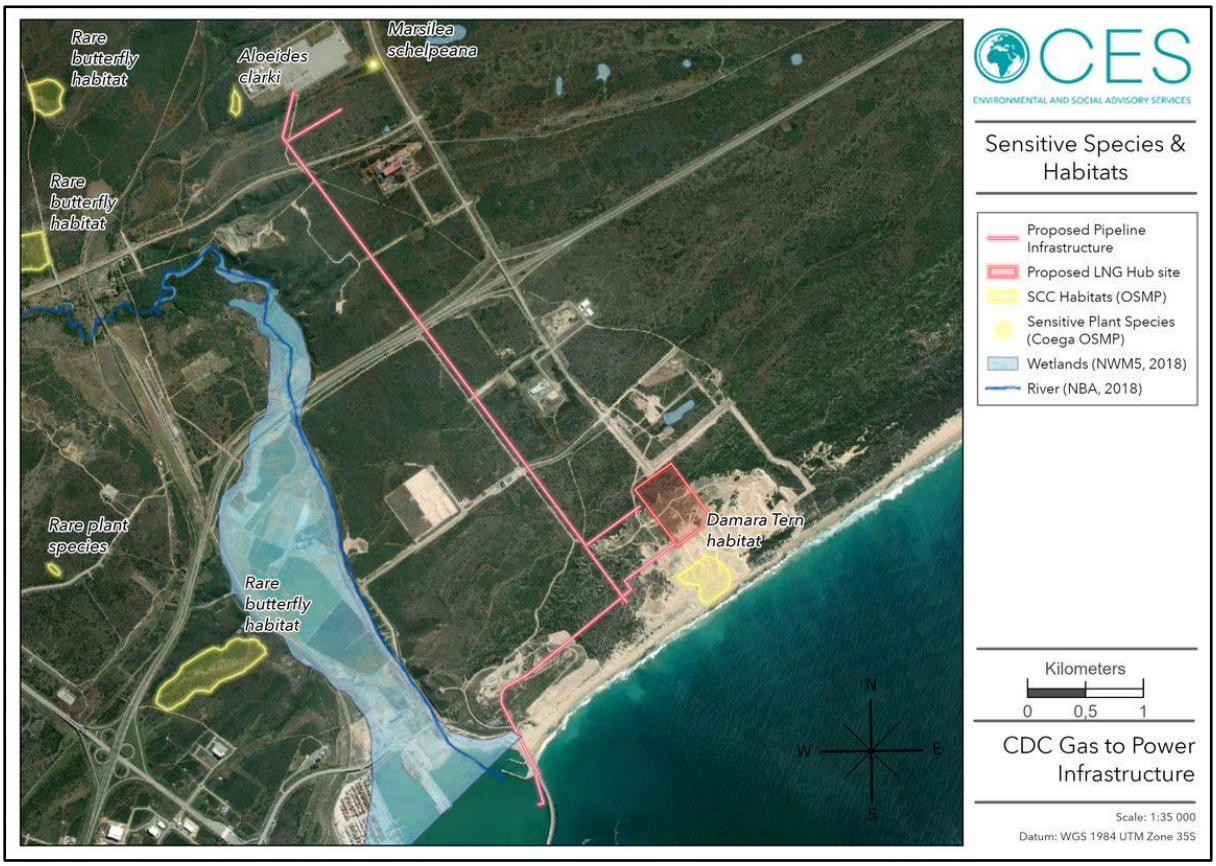


Figure 4.4: Coega OSMP (2014) Species of Special Concern surrounding the project area.

4.3 ECOSYSTEM THREAT STATUS

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. According to the NEM:BA List of threatened ecosystems (2011), the proposed development does not affect a threatened ecosystem.

SANBI (2021) recently updated the Red List of South Africa's Terrestrial Threatened Ecosystems (RLEs), and Grassridge Bontveld, Sundays Valley Thicket, St Francis Dune Thicket, and Cape Seashore Vegetation are all classified as Least Concern. The same classification/threat status is applied in the NMBM Bioregional Plan.

Both Grassridge Bontveld and Cape Seashore Vegetation are considered Well Protected, followed by Sundays Valley Thicket, which is Moderately Protected, and lastly St Francis Dune Thicket, which is Poorly Protected (Skowno *et al*., 2018). The conservation target for Sundays Valley Thicket is 19%, while the other three ecosystem types have a target of 20% (Skowno *et al*., 2018). Based on the best available data, these ecosystems are therefore not expected to collapse at any rate, however this assessment may be underestimated due to a lack of comprehensive data on ecosystem condition/integrity (including biotic disruptions due to invasive species, overutilisation, altered fire regimes and other environmental degradation) (SANBI, 2021).

For example, the development of the Coega IDZ poses a serious threat to Grassridge Bontveld and, to a lesser extent, Sundays Thicket through increasing human encroachment (Mucina *et al*., 2006-2018). Furthermore, Sundays Valley Thicket is estimated to decline by 7.1% by the year 2040. The main pressures threatening this vegetation type includes urban sprawl, overgrazing and browsing, overstocking of game, the aerial application of herbicides, crop cultivation, and alien invasive plants (Mucina *et al*., 2006-2018). Grassridge Bontveld is better protected than Sundays Valley Thicket, with strongholds in the Greater Addo Elephant National Park and in the private Grassridge Nature Reserve.

St Francis Dune Thicket on the other hand is poorly protected and the main threats to this vegetation type is still being assessed (Skowno *et al*., 2018). However, approximately 14.13% of this vegetation type has been transformed due to mining, alien invasion by *Acacia cyclops*, urban sprawl, and erosion (Grobler *et al*., 2018). Based on observations during the site survey, St Francis Dune Thicket within the project area was altered due to infestation by *A. cyclops* and sand mining. Conversely, more than half of Cape Seashore vegetation is protected within national and private conservation areas, and less than 2% has been transformed, mainly by urban development.

Assessing the proposed project against South Africa's Terrestrial Red List of Ecosystems (RLE), all four (4) vegetation types are expected to occur within the proposed pipeline, while only two (2), namely St Francis Dune Thicket and Cape Seashore Vegetation, are expected to occur within the proposed hub site (Figure 4.5). Based on the current threat status of ecosystems, the proposed development is not expected to affect a threatened ecosystem.

The conservation status and extent of vegetation types listed above are summarised in Table 4.1 below.

Table 4.1: Conservation status and extent of vegetation types within the development footprint (Skowno *et al*., 2018).

Vegetation Type	Conservation Status	Historical Area (Ha)	NBA 2018 Area (Ha)	Percentage Lost	Proposed development activity	Potential loss due to activity (Ha)
Grassridge Bontveld	Least Concern	24, 583	22, 124.7	10%	Pipeline	4.82
Sundays Valley Thicket	Least Concern	96, 341	83, 816.67	13%	Pipeline	0.14
St Francis Dune Thicket	Least Concern	26, 439	22208.76	16%	Pipeline and Hub Site	19.85
Cape Seashore Vegetation	Least Concern	21,989	21, 549.22	2%	Pipeline and Hub Site	11.25

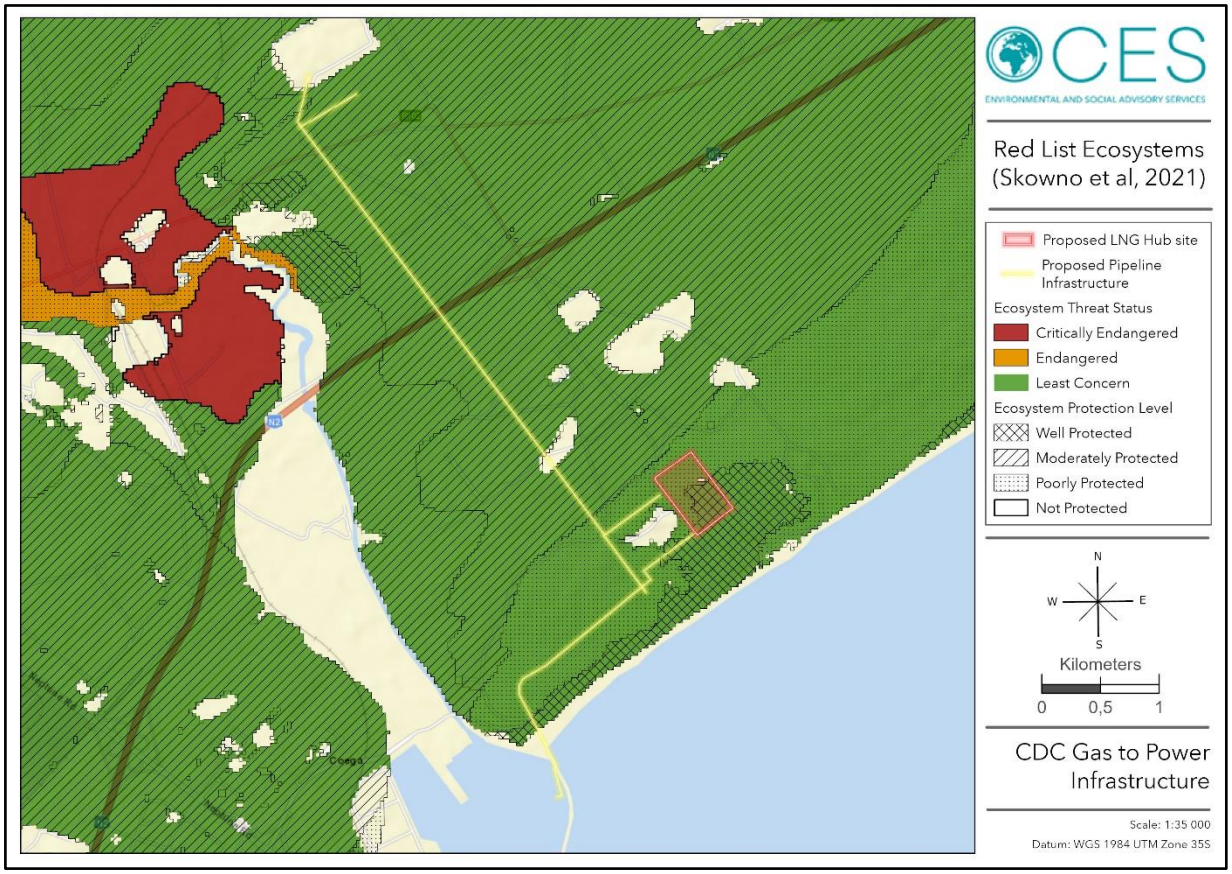


Figure 4.5: Threatened Ecosystems Map of the project area.

4.4 PROTECTED AREAS

The National Protected Areas Expansion Strategy (NPAES, 2010) was developed to "*achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change*." The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and ecosystem functions. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected.

As illustrated in Figure 4.6 below, the proposed project is in proximity to a Marine Protected Area, the Addo Elephant National Park Marine Protected Area. On land, however, the project area falls within the Coega IDZ and therefore does not constitute a protected or conservation area recognised by the NPAES (2010) or the South African Conservation Areas Database (SACAD 2022, Q3).

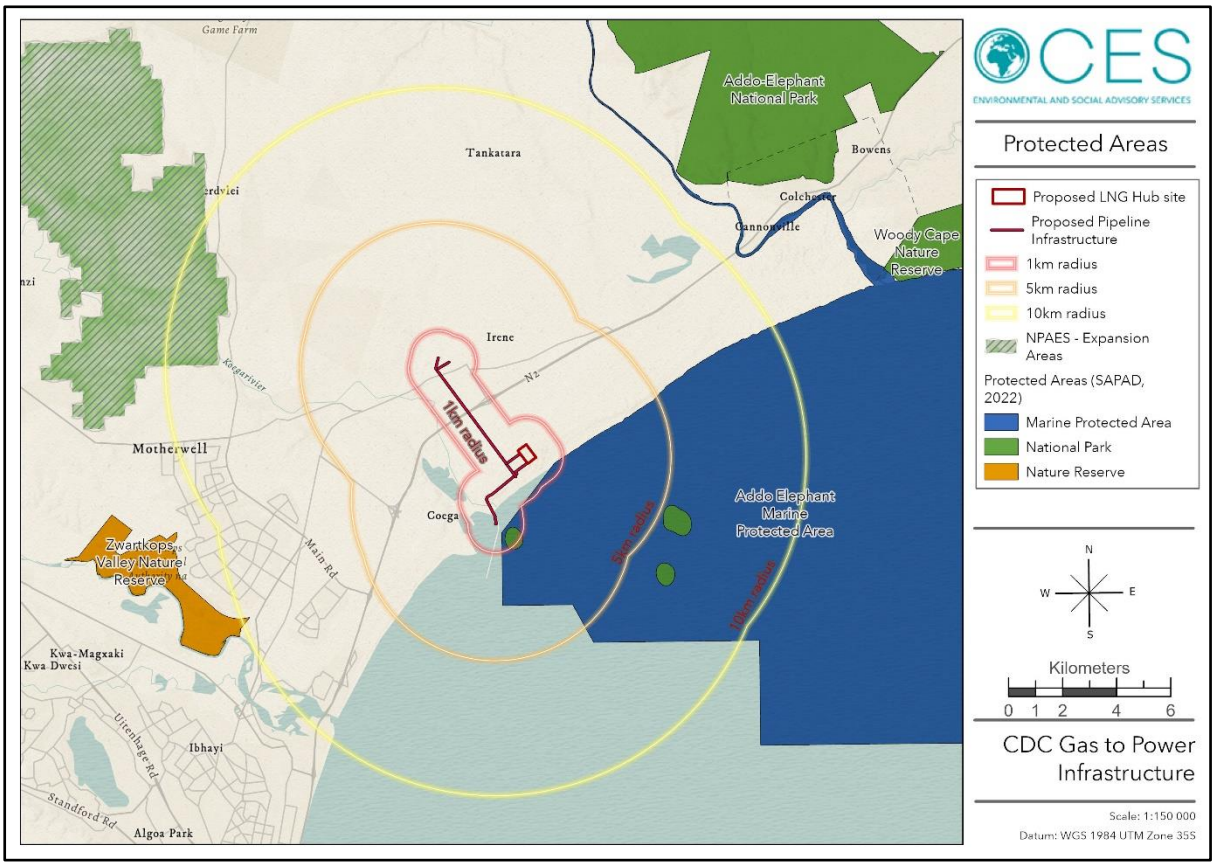


Figure 4.6: Protected Areas surrounding the Project Area.

4.5 DISCUSSION

When assessing a proposed development in the context of the various planning tools, such as the ECBCP and the OSMP, it is necessary to reflect on two aspects that inform how the planning tool needs to be applied. The first is the consideration of the biodiversity/ecosystem/habitat feature(s) are driving the classification and how the proposed project may impact on these features, and the second consideration is the actual condition of the site.

The proposed Coega Gas to Infrastructure development in its current layout is assessed against the various biodiversity/environmental planning tools as follows:

Table 4.1: Biodiversity priority areas affected by the proposed gas infrastructure project.

Biodiversity/Environmental Plan	Mapping classification	Aligned/Compliant	Can impact be avoided by implementing management/mitigation measures
Eastern Cape Biodiversity Conservation Plan	Aquatic CBAs	Yes, all freshwater critical biodiversity areas have been avoided.	
NMBM Bioregional Plan	Terrestrial CBAs	No, however the Coega OSMP supersedes the NMBM Bioregional Plan so biodiversity in this report is assessed against the Coega OSMP.	
Coega Open Space Management Plan	CBA Network	No. The northernmost part of the pipeline falls within a CBA Network. This is somewhat mitigated by the very small footprint 0.14 ha) of the pipeline.	Yes. Impacts can be mitigated to low if mitigation measures for the loss of indigenous vegetation and loss of CBA – IDZ are implemented. Furthermore, the removal of alien invasive tree species within the affected areas would be considered a significant gain for the ecosystem and could offset residual impacts of the development.
Sensitive Species and Habitat (OSMP)	Rare Butterfly Habitat; Damara Tern Colony; Sensitive Animal Species –	Yes, all sensitive species and habitat have been delineated as	

	including a population of *Aloeides clarki*; and Sensitive Plant Species – including a population of *Marsilea schelpeana* a rare aquatic plant species.	no-go areas for development with individual buffer zones.	
Threatened Ecosystems	Critically Endangered Ecosystems	Yes, the development avoids Motherwell Karroid Thicket vegetation.	
	Endangered Ecosystems	Yes, the development avoids Albany Alluvial Vegetation.	
Protected Area Expansion Strategy	Addo Elephant National Park Marine Protected Area	Yes. The project area falls within the Coega IDZ and therefore does not constitute a protected or conservation area recognised by the NPAES tool.	

5 SITE SENSITIVITY

5.1 SITE SENSITIVITY

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and SCC in the project area were assessed based on their conservation importance, functional integrity, and receptor resilience (Table). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 5.1: Criteria for establishing Site Ecological Importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	*The importance of a site for supporting biodiversity features of conservation concern present e.g., populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

Table provides a summary of how each receptor was assessed.

Table 5.2: Evaluation of Site Ecological Importance (SEI) of habitat and/or SCC affected by the proposed development.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Grassridge Bontveld	**High** Fulfilling Criteria triggered: *Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10,000 mature individuals remaining.* Justification: The presence of several protected and threatened plant species including *Crassula calcarea*, *Euphorbia meloformis* (NT), *Euphorbia globosa* (Criterion B, EN), *Ledebouria coriacea* (CR), *Roepera divaricata* (EN), and *Rhombophyllum rhomboideum* (Criterion B, EN) were confirmed during the most recent site visit.	**Low** Fulfilling Criteria triggered *Small (> 1 ha but < 5 ha) area.* Justification The extent of Grassridge Bontveld that will be affected by the proposed development, specifically the pipeline infrastructure, is approximately 4.82 ha, with 0.4 ha of this already altered by other land uses. Therefore, approximately 4.42 ha of this vegetation type remains intact within the proposed pipeline servitude.	**Medium**	**Low** Fulfilling Criteria triggered *Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.* Justification A study undertaken by Campbell (2018) found that Grassridge Bontveld cannot recover fully from vegetation clearance, especially if the underlying soil and geology has been disturbed. Additionally, according to EWT and Bionerds (2021) in Vervurgt (2021), it has been found that Sensitive Species 18 does not return to	**HIGH**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
				rehabilitated areas of Grassridge Bontveld.	
Sundays Valley Thicket	**High** Fulfilling Criteria triggered: *Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10,000 mature individuals remaining.* Justification: The presence of threatened plant species such as *Euphorbia globosa* (Criterion B, EN) is highly likely within this vegetation type.	**Very Low** Fulfilling Criteria triggered *Very small (< 1 ha) area.* Justification The extent of Sundays Valley Thicket that will be affected by the proposed development, specifically the pipeline infrastructure, is approximately 0.14 ha, which remains relatively intact.	**Low**	**Low** Fulfilling Criteria triggered *Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.* Justification Sundays Valley Thicket is highly susceptible to habitat fragmentation with very low rehabilitation potential. Once lost, this vegetation type cannot be restored. Plant SCC within this habitat type are considered highly sensitive.	**MEDIUM**
	Low / **Medium**		**High**		

Habitat / Species	Conservation Importance (CI)		Functional Integrity (FI)	BI	Receptor Resilience	SEI
Cape Seashore Vegetation	Fulfilling Criteria triggered: *No confirmed or highly likely populations of SCC.* *No confirmed or highly likely populations of range-restricted species.* Justification: Cape Seashore Vegetation is often dominated by a single pioneer species and is characterised by mobile sand and high salt loading. However, the presence of *Acyranthemum sordescens* (VU and known from less than 10 locations) was confirmed during the most recent site visit.	Fulfilling Criteria triggered *Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types.* *Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches.* *Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.* Justification The extent of Cape Seashore Vegetation that will be affected by	**Low**	Fulfilling Criteria triggered: *Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.* Justification: The area comprises exposed dune areas with sparse vegetation cover and pioneer species, which should be able to recover relatively quickly after disturbance.		**VERY LOW**

Habitat / Species	Conservation Importance (CI)		Functional Integrity (FI)	BI	Receptor Resilience	SEI
		the proposed development, including both the pipeline and hub site, is approximately 11.25 ha, of which 11.07 ha remains relatively intact.				
St Francis Dune Thicket	**High**	**Medium**		**Medium**		
	Fulfilling Criteria triggered: *Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10,000 mature individuals remaining.* Justification: The presence of *Acyranthemum sordescens* (VU and known from less than 10 locations) was confirmed during the most recent site visit.t	Fulfilling Criteria triggered *Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types.* *Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches.* *Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs*	**Medium**	Fulfilling Criteria triggered *Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.* Justification St Francis Dune Thicket is highly susceptible to habitat fragmentation with very low rehabilitation potential. Once lost, this vegetation type cannot be restored. Plant SCC within this habitat type are considered highly sensitive.	**MEDIUM**

Habitat / Species	Conservation Importance (CI)		Functional Integrity (FI)	BI	Receptor Resilience	SEI
		of minor past disturbance. Moderate rehabilitation potential. <u>Justification</u> The extent of St Francis Dune Thicket that will be affected by the proposed development, specifically the LNG hub site, is approximately 19.85 ha, of which 18.01 ha remains relatively intact.				

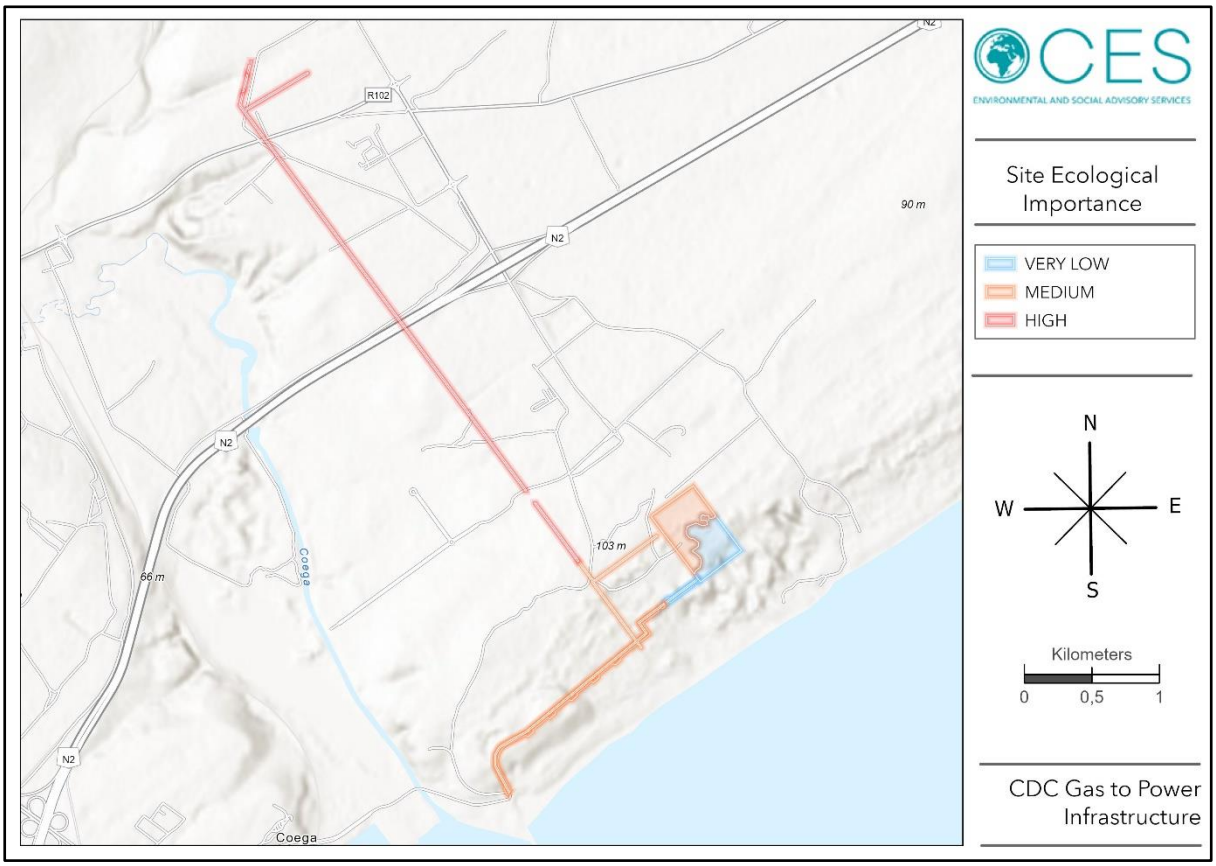


Figure 5-1: Sensitivity map of the project area

In terms of the Species Environmental Assessment Guideline (SANBI, 2020), the following guidelines apply to areas with an SEI of HIGH, MEDIUM, or VERY LOW:

SEI	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

6 IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information to assess the impacts of the proposed Gas Infrastructure Project on the terrestrial biodiversity of the area at the appropriate spatial and temporal scales. The impacts identified and described in Section 6.1 below have been assessed in terms of the criteria described in Appendix 5 of this report.

6.1 IMPACT ASSESSMENT

Table 6.1: Assessment of ecological impacts associated with the proposed development.

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
CONSTRUCTION PHASE														

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Indigenous Vegetation	Gas Infrastructure Project	Vegetation clearance for the construction of the proposed pipeline will result in the approximate loss of 4.42 ha of Grassridge Bontveld and 0.14 ha of Sundays Valley Thicket. The clearance of vegetation for the construction of both the proposed pipeline and LNG hub site will result in the approximate loss of 19.85 ha of St Francis Dune Thicket and 11.25 ha of Cape Seashore Vegetation. Based on the current remaining extent (NBA 2018), the proposed development is expected to alter less than 1% of these vegetation types. Consequently, due to the relatively small size of expected alteration (36,06 ha in total) and the small percentage loss (< 1%) of vegetation relative to remaining extent and combined with the ecological sensitivity of each vegetation type, this impact is rated moderate negative.	Negative	Direct	Moderate	Localised	Permanent	Definite	Reversible	Resource will be lost	Achievable	**Moderate (-)**	• The clearance of approximately 32.06 ha of vegetation must be limited to that which is strictly necessary for the project. • Laydown areas should be located within previously disturbed areas. • The Search & Rescue (S&R) of rare, endemic, or threatened plant species, prior to vegetation clearance must be carried out in accordance with the Project Vegetation Specification (PVS). • The removal and stockpiling of topsoil must also be carried out in accordance with the PVS. • Employees must be prohibited from making fires and harvesting plants. • Existing access roads should be used as far as practically possible. • The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Due to the relatively small percentage loss (< 1% in total) of vegetation expected from the proposed development, relative to the remaining extent of each vegetation type, this impact is rated low negative.	Negative	Cumulative	Slight	Study Area	Permanent	Definite	Irreversible	Resource will be lost	N/A	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-Go	The project area, particularly areas of St Francis Dune Thicket, is infested with *A. cyclops* while and sand mining is taking place on the dunes. This has resulted in the alteration of indigenous habitat. This, amongst other land uses in the SEZ, will likely continue to alter native habitat. Therefore, the current impact under the no-go alternative is rated moderate negative.	Negative	No-go	Moderate	Regional	Long-term	Definite	Irreversible	Resource has been lost	N/A	**Moderate (-)**	• N/A	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of OSMP (2014) Sensitive Species and Habitat	Gas Infrastructure Project	Certain sensitive habitat (i.e., Damara Tern Colony and Rare Butterfly Habitat) and Species of Special Concern (i.e., *A. clarki, M. schelpeana*) occurring within the project area have been delineated and declared no-go areas. Should construction activities encroach on these areas, the impact associated with the loss of sensitive habitat and/or SCC would be high. However, if the recommended mitigation measures and buffers are implemented, the impact on these areas would be low.	Negative	Direct	Severe	Localised	Permanent	Possible	Irreversible	Resource will be lost	Achievable	**High (-)**	• These areas have been delineated in the OSMP (2014) and declared no-go areas. • Construction vehicles and machinery used for the proposed development must not encroach into identified 'no-go' areas or areas outside the development footprint. • It is inevitable that noise and dust pollution from the construction of the proposed development will disturb some of the sensitive species outlined in the OSMP (e.g., Damara Terns). As such, all measures to minimise noise and dust during construction should be implemented.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Sand mining has already replaced sensitive habitat within the project area, including sections of Damara Tern habitat in Zone 10 of the SEZ. However, there will be no additional loss of sensitive habitat and/or species associated with the construction of the proposed development if they are treated as no-go areas.	Negative	Cumulative	Severe	Study Area	Permanent	Possible	Irreversible	Resource will be lost	N/A	**N/A**	All sensitive habitat and Species of Special Concern have been delineated and declared no-go areas in the OSMP. Therefore, there is no cumulative impact associated with the proposed development.	**N/A**
	No-Go	If the proposed development does not go ahead, the current impacts associated with sand mining and the infestation of invasive alien plants will continue to replace sensitive habitat in Zone 10. As such, the No-go Alternative is rated moderate negative.	Negative	No-go	Moderate	Regional	Long-term	Definite	Irreversible	Resource has been lost	N/A	**Moderate (-)**	• N/A	**N/A**

Loss of Plant SCC	Gas Infrastructure Project	The clearance of vegetation will result in the direct loss of plant SCC – the presence of six SCC was confirmed on site. Although not confirmed during the site visit, additional SCC are highly likely to be present. Due to the high number of rare, endemic, or threatened species in the project area, the loss of SCC is rated high negative.	Negative	Direct	High	Regional	Permanent	Possible	Irreversible	Resource will be lost	Achievable	**High (-)**	• The development footprint (i.e., pipeline and hub site) must be micro-sited prior to construction. Should populations of threatened SCC be identified during micro-siting, where feasible, the servitudes must be shifted to avoid these populations. • No plants are to be removed, damaged, or disturbed outside of the extent of the development footprint nor vegetation planted. • The S&R of rare, endemic, or endangered species prior to vegetation clearance must be carried out in accordance with PVS, by a competent and qualified service provider. • Permits for the removal of plant species protected in terms of the PNCO must be obtained prior to vegetation clearance. • The removal and stockpiling of topsoil must also be carried out in accordance with the PVS. • Construction vehicles and machinery must	**Moderate (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													not encroach into identified 'no-go' areas or areas outside the development footprint.	

	Cumulative	SCC have likely already been lost because of existing land uses such as sand mining and alien plant infestation in the project area. As such, the potential loss of SCC associated with the proposed development would contribute to the further loss of SCC within the project area. However, if the mitigation measures outlined in this report are implemented and adhered to, this impact can be reduced to low negative.	Negative	Direct	Moderate	Study area	Permanent	Possible	Irreversible	Resource will be lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts. In addition, mitigation could involve eradicating alien invasive species from the area	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	If the proposed development does not go ahead, the current impacts associated with sand mining and the infestation of invasive alien species in Zone 10 will continue to displace plants, including SCC. As such, the No-go Alternative is rated moderate negative.	Negative	Direct	Moderate	Regional	Permanent	Possible	Irreversible	Resource will be lost	N/A	**Moderate (-)**	• N/A	**N/A**

Loss of herpetofauna SCC and/or loss of faunal habitat	Gas Infrastructure Project	During the construction phase, construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil, and the movement of construction vehicles) could result in wildlife mortalities through road kills or accidental killing, and/or cause the displacement of herpetofauna via increased noise or air pollution. Additionally, the loss of vegetation/soil due to clearance will result in the direct loss of faunal habitat, which will directly, and indirectly, impact on amphibians and reptiles adapted to their ground dwelling habitats. Reptiles also face a high risk of being poached in the wild, and the increase in individuals associated with the construction of the proposed development could create poaching opportunities. Moreover, Sensitive Species 18 is restricted to Bonteveld vegetation and has a high risk of being affected by construction (and operation) activities. As such, this impact is rated severe negative.	Negative	Direct	Severe	Localised	Lon-term	Possible	Permanent	Resource will be lost	Achievable	**High (-)**	• It is illegal to remove or kill amphibians and reptiles within the project area listed as either Schedule I or II on the PNCO unless the relevant permit is acquired. • All construction staff must be educated with regards to wildlife conservation, and all staff employed by the development must ensure that any amphibians or reptiles encountered during construction of the proposed development are not harmed or killed. • Amphibians and reptiles encountered must be allowed to move away from the construction area. In the event they need to be translocated, amphibians must be released in the same catchment areas while reptiles must be relocated to directly adjacent areas of the proposed development. No amphibian or reptile species may be removed off site without authorisation from the relevant authority. • A rescue plan must be	**Moderate (-)**

													developed to protect reptiles which could fall into construction pits. • The appointed ECO should be trained in snake handling and removal techniques. • Herpetofauna SCC's that may die due to construction activities associated with the proposed development must be recorded (e.g., photographed and GPS coordinates taken) and reported to the appointed ECO and relevant authorities (i.e., EWT). Where needed, the carcass should be donated to SANBI. • All individuals, including construction workers must sign a register prior to accessing the construction site. • Construction workers must not be housed on site. • Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads.	

														• Unless in case of emergencies, driving of construction vehicles within the project area must be restricted to day-light hours. • Existing roads must be used as far as practically possible. • An S&R must be undertaken by a qualified herpetologist for SCC, particularly Sensitive Species 18. This must be in line with the CDC's Environmental Specifications relating to the translocation of wild animals. • The construction of infrastructure near permanent waterbodies must be avoided. • All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas. • Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the development footprint.	
	Cumulative	The proposed development will likely exacerbate current impacts (e.g., road activity) on amphibians and reptiles	Negati	Direct	Moder	Study	Perma	Possibl	Revers	Resour	Achiev	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		within the project area and may exacerbate the loss of protected reptile species through increased poaching opportunities. The additional clearing of vegetation reduces habitat further, resulting in displacement.											only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	
	No-go	If the proposed development does not go ahead, the current impacts associated with other activities in the area, such as sand mining, also pose a threat to herpetofauna SCC. As such, the No-go Alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Possible	Permanent	Resource will be lost	Achievable	**Moderate (-)**	• N/A	**N/A**

Loss of mammal SCC and/or loss of faunal habitat	Gas Infrastructure Project	Construction activities associated with the proposed development (e.g., vegetation clearance, excavation of soil and the movement of construction vehicles) could result in wildlife mortalities through road kills or accidental killing, and/or cause the displacement of mammals via increased noise or air pollution. Additionally, the loss of vegetation/soil due to clearance will result in the direct loss of faunal habitat, which will directly, and indirectly, impact on small sedentary species adapted to their ground dwelling habitats. Larger more agile species such as antelope are likely to disperse to more suitable habitats away from construction areas. As such, this impact is rated moderate negative.	Negative	Direct	Moderate	Localised	Permanent	Possible	Irreversible	Resources will be lost	Achievable	**Moderate (-)**	• It is illegal to remove or kill mammals within the study area listed as either Schedule I or II on the PNCO unless the relevant permit is acquired. • All construction staff must be educated with regards to wildlife conservation, and all staff employed by the developer must ensure that any mammals encountered during construction of the proposed development are not harmed or killed. • Any mammals encountered must be allowed to move away from the construction area. The CDC's Environmental Specifications relating to the translocation of wild animals must be adhered to in the event mammal SCC need to be translocated. • Mammal SCC that may die due to construction activities associated with the proposed development must be recorded (e.g., photographed and GPS coordinates	**Low (-)**

													taken) and reported to the appointed ECO and relevant authorities (i.e., EWT). Where needed, the carcass should be donated to SANBI. • Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads. • Unless in case of emergencies, driving of construction vehicles within the project area must be restricted to day-light hours. • Existing roads must be used as far as practically possible. • The construction of linear infrastructure near permanent waterbodies must be avoided. • All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas. • Construction vehicles and machinery must not encroach into	

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
													identified 'no-go' areas or areas outside the development footprint.	
	Cumulative	The addition of the proposed development may exacerbate current impacts on mammals within the project area due to existing developments (e.g., sand mining). This could exacerbate the loss of mammal SCC through increased poaching opportunities or road kills. However, mammals are relatively agile and can move away from construction areas to more suitable habitat. Therefore, the cumulative impact is rated low negative.	Negative	Direct	Slight	Study Area	Permanent	Possible	Irreversible	Resources will be lost	Achievable	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	If the proposed development does not go ahead, the current impacts associated with other activities in the area, such as sand mining, also pose a threat to mammal SCC. As such, the No-go Alternative is rated low negative.	Negative	Direct	Moderate	Study Area	Permanent	Possible	Irreversible	Resources will be lost	Achievable	**Low (-)**	• N/A	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of CBA - IDZ	Gas Infrastructure Project	The construction of the proposed pipeline will result in the loss of approximately 0.14 ha of intact Sundays Valley Thicket, which in the OSMP spatial dataset (2014) directly translates to CBA - IDZ. The category of CBA – IDZ is driven by the vegetation type (i.e., Mesic Succulent Thicket), Species of Special Concern, and long-term conservation commitments. According to the OSMP, development in these areas should be avoided, however certain linear infrastructure such as a pipeline) could be allowed, but this should preferably either be put underground or above vegetation. Disturbed land should be rehabilitated after construction to ensure a continuous system is maintained. Due to the relatively small size of the pipeline within the CBA (~0.14 ha) and the type of activity (i.e., linear), this impact is rated moderate negative.	Negative	Direct	Moderate	Localised	Permanent	Definite	Irreversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The clearance of approximately 0.14 ha of Sundays Valley Thicket vegetation must be limited to that which is strictly necessary for the installation of the pipeline. • The S&R of rare, endemic, or threatened plant species, prior to vegetation clearance, must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider. • The removal and stockpiling of topsoil must also be carried out in accordance with the PVS. • Employees must be prohibited from making fires and harvesting plants. • Existing access roads should be used as far as practically possible.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	The added loss of 0.14 ha of CBA – IDZ due to the proposed pipeline will contribute to the cumulative loss of CBA – IDZ within the SEZ, which may affect long-term conservation commitments. However, as loss is minimal the cumulative impact is rated low negative.	Negative	Direct	Slight	Study Area	Permanent	Definite	Irreversible	Resource will be lost	N/A	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	The No-go alternative will not result in the loss of CBA - IDZ. However, it should be noted that current land uses such as alien plant infestation, sand mining, and roads in Zone 10 have encroached on CBA – IDZ, including Damara Tern Habitat. As such the No-go alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource will be lost	N/A	**Moderate (-)**	• N/A	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Aquatic ESA	Gas Infrastructure Project	The construction of the proposed development will result in the loss of approximately 32.06 ha of Aquatic ESA (ECBCP, 2019). ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands. However, with the recommended 32m buffer around rivers and wetlands in the project area, combined with the relatively small footprint of the development (32.06 ha), it is unlikely that the proposed development will have a significant impact on nearby rivers and/or wetlands. As such, the significance of this impact is rated low negative.	Negative	Direct	Slight	Localised	Long term	Definite	Reversible	Resource will not be lost	Achievable	**Low (-)**	• The clearance of approximately 32.06 ha of vegetation must be limited to that which is strictly necessary for the installation of the pipeline and construction of the hub site. • Existing roads must be used as far as possible. • All exposed areas must be stabilised against erosion and rehabilitated, using appropriate indigenous vegetation. • The affected areas should be monitored regularly for signs of erosion and remedial action must be taken at the first signs of erosion.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	The construction of the proposed development will likely contribute to the cumulative loss of Aquatic ESA in the Coega SEZ. However, this loss is expected to be minimal (> 1 ha). As such, the cumulative impact is rated low negative.	Negative	Direct	Slight	Study Area	Long term	Definite	Reversible	Resource will not be lost	Achievable	**Low (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	The No-go alternative will not result in the loss of Aquatic ESA. However, it should be noted that current land uses such as alien plant infestation and sand mining in Zone 10 will continue to degrade Aquatic ESA in the SEZ. As such the No-go alternative is rated moderate negative.	Negative	Direct	Moderate	Study Area	Long term	Definite	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• N/A	**N/A**

Disruption of Ecosystem Function and Process	Gas Infrastructure Project	<u>Coastal Dune System</u>: • Development within the coastal dune system will alter the natural dynamic processes characteristic of the coastal zone, including sediment dynamics and windblown sediment transport, ultimately resulting in the modification of the dune system and changes to the coastal sediment budget in the region. <u>Albany Thicket System</u>: • Development within Bontveld and to a lesser extent Sundays Valley Thicket, may cause changes to fire dynamics (e.g., due to increased vehicular use and traffic in the Construction (and Operation) Phase and/or the proliferation of grasses in disturbed areas, amongst other factors. Due to this impact being restricted to the affected areas, this impact is rated moderate negative before mitigation.	Negative	Direct	Moderate	Localised	Long-Term	Possible	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The clearance of approximately 32.06 ha of vegetation must be limited to that which is strictly necessary for the installation of the pipeline and construction of the hub site. • Existing roads must be used as far as possible. • All exposed areas must be stabilised against erosion and rehabilitated, using appropriate indigenous vegetation. • Laydown areas should be located within previously disturbed areas. • Employees must be prohibited from making fires. • No livestock grazing must be allowed.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Disruption of ecosystem function and process due to habitat degradation and/or fragmentation has likely already occurred within the project area due to alien plant infestation, sand mining, and road activity, amongst other land uses. The construction of the proposed development may thus cause additional disruption(s).	Negative	Direct	Moderate	Study Area	Long-Term	Probable	Reversible	Resource may be partly lost	N/A	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	Under the No-go alternative, habitat degradation and/or fragmentation which could disrupt ecosystem dynamics will likely still occur because of other land uses such as sand mining. Under the No-go alternative the impact is therefore rated moderate negative.	Negative	No-go	Slight	Study Area	Long-Term	Definite	Reversible	Resource may be partly lost	N/A	**Moderate (-)**	• N/A	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Habitat fragmentation and/or degradation	Gas Infrastructure Project	During the Construction Phase, the loss of vegetation associated with the proposed development will coincide with the loss of faunal habitat, thereby reducing breeding and rearing locales. Faunal populations could become locally extinct or diminish in size. However, as the development is linear in nature and there is sufficient suitable habitat surrounding the proposed servitude, this impact is rated moderate negative.	Negative	Indirect	Moderate	Localised	Long term	Probable	Irreversible	Resources may be partly lost	Achievable	**Moderate (-)**	• Please refer to the mitigation measures relating to the Loss of Herpetofauna SCC as well as the Loss of Mammal SCC listed in this table.	**Low (-)**
	Cumulative	Habitat degradation and/or fragmentation has already occurred within the project area due to alien plant infestation, sand mining, and road activity, amongst other land uses. The construction of the proposed development will thus cause additional habitat fragmentation and/or degradation.	Negative	Indirect	Moderate	Study area	Long term	Probable	Irreversible	Resources may be partly lost	N/A	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. • However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	Under the No-go alternative, habitat degradation and/or fragmentation will still occur because of other land uses such as sand mining. Under the No-go alternative the impact is therefore rated moderate negative.	Negative	Indirect	Moderate	Study area	Long term	Probable	Irreversible	Resourced will be partly lost	N/A	**Moderate (-)**	• N/A	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establish-ment and/or Spread of Alien Plant Species	Gas Infrastructure Project	The removal of existing natural vegetation creates 'open' habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate and could pose a threat to surrounding ecosystems. Alien invasive species already present on site include *A. cyclops*.	Negative	Direct	Moderate	Localised	Long term	Possible	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	In line with the recommendations and management requirements outlined within the Coega OSMP, the following mitigation measures apply: • The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ. • Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. • Continuous monitoring for seedlings should take place throughout the construction phase.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Pockets of alien invasive vegetation, namely *A. cyclops,* has already established in the project area, particularly in St Francis Dune Thicket. Should construction of the proposed development take place, this could lead to the additional spread of alien invasive species in the project area, which would exacerbate the current and land use. As such, the cumulative impact is rated moderate negative.	Negative	Direct	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be partly lost	N/A	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go	The site is already invaded with *A. cyclops* which has resulted in the alteration of habitat, particularly St Francis Dune Thicket. If the project does not go ahead, this infestation is still likely to spread. The current impact under the no-go alternative is therefore rated moderate negative.	Negative	No-go	Moderate	Study Area	Long-Term	Definite	Reversible	Resource have been lost	N/A	**Moderate (-)**	• N/A	**N/A**
OPERATIONAL PHASE														

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establish-ment and/or Spread of Alien Plant Species	Gas Infrastructure Project	Failure to rehabilitate and monitor the establishment of Alien Plant Species during the Construction (and Operation) Phase) could lead to the establishment and spread of Alien Plant Species.	Negative	Direct	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be partly lost	Achievable	**Moderate (-)**	• The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ. • Implement a Rehabilitation Plan in accordance with the specifications outlined within the OSMP (2014) and the CDC's PVS.	**Low (-)**
	Cumulative	Alien plant species such as *A. cyclops* have already established in the project area, particularly within the St Francis Dune Thicket vegetation type. Therefore, should the operation of the proposed development led to the further spread of alien invasive species in the project area, the invasion by alien species could be exacerbated.	Negative	Direct	Moderate	Study Area	Long-Term	Possible	Reversible	Resource may be lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments in the area. However, it is imperative that the applicant implement the mitigation measures listed above.	**N/A**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-Go	Alien invasive plants have already established within the project area. Under the No-go alternative these species are likely to continue multiplying if left unchecked. The current No-go alternative is therefore rated moderate negative.	Negative	No-go	Severe	Study Area	Long-Term	Definite	Reversible	Resource may be lost	Achievable	**Moderate (-)**	• N/A	**N/A**
Disturbance and/or death of faunal SCC	Gas Infrastructure Project	Operational activities associated with the proposed development such as vehicular movement are likely to disturb faunal species (e.g., sensitive species 18) using the affected areas. This could result in the movement of faunal species away from the affected areas and/or the loss of faunal species. Slow-moving species such as tortoises and snakes are particularly susceptible to road kills. As such, this impact is rated moderate negative.	Negative	Direct	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	**Moderate (-)**	• Please refer to the mitigation measures relating to the Loss of Herpetofauna SCC as well as the Loss of Mammal SCC listed in this table.	**Low (-)**

POTENTIAL ISSUE	ALT	DESCRIPTION / SOURCE OF IMPACT	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Cumulative	Operational activities associated with the proposed development such as vehicular movement are likely to increase the disturbance of faunal species caused by existing developments and activities within the project area. As such, this impact is rated moderate negative.	Negative	Cumulative	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	**Moderate (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area. However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	**N/A**
	No-go	Existing developments and activities within the project area will continue to disturb faunal species within the project area, even in the absence of the proposed development. The no-go alternative therefore is rated moderate negative.	Negative	Existing	Moderate	Study Area	Long-term	Probable	Reversible	Resource may be lost	Achievable	**Moderate (-)**	• N/A	**N/A**
DECOMMISSIONING PHASE														
Not applicable.														

7 IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS AND DISCUSSION

The construction of the **LNG Hub site** for the proposed Gas to Power project will result in the direct and localised loss of indigenous (terrestrial) vegetation, specifically St Francis Dune Thicket and Cape Seashore Vegetation. Both vegetation types are classified as Least Concern (SANBI 2021), but the former is considered to have a medium sensitivity rating while the latter has a very low rating. The **pipeline infrastructure** on the other hand is expected to result in the direct loss of predominantly Grassridge Bontveld, followed by Cape Seashore Vegetation, and a small portion of Sundays Valley Thicket. Bontveld and Sundays Valley Thicket are also classified as Least Concern. However, these ecosystem types have a high sensitivity rating due to the presence and/or high likelihood of several highly threatened plant and animal species, as well as the poor ability of these ecosystems to recover from severe disturbance.

For a high SEI rating, the following guidelines must be applied:

"Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities."

Impacts associated with high sensitivity areas must be avoided, and where these can't be avoided, they must be offset. However, depending on the scale of development activities and the significance of impacts, certain activities may be deemed acceptable in high sensitivity areas. In this case, the proposed development is considered to result in a minimal loss of Grassridge Bontveld (4 ha) and will have a low impact if the relevant mitigation measures are followed.

Conversely, Damara Tern (CR) breeds within the dune slacks of the mobile dunes below the proposed LNG Hub site. This area has been allocated high sensitivity and must be treated as a no-go area. Additional biodiversity priority areas delineated within the Coega OSMP have also been allocated high sensitivity and stringent management/mitigation measures must be applied in areas of the development within proximity to CBA areas.

In terms of a medium SEI rating, the following applies:

"Mi*nimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities."*

Again, the proposed development is considered to result in a minimal loss of Sundays Valley Thicket (> 1 ha) and will have a low impact if the relevant mitigation measures are followed, likewise with St Francis Dune Thicket. The impacts associated with the loss of St Francis Dune Thicket (20 ha) can further be mitigated by eradicating alien invasive species in the area.

Overall, twelve (12) negative impacts on the vegetation, fauna and ecological processes in the affected areas were identified for the construction and operation phase of the Gas Infrastructure Project. Prior to mitigation, three (3) of these impacts are considered High, eight (8) are considered Moderate, and one (1) Low. If mitigation measures are implemented, the identified impacts in this report could be reduced to two (2) Moderate and ten (10) Low (Figure 6.1).

Figure 6.1: Pie charts comparing impacts on the ecology of the affected areas prior to and after implementation of mitigation measures.

It is recommended that the clearance of indigenous vegetation be restricted to that which is only necessary for the proposed development. Vehicles, including those that are heavy-duty, must utilise existing access roads as far as possible, to prevent further loss or damage to surrounding fauna and flora.

7.2 Conditions of EMPr, EA and Monitoring

All management/mitigation measures identified in Section 6.1 of this report for the impacts associated with the proposed development must be incorporated into the EMPr and implemented during the relevant phases associated with the proposed Gas to Power Project. Specific mitigation measures and recommendations that should be incorporated into the EA (if granted) include:

- All necessary permitting and authorisations pertaining to indigenous terrestrial biodiversity (i.e., plants and animals) must be obtained prior to the commencement of any construction activities.
- A suitably qualified ECO must be appointed prior to the commencement of the construction phase. If this appointment is to be done in-house by the CDC, then it is important to ensure that the ECO has sufficient knowledge of the local fauna and flora. If not, an external specialist might need to be appointed.
- Except to the extent necessary for the carrying out of construction works, plants shall not be removed, damaged, or disturbed. The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint(s).

- A botanical Search and Rescue for the threatened SCC identified within the development footprint must be undertaken to mitigate the loss of these individuals. Threatened SCC must be translocated to the nearest, same habitat type on the same property by a qualified botanist/horticulturalist. Threatened SCC must be translocated to the nearest, same habitat type on the same property outside of future authorized development footprint by a qualified botanist/horticulturalist.
- In areas where vegetation density restricts access and the ability of S&R teams to conduct thorough searches, strip clearing of the thicket vegetation using a tractor loaded backhoe (TLB) is permitted to allow access into the dense vegetation for the S&R efforts.
- Except to the extent necessary for the carrying out of the Works, fauna shall not be removed, injured, disturbed, or killed. Trapping, poisoning, poaching and/or shooting of fauna is strictly forbidden. No domestic pets or livestock are permitted on site.
- A thorough Search and Rescue (S&R) for herpetofauna SCC should be conducted prior to vegetation clearance by a qualified herpetologist. If found, herpetofauna SCC's should be placed in similar habitat directly adjacent to the affected area.
- The priority biodiversity areas delineated by the Coega OSMP, including the Ecological Support Area and the Secondary Dune have been classified as HIGH sensitivity and the strict management/mitigation measures as specified in the approved OSMP (2014) and Section 8.1 of this report must be applied to development in or near these areas.
- The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ. This requires active management and maintenance.
- A comprehensive Rehabilitation Plan must be compiled and implemented. Only indigenous plant species typical of the local vegetation should be used for rehabilitation purposes. This requires active management and maintenance.
- An Erosion Management Plan must be developed prior to the commencement of construction activities to mitigate the unnecessary loss of topsoil and runoff. This requires active management and maintenance.
- Lay down areas must not be located within any watercourses or drainage lines.

7.3 Ecological Statement and Opinion of the Specialists

According to the results of the DFFE Screening Report, the Terrestrial Biodiversity theme for the project area is classified as VERY HIGH.

The ecological features likely contributing to the very high sensitivity rating include the location of the proposed project within a Marine Protected Area, namely the Addo Elephant National Park Marine Protected Area. On land, however, the project area falls within the Coega IDZ and therefore does not constitute a nationally protected or conservation area. However, the project area does fall within the Coastal Protection Zone vegetated by Cape Seashore Vegetation along the foredune areas and St Francis Dune Thicket in areas protected from direct sea spray. St Francis Dune Thicket in the project area has been invaded by relatively thick pockets of *Acacia cyclops* but still supports several indigenous plant species, including SCC's, and has a well-developed canopy in some dune slacks.

Another factor is the likely occurrence of highly sensitive and/or threatened plant and animal species within the project area.

Out of the thirty-four (34) plant SCC identified as potentially occurring within the project area, the presence of eight (8) species were confirmed on site, while the probability of occurrence for five (5) species is considered very high, eighteen (18) considered medium likelihood, and three (3) low. In terms of fauna, no SCC were confirmed present on site, however two (2) SCC are highly likely to occur, particularly within the thicket and bontveld vegetation types.

Based on the findings of the site investigation and the high likelihood of occurrence for some plant and faunal SCC, as well as the low rehabilitation potential of affected ecosystems once disturbed, it was established that Grassridge Bontveld is highly sensitive while St Francis Dune Thicket and Sundays Valley Thicket are medium sensitivity. St Francis Dune Thicket was considered to have a very low sensitivity. This sensitivity rating is valid despite all ecosystems being classified as Least Concern on the SANBI Red List of Ecosystems (2021). As such, it can be expected that the proposed project will negatively affect key biodiversity features.

However, considering the nature of the proposed development, which is mostly linear, and the size, which is relatively small, the expected loss of biodiversity can be considered minimal. However small this still most likely will contribute to the cumulative loss of key biodiversity features within the wider project area, such as the Coega SEZ. For example, the continuous development within the SEZ and expansion is predicted to have a significant negative impact on, for example, Grassridge Bontveld vegetation in the future and the long-term impact could be significant (Mucina & Rutheford, 2006-2018).

No development on the other hand could negatively influence future investment within the Coega SEZ, an area specifically zoned for industry and development.

Overall, the ecological impacts of the proposed development were assessed and considered to be acceptable provided the mitigation measures outlined in this report are implemented. To reiterate, the implementation of the recommended mitigation measures is critical to ensure this development is ecologically sound. In addition, it is important that the Alien Vegetation Management Plan developed for the Coega SEZ is implemented and adhered to during the construction and operational phase of the proposed development to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ. Further mitigation could involve eradicating alien invasive species from the surrounding areas to minimise the cumulative ecological impacts associated with the proposed development.

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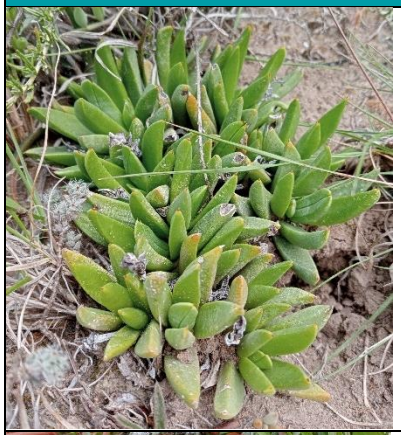
APPENDIX 1: LIST OF PLANTS

Table A1: Plant species occurring within the project area.

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Acanthaceae	*Blepharis procumbens*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Acanthaceae	*Dyschoriste setigera*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Apiaceae	*Dasispermum suffruticosum*	LC	-	-	-	S3; S4	Cape Seashore Vegetation
	Aizoaceae	*Aizoon glinoides*	LC	Schedule 4	-	-	All sites (mainly within previously disturbed areas such as road sides, etc)	Cape Seashore Vegetation; Grassridge Bontveld; Sundays Valley Thicket; Sundays Mesic Thicket
	Aizoaceae	*Aizoon rigidum*	LC	Schedule 4	-	-	S1; S2; S5; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Aizoaceae	*Bergeranthus scapiger*	LC	Schedule 4	-	-	S5	Grassridge Bontveld
	Aizoaceae	*Carpobrotus deliciosus*	LC	Schedule 4	-	-	S1; S2; S3; S4; S5; S6; S8	Grassridge Bontveld; Cape Seashore Vegetation; St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Aizoaceae	*Delosperma litorale*	LC	Schedule 4	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Aizoaceae	*Drosanthemum intermedium*	LC	Schedule 4	-	-	S1; S2; S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Aizoaceae	*Glottiphyllum longum*	LC	Schedule 4	-	-	S5	Grassridge Bontveld
	Aizoaceae	Rhombophyllum rhomboideum	EN	Schedule 4	-	-	S1	Grassridge Bontveld
	Aizoaceae	*Ruschia orientalis*	LC	Schedule 4	-	-	S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Aizoaceae	*Mesembryanthemum aitonis*	LC	Schedule 4	-	-	S1; S2; S4; S5	Grassridge Bontveld; Cape Seashore Vegetation
	Aizoaceae	*Tetragonia decumbens*	LC	Schedule 4	-	-	S1; S5; S3; S4	Grassridge Bontveld; Cape Seashore Vegetation

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Aizoaceae	*Trichodiadema intonsum*	LC	Schedule 4	-	-	S1; S5; S6	Grassridge Bontveld
	Amaryllidaceae	*Boophone disticha*	LC	Schedule 4	-	-	S5; S8	Grassridge Bontveld
	Amaryllidaceae	*Haemanthus coccineus*	LC	Schedule 4	-	-	S5; S6	Grassridge Bontveld
	Anacardioideae	*Searsia incisa*	LC	-	-	-	S6; S7	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Anacardioideae	*Searsia longispina*	LC	-	-	-	S1; S2; S6; S7	Grassridge Bontveld Sundays Valley Thicket
	Anacardioideae	*Searsia lucida*	LC	-	-	-	S1; S2; S3; S5; S6; S7; S9	Grassridge Bontveld St Francis Dune Thicket; Sundays Mesic Thicket
	Anacardioideae	Searsia crenata	LC	-	-	-	S2; S3	Grassridge Bontveld; St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Apocynaceae	Carissa bispinosa	LC	Schedule 4	-	-	S5; S6; S7; S9	Grassridge Bontveld; Sundays Mesic Thicket; Sundays Valley Thicket
	Apocynaceae	Cynanchum africanum	LC	Schedule 4	-	-	S3	St Francis Dune Thicket
	Apocynaceae	*Cynanchum ellipticum*	LC	Schedule 4	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Apocynaceae	Cynanchum obtusifolium	LC	Schedule 4	-	-	All sites	Grassridge Bontveld; Cape Seashore Vegetation; St Francis Dune Thicket; Sundays Valley Thicket; Sundays Mesic Thicket
	Apocynaceae	*Cynanchum viminale*	LC	Schedule 4	-	-	S1; S2; S5; S6; S7; S8; S9	Grassridge Bontveld; Sundays Valley Thicket; Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Apocynaceae	*Duvalia cf caespitosa*	LC	Schedule 4	-	-	S5	Grassridge Bontveld
	Apocynaceae	*Gomphocarpus physocarpus*	LC	Schedule 4	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Apocynaceae	*Pachypodium bispinosum*	LC	Schedule 4	-	-	S6	Grassridge Bontveld
	Araliaceae	*Cussonia spicata*	LC	-	-	-	S3; S7; S9	Sundays Mesic Thicket; Sundays Valley Thicket; St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Araliaceae	*Cussonia thyrsiflora*	LC	-	-	-	S3	St Francis Dune Thicket
	Asteaceae	*Acyranthemum sordescens*	VU	-	-	-		St Francis Dune Thicket
	Asteraceae	*Arctotheca populifolia*	LC	-	-	-	S4	Cape Seashore Vegetation

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Brachylaena discolor*	LC	-	-	-	S3; S6	St Francis Dune Thicket
	Asteraceae	*Brachylaena ilicifolia*	LC	-	-	-	S9	Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Berkheya heterophylla*	LC	-	-	-	S1; S5	Grassridge Bontveld
	Asteraceae	*Cineraria geifolia*	LC	-	-	-	S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Cotula discolor*	LC	-	-	-	S3; S4	Cape Seashore Vegetation; St Francis Dune Thicket
	Asteraceae	*Curio radicans*	LC	-	-	-	S5; S7	Grassridge Bontveld; Sundays Valley Thicket
	Asteraceae	*Dicerothamnus rhinocerotis*	LC	-	-	-	S3	St Francis Dune Thicket

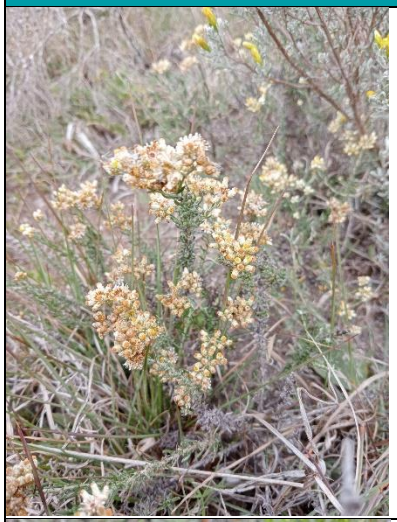
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Dimorphotheca cuneata*	LC	-	-	-	S6	Grassridge Bontveld
	Asteraceae	*Disparago tortilis*	LC	-	-	-	S2	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Eriocephalus africanus*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Asteraceae	*Euryops algoensis*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld

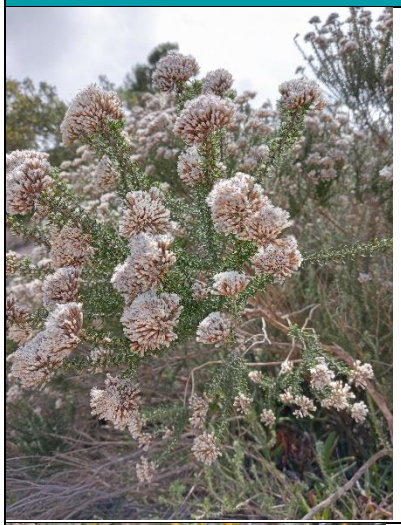
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Osteospermum imbricatum*	Not assessed	-	-	-	S1; S6	Grassridge Bontveld
	Asteraceae	*Chrysocoma ciliata*	LC	-	-	-	S1; S2; S3; S5; S6; S8	Grassridge Bontveld; St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Crassothonna cacalioides*	LC	-	-	-	S5	Grassridge Bontveld
	Asteraceae	*Osteospermum moniliferum*	LC	-	-	-	All sites	Grassridge Bontveld; St Francis Dune Thicket; Cape Seashore Vegetation; Sundays Valley Thicket; Sundays Mesic Thicket

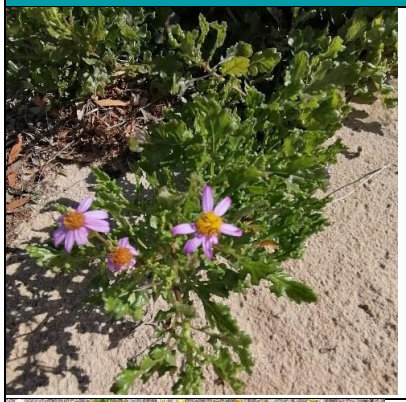
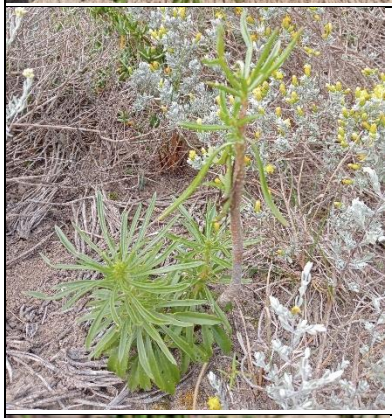
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Gazania rigens*	LC	-	-	-	All sites	Grassridge Bontveld Cape Seashore Vegetation; Sundays Valley Thicket; Sundays Mesic Thicket
	Asteraceae	*Helichrysum tinctum*	LC	-	-	-	S3; S4	Cape Seashore Vegetation

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Helichrysum rosum*	LC	-	-	-	S5; S6	Grassridge Bontveld
	Asteraceae	*Helichrysum albanense*	LC	-	-	-	S1; S2	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Felicia amoena*	LC	-	-	-	S3	St Francis Dune Thicket
	Asteraceae	*Felicia filifolia*	LC	-	-	-	S6	Grassridge Bontveld
	Asteraceae	*Chrysocoma rigidula*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Metalasia muricata*	LC	-	-	-	S3	St Francis Dune Thicket / Cape Seashore Vegetation
	Asteraceae	*Pteronia incana*	LC	-	-	-	S1; S2; S5; S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Senecio ilicifolius*	LC	-	-	-	S1; S2	Grassridge Bontveld Dune
	Asteraceae	*Senecio burchellii*	LC	-	-	-	S1; S2; S3; S4; S5	Grassridge Bontveld; Cape Seashore Vegetation; St Francis Dune Thicket

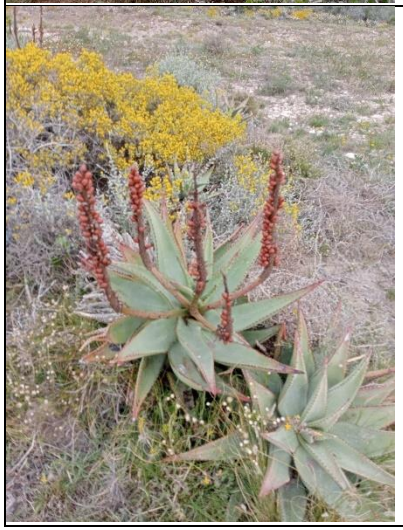
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Senecio elegans*	LC	-	-	-	S4	Cape Seashore Vegetation
	Asteraceae	*Senecio linifolius*	LC	-	-	-	S6; S7	Grassridge Bontveld
	Asteraceae	*Senecio litorosus*	LC	-	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asteraceae	*Tarchonanthus littoralis*	LC	-	-	-	S3	St Francis Dune Thicket
	Asparagaceae	*Albuca setosa*	LC	-	-	-	S1; S2	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asparagaceae	*Asparagus aethiopicus*	LC	-	-	-	S1; S2	Grassridge Bontveld
	Asparagaceae	*Asparagus densiflorus*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asparagaceae	*Asparagus burchellii*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld
	Asparagaceae	*Asparagus striatus*	LC	-	-	-	S1; S2; S5; S6; S7; S8;	Grassridge Bontveld; Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asparagaceae	*Drimia anomala*	LC	-	-	-	S1; S2; S5; S6	Grassridge Bontveld
	Asparagaceae	*Eriospermum sp.*	LC	-	-	-	S8	Grassridge Bontveld
	Asparagaceae	*Sansevieria hyacinthoides*	LC	-	-	-	S7	Grassridge Bontveld; Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asphodelaceae	*Aloe africana*	LC	Schedule 4	-	-	S7	Sundays Valley Thicket
	Asphodelaceae	*Aloe ferox*	LC	-	-	-	S6; S7; S8	Grassridge Bontveld; Sundays Valley Thicket

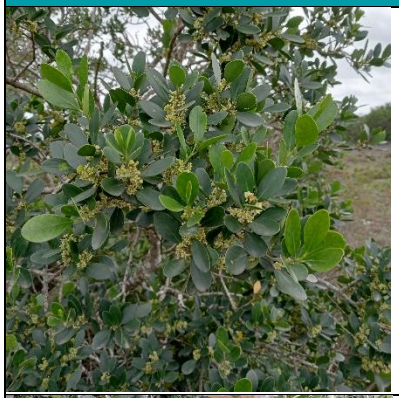
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asphodelaceae	*Aloe pluridens*	LC	Schedule 4	-	-	S9	Sundays Mesic Thicket
	Asphodelaceae	*Bulbine latifolia*	LC	-	-	-	S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Asphodelaceae	*Bulbine narcissifolia*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld
	Asphodelaceae	*Bulbine frutescens*	LC	-	-	-	S1; S2	Grassridge Bontveld
	Asphodelaceae	*Gasteria bicolor*	LC	-	-	-	S6; S7	Grassridge Bontveld; Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Boraginaceae	*Ehretia rigida*	LC	-	-	-	S6; S7	Grassridge Bontveld Sundays Valley Thicket
	Boraginaceae	*Lobostemon trigonus*	LC	-	-	-	S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Brassicaceae	*Heliophila subulata*	LC	-	-	-	S1; S2; S5; S8	Grassridge Bontveld
	Campanulaceae	*Wahlenbergia tenella*	LC	-	-	-	S1; S2; S3; S5; S6; S8	Grassridge Bontveld St Francis Dune Thicket
	Capparaceae	*Maerua cafra*	LC	-	-	-	S7; S9	Sundays Valley Thicket; Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Celastraceae	*Lauridia tetragona*	LC	-	-	-	S1; S2; S6; S9	Grassridge Bontveld Sundays Mesic Thicket
	Celastraceae	*Maytenus procumbens*	LC	-	-	-	S1; S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Celastraceae	*Pterocelastrus tricuspidatus*	LC	-	-	-	S5; S9	Grassridge Bontveld Sundays Mesic Thicket
	Celastraceae	*Putterlickia pyracantha*	LC	-	-	-	S1; S2; S7	Grassridge Bontveld; Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Colchicaceae	*Colchicum eucomoides*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld
	Convolvulaceae	*Falkia repens*	LC	-	-	-	S1; S5	Grassridge Bontveld
	Crassulaceae	*Crassula calcarea*	Not yet assessed	-	-	-	S8	Grassridge Bontveld

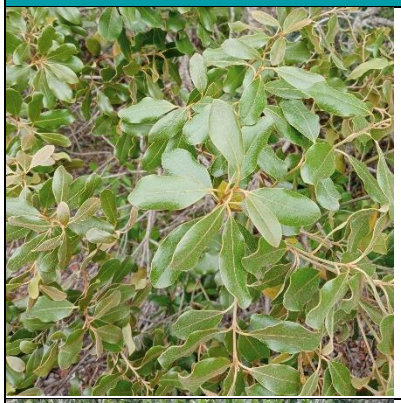
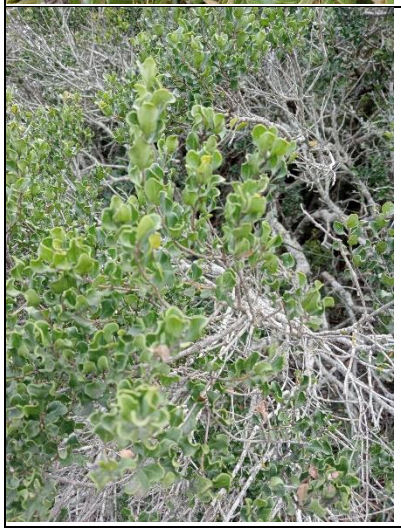
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Crassulaceae	*Crassula capitella*	LC	-	-	-	S5	Grassridge Bontveld
	Crassulaceae	*Crassula cotyledonis*	LC	-	-	-	S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Crassulaceae	*Cotyledon velutina*	LC	-	-	-	S5	Grassridge Bontveld
	Crassulaceae	*Adromischus cristatus*	LC	-	-	-	S8	Grassridge Bontveld
	Crassulaceae	*Crassula ericoides*	LC	-	-	-	S1; S2; S5; S8	Grassridge Bontveld

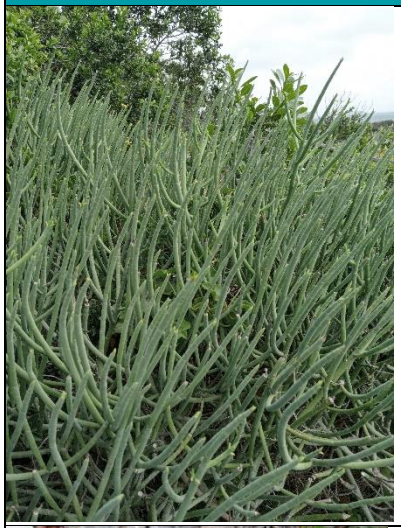
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Crassulaceae	*Crassula expansa*	LC	-	-	-	S1; S5	Grassridge Bontveld
	Crassulaceae	*Crassula muscosa*	LC	-	-	-	S1; S5; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Crassulaceae	*Crassula nudicaulis*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Crassulaceae	*Crassula tetragona*	LC	-	-	-	S5	Grassridge Bontveld
	Cyperaceae	*Ficinia truncata*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Cyperaceae	*Ficinia lateralis*	LC	-	-	-	S1; S3; S4	Grassridge Bontveld; Cape Seashore Vegetation
	Didiereaceae	*Portulacaria afra*	LC	-	-	-	S7	Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Ebenaceae	*Euclea racemosa*	LC	-	-	-	S3	St Francis Dune Thicket
	Ebenaceae	*Euclea undulata*	LC	-	-	-	S3; S5; S6; S7	Grassridge Bontveld; St Francis Dune Thicket; Sundays Valley Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Euphorbiaceae	*Euphorbia caerulescens*	LC	-	-	-	S9	Sundays Mesic Thicket
	Euphorbiaceae	*Euphorbia clava*	LC	-	-	-	S9	Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Euphorbiaceae	*Euphorbia mauritanica*	LC	-	-	-	S6; S9	Grassridge Bontveld; Sundays Mesic Thicket
	Euphorbiaceae	*Euphorbia meloformis*	NT	Schedule 4	Protected	-	S5; S8	Grassridge Bontveld

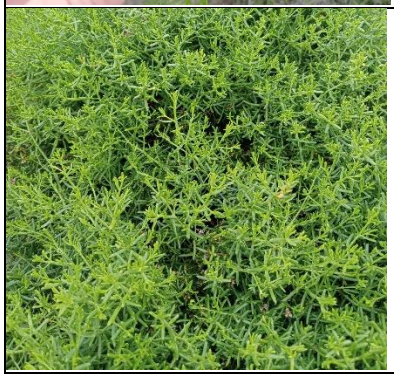
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Euphorbiaceae	*Euphorbia globosa*	EN	Schedule 4	-	-	S8	Grassridge Bontveld
	Euphorbiaceae	*Euphorbia stellata*	LC	-	-	-	S6; S8	Grassridge Bontveld
	Euphorbiaceae	*Euphorbia triangularis*	LC	-	-	-	S9	Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Fabaceae	*Aspalathus subtingens*	LC	-	-	-	S3	St Francis Dune Thicket
	Fabaceae	*Lessertia frutescens*	LC	-	-	-	S3; S4	St Francis Dune Thicket;
	Fabaceae	*Lotononis pungens*	LC	-	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Fabaceae	*Lotononis umbellata*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld
	Fabaceae	*Indigofera porrecta*	LC	-	-	-	S1; S2; S5; S8	Grassridge Bontveld
	Fabaceae	*Indigofera verrucosa*	LC	-	-	-	S1; S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Fabaceae	*Indigofera disticha*	LC	-	-	-	S1; S2; S5; S8	Grassridge Bontveld
	Fabaceae	*Psoralea repens*	NT	-	-	-	S3; S4	Cape Seashore Vegetation
	Fabaceae	*Rhynchosia caribaea*	LC	-	-	-	S1; S2	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Fabaceae	*Schotia afra*	LC	-	-	-	S9	Sundays Mesic Thicket
	Fabaceae	*Tephrosia capensis*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Fabaceae	*Vachellia karroo*	LC	-	-	-	S3	St Francis Dune Thicket
	Gentianaceae	*Chironia baccifera*	LC	-	-	-	S3; S4	Cape Seashore Vegetation

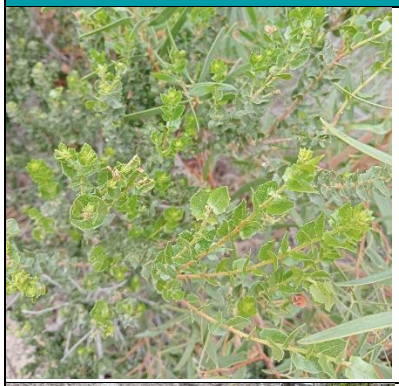
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Geraniaceae	*Monsonia emarginata*	LC	-	-	-	S1; S5	Grassridge Bontveld
	Geraniaceae	*Pelargonium reniforme*	NT	-	-	-	S6	Grassridge Bontveld
	Geraniaceae	*Pelargonium sidoides*	LC	-	-	-	S1; S2; S5	Grassridge Bontveld

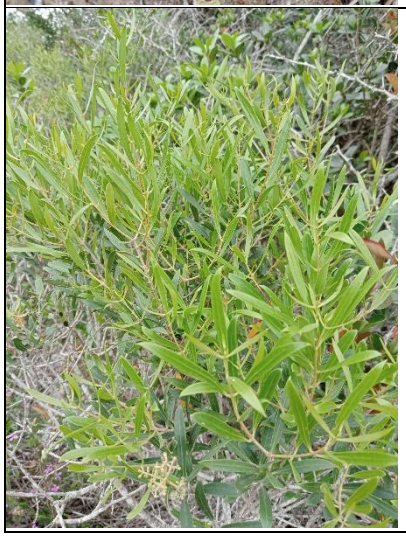
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Geraniaceae	*Pelargonium lobatum*	LC	-	-	-	S5	Grassridge Bontveld
	Goodeniaceae	*Scaevola plumieri*	LC	-	-	-	S4	Cape Seashore Vegetation
	Hyacinthaceae	*Ledebouria coriacea*	CR	-	-	-	S1; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Hyacinthaceae	*Ledebouria revoluta*	LC	-	-	-	S1; S2; S5; S8; S6	Grassridge Bontveld
	Hypoxidaceae	*Hypoxis stellipilis*	LC	-	-	-	S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Iridaceae	*Babiana sambucina*	LC	Schedule 4	-	-	S6	Grassridge Bontveld
	Iridaceae	*Freesia corymbosa*	LC	Schedule 4	-	-	S1; S2; S5; S8	Grassridge Bontveld
	Iridaceae	*Gladiolus wilsonii*	LC	Schedule 4	-	-	S1; S2; S5; S8	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Malvaceae	*Hermannia salviifolia*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Malvaceae	*Hermannia althaeoides*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Malvaceae	*Abutilon sonneratianum*	LC	-	-	-	S5	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Myricaceae	*Morella cordifolia*	LC	-	-	-	S3	St Francis Dune Thicket
	Orchidaceae	*Acrolophia cochlearis*	LC	Schedule 4	-	-	S1	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Agavaceae	*Chlorophytum crispum*	LC	-	-	-	S5	Grassridge Bontveld
	Oleaceae	*Olea exasperata*	LC	-	-	-	S1; S2; S3; S5; S6	St Francis Dune Thicket; Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Oxalidaceae	*Oxalis algoensis*	LC	-	-	-	S1	Grassridge Bontveld
	Peraceae	*Clutia daphnoides*	LC	-	-	-	S3; S6	Grassridge Bontveld Dunes
	Plantaginaceae	*Plantago lanceolata*	LC	-	-	-	S1; S2; S4; S5; S6; S7; S8; S9	All vegetation types (except Cape Seashore Vegetation)

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
No image available, sample taken	Poaceae	*Cynodon incompletus*	LC	-	-	-	S1; S2; S5;S6	Grassridge Bontveld
	Poaceae	*Digitaria argyrograpta*	LC	-	-	-	S1; S2; S5; S6	Grassridge Bontveld
	Poaceae	Ehrharta calycina	LC	-	-	-	S1; S5	Grassridge Bontveld
No image available, sample taken	Poaceae	*Eragrostis curvula*	LC	-	-	-	S1; S2; S5;S6	Grassridge Bontveld

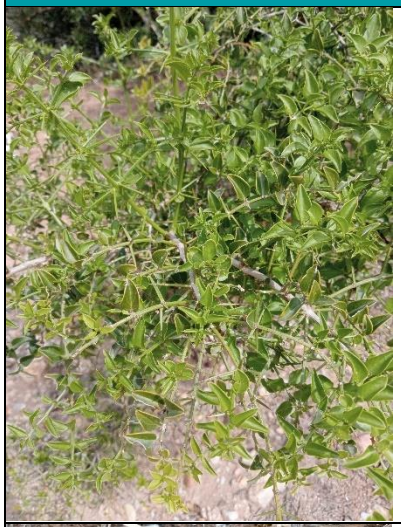
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
No image available, sample taken	Poaceae	*Eustachys paspaloides*	LC	-	-	-	S1; S2; S5;S6	Grassridge Bontveld
No image available, sample taken	Poaceae	*Helictotrichon capense*	LC	-	-	-	S1; S2; S5;S6	Grassridge Bontveld
No image available, sample taken	Poaceae	*Panicum maximum*	LC	-	-	-	S1; S2; S5;S6	Grassridge Bontveld
	Poaceae	*Themeda triandra*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Poaceae	*Thinopyrum distichum*		-	-	-	S4	Cape Seashore Vegetation

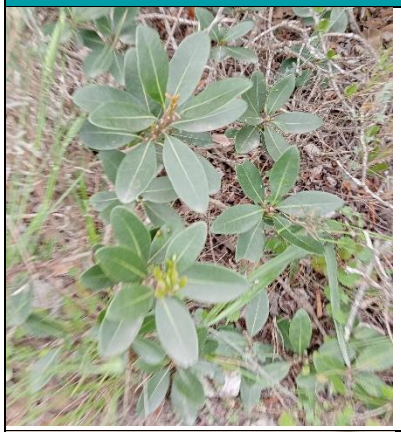
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Polygalaceae	*Muraltia squarrosa*	LC	-	-	-	S1; S5	Grassridge Bontveld
	Polygalaceae	*Polygala ericaefolia*	LC	-	-	-	S6	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Polygalaceae	*Polygala virgata*	LC	-	-	-	S6	Grassridge Bontveld
	Rhamnaceae	*Scutia myrtina*	LC	-	-	-	S5; S6; S9	Grassridge Bontveld; Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Rutaceae	*Acmadenia obtusata*	LC	-	-	-	S1; S2; S5; S6; S8	Grassridge Bontveld
	Rutaceae	*Agathosma apiculata*	LC	-	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Santalaceae	*Colpoon compressum*	LC	-	-	-	S1; S2; S3; S5	Grassridge Bontveld; St Francis Dune Thicket
	Santalaceae	*Rhoiacarpos capensis*	LC	-	-	-	S6; S9	Grassridge Bontveld; Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Salvadoraceae	*Azima tetracantha*	LC	-	-	-	S1; S2; S6; S7; S9	St Francis Dune Thicket; Grassridge Bontveld; Sundays Valley Thicket; Sundays Mesic Thicket
	Sapindaceae	*Hippobromus pauciflorus*	LC	-	-	-	S6; S9	Grassridge Bontveld; Sundays Mesic Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Sapotaceae	*Sideroxylon inerme*	LC	-	-	Protected	S1; S2; S3; S5; S6; S7; S9	St Francis Dune Thicket; Grassridge Bontveld; Sundays Mesic Thicket; Sundays Valley Thicket
	Scrophulariaceae	*Hebenstretia integrifolia*	LC	-	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Scrophulariaceae	*Jamesbrittenia microphylla*	LC	-	-	-	S1; S2; S5; S6	Grassridge Bontveld
	Scrophulariaceae	*Nemesia bicornis*	LC	-	-	-	S3	St Francis Dune Thicket
	Scrophulariaceae	*Nemesia fruticans*	LC	-	-	-	S1	Grassridge Bontveld

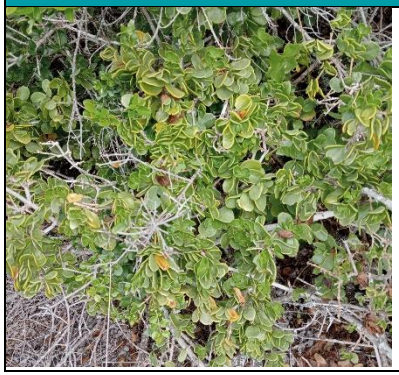
Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Scrophulariaceae	*Chaenostoma cordatum*	LC	-	-	-	S1; S2; S8	Grassridge Bontveld
	Scrophulariaceae	*Chaenostoma polyanthum*	LC	-	-	-	S1	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Scrophulariaceae	*Selago canescens*	LC	-	-	-	S3	St Francis Dune Thicket
	Scrophulariaceae	*Selago corymbosa*	LC	-	-	-	S1; S2; S3	Grassridge Bontveld; St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Solanaceae	*Lycium ferocissimum*	LC	-	-	-	S1	Grassridge Bontveld
	Solanaceae	*Solanum africanum*	LC	-	-	-	S3; S4	Cape Seashore Vegetation
	Solanaceae	*Solanum linnaeanum*	LC	-	-	-	S3	St Francis Dune Thicket

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Thymelaeaceae	*Passerina corymbosa*	LC	-	-	-	S1;S2; S5; S6; S8	Grassridge Bontveld
	Thymelaeaceae	*Passerina rigida*	LC	-	-	-	S3; S4	St Francis Dune Thicket Cape Seashore Vegetation

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Zygophyllaceae	*Roepera divaricata*	EN	-	-	-	S5	Grassridge Bontveld
	Zygophyllaceae	*Roepera maritima*	LC	-	-	-	S1; S2; S3; S4	Grassridge Bontveld

Photograph	Family	Species	Red List Status	PNCO	NEM:BA	Protected Tree	Sample Site	Vegetation Type
	Zygophyllaceae	*Roepera morgsana*	LC	-	-	-	S5	Grassridge Bontveld

APPENDIX 2: LIST OF HERPETOFAUNA

Table A2: Herpetofauna which may occur within the project area.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
AMPHIBIA (Amphibians), *n=17* (SANBI 2004, Measey 2010 & 2014, IUCN 2022, PNCO 1974)							
Common River Frog	*Amietia delalandii*	Least Concern	No	-	Schedule II	-	-
Cape River Frog	*Amietia fuscigula*	Least Concern	**Yes**	-	Schedule II	-	-
Eastern Leopard Toad	*Sclerophys pardalis*	Least Concern	**Yes**	-	Schedule II	-	-
Raucous Toad	*Sclerophys capensis*	Least Concern	**Yes**	-	Schedule II	**X**	-
Bushveld Rain Frog	*Breviceps adspersus*	Least Concern	No	-	Schedule II	-	-
Southern Rain Frog	*Breviceps pentheri*	Least Concern	No	-	Schedule II	**X**	-
Boettger's Caco	*Cacosternum boettgeri*	Least Concern	No	-	Schedule II	-	-
Bronze Caco	*Cacosternum nanum*	Least Concern	**Yes**	-	Schedule II	-	-
Painted Reed Frog	*Hyperolius marmoratus*	Least Concern	No	-	Schedule II	**X**	-
Yellow-striped Reed Frog	*Hyperolius semidiscus*	Least Concern	*Near*	-	Schedule II	-	-
Bubbling Kassina	*Kassina senegalensis*	Least Concern	No	-	Schedule II	-	-
Rattling Frog	*Semnodactylus wealii*	Least Concern	**Yes**	-	Schedule II	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
Striped Stream Frog	*Strongylopus fasciatus*	Least Concern	No	-	Schedule II	-	-
Clicking Stream Frog	*Strongylopus grayii*	Least Concern	**Yes**	-	Schedule II	**X**	-
Cape Sand Frog	*Tomopterna delelandii*	Least Concern	**Yes**	-	Schedule II	-	-
Cape Sand Toad	*Vandijkophrynus angusticeps*	Least Concern	**Yes**	-	Schedule II	-	-
African Clawed Frog	*Xenopus laevis*	Least Concern	No	-	Schedule II	-	-
TESTUDINATA (Turtles and Tortoises), *n=8* (SARCA 2014, IUCN 2022, PNCO 1974)							
Leopard Tortoise	*Stigmochelys pardalis*	Least Concern	No	Appendix II	Schedule II	-	-
Angulate Tortoise	*Chersina angulata*	Least Concern	*Near*	Appendix II	Schedule II	**X**	-
Parrot-beaked Tortoise	*Homopus areolatus*	Least Concern	**Yes**	Appendix II	Schedule II	**X**	-
Marsh Terrapin	*Pelomedusa subrufa*	Least Concern	No	-	Schedule II	-	-
Loggerhead Turtle	Caretta caretta	Vulnerable	No	Appendix I	Schedule II	-	-
Green Turtle	Chelonia mydas	Near Threatened	No	Appendix I	Schedule II	**X**	-
Olive Ridley Turtle	Lepidochelys olivacea	Data Deficient	No	Appendix I	Schedule II	-	-
Leatherback Turtle	Dermochelys coriacea	Endangered	No	Appendix I	Schedule II	-	-
LACERTILIA (Lizards), *n=26* (SARCA 2014, IUCN 2022, PNCO 1974)							

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
Thin-tailed Legless Skink	*Acontias gracilicauda*	Least Concern	**Yes**	-	Schedule II	-	-
Algoa Bay Legless Skink	*Acontias lineicauda*	Least Concern	**Yes**	-	Schedule II	**X**	-
Cape Legless Skink	*Acontias meleagris*	Least Concern	**Yes**	-	Schedule II	-	-
Eastern Cape Legless Skink	*Acontias orientalis*	Least Concern	**Yes**	-	Schedule II	**X**	-
Marbled Leaf-toed Gecko	*Afrogecko porphyreus*	Least Concern	**Yes**	-	Schedule II	-	-
Southern Rock Agama	*Agama atra*	Least Concern	*Near*	-	Schedule II	-	-
Elandsberg Dwarf Chameleon	*Bradypodion taeniabronchum*	Endangered	**Yes**	Appendix II	Schedule II	**X**	-
Eastern Cape Dwarf Chameleon	*Bradypodion ventrale*	Least Concern	**Yes**	Appendix II	Schedule II	**X**	-
Cape Grass Lizard	*Chamaesaura anguina anguina*	Least Concern	**Yes**	-	Schedule II	-	-
Cape Girdled Lizard	*Cordylus cordylus*	Least Concern	*Near*	Appendix II	Schedule II	-	-
Common Tropical House Gecko	*Hemidactylus mabouia*	Least Concern	No	-	Schedule II	**X**	**Yes**
Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*	Least Concern	No	-	Schedule II	-	-
Cape Dwarf Gecko	*Lygodactylus capensis*	Least Concern	No	-	Schedule II	**X**	-
Spotted Sandveld Lizard	*Nucras intertexta*	Least Concern	No	-	Schedule II	-	**Yes**
Delalande's Sandveld Lizard	*Nucras lalandii*	Least Concern	**Yes**	-	Schedule II	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
Spotted Gecko	*Pachydactylus maculatus*	Least Concern	*Near*	-	Schedule II	**X**	-
Common Sand Lizard	*Pedioplanis lineoocellata pulchella*	Least Concern	*Near*	-	Schedule II	-	-
Cape Crag Lizard	*Pseudocordylus microlepidotus*	Least Concern	**Yes**	Appendix II	Schedule II	-	-
Algoa Dwarf Burrowing Skink	*Scelotes anguineus*	Least Concern	**Yes**	-	Schedule II	**X**	-
FitzSimons' Long-tailed Seps	*Tetradactylus fitzsimonsi*	Vulnerable	**Yes**	-	Schedule II	-	-
Short-legged Seps	*Tetradactylus seps*	Least Concern	**Yes**	-	Schedule II	-	-
Cape Skink	*Trachylepis capensis*	Least Concern	No	-	Schedule II	-	**X**
Red-sided Skink	*Trachylepis homalocephala*	Least Concern	**Yes**	-	Schedule II	-	-
Variable Skink	*Trachylepis varia*	Least Concern	No	-	Schedule II	-	-
Rock Monitor	*Varanus albigularis*	Least Concern	No	Appendix II	Schedule II	-	-
Water Monitor	*Varanus niloticus*	Least Concern	No	Appendix II	Schedule II	**X**	-
SERPENTES (Snakes), *n=29* (SARCA 2014, IUCN 2022, PNCO 1974)							
Cape Coral Cobra	*Aspidelaps lubricus lubricus*	Least Concern	No	-	-	-	-
Rhombic Egg Eater	*Dasypeltis scabra*	Least Concern	No	-	Schedule II	-	-
Boomslang	*Dispholidus typus typus*	Least Concern	No	-	-	**X**	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
Red-lipped Herald Snake	*Crotaphopeltis hotamboeia*	Least Concern	No	-	-	**X**	-
Yellow-bellied House Snake	*Lamprophis fuscus*	Least Concern	**Yes**	-	Schedule II	-	-
Aurora Snake	*Lamprophis aurora*	Least Concern	**Yes**	-	Schedule II	-	-
Cape Cobra	*Naja nivea*	Least Concern	No	-	-	-	-
Rinkhals	*Hemachatus haemachatus*	Least Concern	*Near*	-	-	-	-
Yellow-bellied Sea Snake	*Hydrophis platurus*	Least Concern	No	-	-	-	-
Puff adder	*Bitis arietans*	Least Concern	No	-	-	-	-
Common Slug Eater	*Duberria lutrix*	Least Concern	**Yes**	-	Schedule II	**X**	-
Cape Cobra	*Naja nivea*	Least Concern	No	-	-	-	-
Cross-marked Grass Snake	*Psammophis crucifer*	Least Concern	*Near*	-	-	-	-
Mole Snake	*Pseudaspis cana*	Least Concern	No	-	Schedule II	-	-
Karoo Whip Snake	*Psammophis notostictus*	Least Concern	No	-	Schedule II	**X**	**Yes**
South Eastern Green Snake	*Philothamnus hoplogaster*	Least Concern	No	-	Schedule II	-	-
Western Natal Green Snake	*Philothamnus occidentalis*	Least Concern	**Yes**	-	Schedule II	-	-
Spotted Bush Snake	*Philothamnus semivariegatus*	Least Concern	No	-	Schedule II	-	-
Spotted Grass Snake	*Psammophylax rhombeatus*	Least Concern	No	-	-	-	-

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS	ENDEMIC	CITES	ECENCO	QDS CODE (ADU, 2011) 3325DC	CONFIRMED SIGHTINGS
Sensitive Species 18	-	Critically Endangered	**Yes**	-	-	-	-
Rhombic Night Adder	*Causus rhombeatus*	Least Concern	No	-	-	-	-
Brown House Snake	*Boaedon capensis*	Least Concern	No	-	-	-	-
Cape Wolf Snake	*Lycophidion capense capense*	Least Concern	No	-	Schedule II	-	-
Spotted Harlequin Snake	*Homoroselaps lacteus*	Least Concern	**Yes**	-	-	-	-
Black Thread Snake	*Leptotyphlops nigricans*	Least Concern	**Yes**	-	-	-	-
Olive Snake	*Lycodonomorphus inornatus*	Least Concern	**Yes**	-	Schedule II	-	-
Brown Water Snake	*Lycodonomorphus rufulus*	Least Concern	No	-	Schedule II	-	-
Dusky-bellied Water Snake	*Lycodonomorphus laevissimus*	Least Concern	No	-	Schedule II	-	-
Sundevall's Shovel-snout	*Prosymna sundevallii*	Least Concern	*Near*	-	Schedule II	-	-

APPENDIX 3: LIST OF MAMMALS

Table A3: Mammal species which may occur within the project area.

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO EC	QDS CODE (ADU, 2011, 3325DC)	CONFIRMED SIGHTINGS
CARNIVORA							
Striped Polecat	*Ictonyx striatus*	Least Concern	No	-	-	-	
Aardwolf	*Proteles cristata*	Least Concern	No	-	-	-	
Black-backed Jackal	*Canis mesomelas*	Least Concern	No	-	-	-	
Bat-eared Fox	*Otocyon megalotis*	Least Concern	No	-	Schedule II	-	
African Clawless Otter	*Aonyx capensis*	Near Threatened	No	Protected	-	-	
Cape Grey Mongoose	*Herpestes pulverulenta*	Least Concern	*Near*	-	-	-	
Yellow Mongoose	*Cynictis penicillata*	Least Concern	No	-	-		
Large Grey Mongoose	*Herpestes ichneumon*	Least Concern	No	-	-	-	
Caracal	*Caracal caracal*	Least Concern	No	-	-	-	
African Wildcat	*Felis silvestris*	Least Concern	No	-	-	-	
Southern Small-spotted Genet	*Genetta genetta*	Least Concern	No	-	-	-	
Large-spotted Genet	*Genetta tigrina*	Least Concern	No	-	-		
Water Mongoose	*Atilax paludinosus*	Least Concern	No	-	-	-	
Honey Badger	*Mellivora capensis*	Least Concern	No	Protected	-	-	

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO EC	QDS CODE (ADU, 2011, 3325DC)	CONFIRMED SIGHTINGS
ARTIODACTYLA							
Common Duiker	*Sylvicapra grimmia*	Least Concern	No	-	Schedule II		
Bushpig	*Potamochoerus larvatus*	Least Concern	No	-	-		
Bushbuck	*Tragelaphus sylvaticus*	Least Concern	No	-	Schedule II		
Steenbok	*Raphicerus campestris*	Least Concern	No	-	Schedule II		
Cape Grysbok	*Raphicerus melanotis*	Least Concern	**Yes**	-	Schedule II		
Sensitive Species 5	-	Vulnerable	No	Vulnerable	Schedule II		
Chacma Baboon	*Papio ursinus*	Least Concern	No	-	-		
Vervet Monkey	*Chlorocebus pygerythrus*	Least Concern	No	-	-		
HYRACOIDEA							
Rock Hyrax	*Procavia capensis*	Least Concern	No	-	-		
RODENTIA							
Cape Porcupine	*Hystrix africaeaustralis*	Least Concern	No	-	-		
Natal Molerat	*Cryptomys natalensis*	Least Concern	No	-	-		
Cape Mole Rat	*Georychus capensis*	Least Concern	**Yes**	-	-		
Common Mole-Rat	*Cryptomys hottentotus*	Least Concern	**Yes**	-	-		

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO EC	QDS CODE (ADU, 2011, 3325DC)	CONFIRMED SIGHTINGS
Four-striped Grass Mouse	*Rhabdomys pumilio*	Least Concern	**Yes**	-	-		
Robert's Vlei Rat	*Otomys karoensis*	Least Concern	**Yes**	-	-		
Vlei Rat	*Otomys irroratus*	Near Threatened	**Yes**	-	-		
Woodland Doormouse	*Graphiurus murinus*	Least Concern	No	-	-		
Namaqua Rock Mouse	*Micaelamys namaquensis*	Least Concern	No	-	-		
Pygmy Mouse	*Mus minutoides*	Least Concern	No	-	-		
House Mouse	*Mus musculus*	Least Concern	No	-	-		
Hairy-footed Gerbil	*Gerbilliscus paeba*	Least Concern	No	-	-		
Pouched Mouse	*Saccostomus campestris*	Least Concern	No	-	-		
Krebs's Fat Mouse	*Steatomys krebsii*	Least Concern	No	-	-		
Natal Multimammate Mouse	*Mastomys natalensis*	Least Concern	No	-	-		
Woodland Thicket Rat	*Grammomys dolichurus*	Least Concern	No	-	-		
Gray Climbing Mouse	*Dendromus melanotis*	Least Concern	No	-	-		
Brant's Climbing Mouse	*Dendromus mesomelas*	Least Concern	No	-	-		
Black Rat	*Rattus rattus*	Least Concern	No	-	-		
Brown Rat	*Rattus norvegicus*	Least Concern	No	-	-		
LAGOMORPHA							

COMMON NAME	SCIENTIFIC NAME	REGIONAL RED LIST STATUS (2016)	ENDEMIC	TOPS LISITNG (2007)	PNCO EC	QDS CODE (ADU, 2011, 3325DC)	CONFIRMED SIGHTINGS	
Hewitt's Red Rock Hare	*Pronolagus saundersiae*	Least Concern	**Yes**	-	-			
Scrub Hare	*Lepus saxatilis*	Least Concern	**Yes**	-	-			
AFROSORICIDA								
Hottentot Golden Mole	*Amblysomus hottentotus*	Least Concern	**Yes**	-	-	-	-	
Duthie's Golden Mole	*Chlorotalpa duthieae*	Vulnerable	**Yes**	-	-	-	-	
TUBULIDENTATA								
Aardvark	*Orycteropus afer*	Least Concern	No	-	Schedule II	-		
SORICIDAE								
Least Dwarf Shrew	*Suncus infinitesimus*	Least Concern	No	-	Schedule II	-		
Forest Shrew	*Myosorex varius*	Least Concern	No	-	Schedule II	-		
Reddish-grey Musk Shrew	*Crocidura cyanea*	Least Concern	No	-	Schedule II	-		
Greater Red Musk Shrew	*Crocidura flavescens*	Least Concern	No	-	Schedule II			
Lesser Dwarf Shrew	*Suncus varilla*	Least Concern	No	-	Schedule II	-		
MACROSCELIDIDAE								
Eastern Rock Sengi	*Elephantulus myurus*	Least Concern	No	-	Schedule II		Both	-
Karoo Round-eared Sengi	*Macroscelides proboscideus*	Least Concern	No	-	Schedule II		-	

APPENDIX 4: LIST OF BIRDS

The following list of bird species likely to occur within the project area has been compiled by Martin (2019). The list includes the lobal (IUCN Red List), the SA Red Data Book Threat Status, whether the species is Endemic / Near Endemic to southern Africa, as well as the preferred habitat of each species.

Common Name	Scientific Name	IUCN	SA	Endemic	Habitat	Notes
Penguin, African	*Spheniscus demersus*	En	En	NE	Marine	Breed St Croix
Gannet, Cape	*Morus capnesis*	En	Vu	NE	Marine	Breed Bird Isle
Cormorant, White-breasted	*Phalacrocorax carbo*				Coastal	
Cormorant, Cape	*Phalacrocorax capensis*	En	En	NE	Marine, Coastal	Breed St Croix
Heron, Grey	*Ardea cinerea*				Coastal	
Heron, Black-headed	*Ardea melanocephala*				Bontveld	
Egret, Little	*Egretta garzetta*				Coastal	
Egret, Western Cattle	*Bubulcus ibis*				Bontveld	
Ibis, African Sacred	*Threskiornis aethiopicus*				Overfly	Breed Jahleel
Ibis, Hadeda	*Bostrychia hagedash*				Terrestrial	
Goose, Egyptian	*Alopochen aegyptiacus*				Coastal	
Secretarybird	*Sagittarius serpentarius*	Vu	Vu		Bontveld	
Kite, Yellow-billed	*Milvus aegyptius*				Terrestrial	Migrant
Kite, Black-shouldered	*Elanus caeruleus*				Terrestrial	
Buzzard, Steppe	*Buteo vulpinus*				Terrestrial	Migrant
Buzzard, Jackal	*Buteo rufofuscus*			E	Terrestrial	
Sparrowhawk, Black	*Accipiter melanoleucus*				Terrestrial	
Osprey, Western	*Pandion haliaetus*				Coastal	Migrant
Falcon, Peregrine	*Falco peregrinus*				Terrestrial	
Falcon, Lanner	*Falco biarmicus*	LC	Vu		Terrestrial	
Kestrel, Rock	*Falco rupicolus*				Terrestrial	
Spurfowl, Red-necked	*Pternistis afer*				Thicket	
Quail, Common	*Coturnix coturnix*				Bontveld	
Guineafowl, Helmeted	*Numida meleagris*				Terrestrial	
Crane, Blue	*Anthropoides paradiseus*	Vu	NT	E	Bontveld, Dunes	Pair bred in dunes
Oystercatcher, African Black	*Haematopus moquini*			E	Coastal	Breed on coast
Plover, Common Ringed	*Charadrius hiaticula*				Coastal	Migrant
Plover, White-fronted	*Charadrius marginatus*				Coastal	Breed on coast
Plover, Kittlitz's	*Charadrius*				Coastal	Breed on

Common Name	Scientific Name	IUCN	SA	Endemic	Habitat	Notes
	pecuarius					coast
Plover, Grey	*Pluvialis squatarola*				Coastal	Migrant
Lapwing, Crowned	*Vanellus coronatus*				Bontveld	
Lapwing, Blacksmith	*Vanellus armatus*				Coastal	
Turnstone, Ruddy	*Arenaria interpres*				Coastal	Migrant
Greenshank, Common	*Tringa nebularia*				Coastal	Migrant
Sanderling	*Calidris alba*				Coastal	Migrant
Whimbrel, Common	*Numenius phaeopus*				Coastal	Migrant
Thick-knee, Spotted	*Burhinus capensis*				Terrestrial	
Thick-knee, Water	*Burhinus vermiculatus*				Coastal	
Gull, Kelp	*Larus dominicanus*				Coastal	Breed on coast
Gull, Grey-headed	*Chroicocephalus cirrocephalus*				Coastal	
Gull, Hartlaub's	*Chroicocephalus hartlaubii*			E	Coastal	
Tern, Caspian	*Sterna caspia*	LC	Vu		Coastal	
Tern, Swift	*Thalassius bergii*				Marine, Coastal	Breed islands
Tern, Sandwich	*Thalassius sandvicensis*				Coastal	Migrant
Tern, Common	*Sterna hirundo*				Coastal	Migrant
Tern, Roseate	*Sterna dougallii*	LC	En		Marine, Coastal	Breed islands
Tern Damara	*Sterna balaenarum*	Vu	CR	NE	Coastal	Breed dunes. Migrant
Dove, Rock	*Columba livia*				Terrestrial	
Pigeon, Speckled	*Columba guinea*				Terrestrial	Breed in buildings
Dove, Red-eyed	*Streptopelia semitorquata*				Terrestrial	
Turtle-dove, Cape	*Streptopelia capicola*				Terrestrial	
Dove, Laughing	*Streptopelia senegalensis*				Terrestrial	
Wood-Dove, Emerald-spotted	*Turtur chalcospilos*				Thicket	
Dove, Namaqua	*Oena capensis*				Terrestrial	
Cuckoo, Black	*Cuculus clamosus*				Thicket	Breed Migrant
Cuckoo, Jacobin	*Clamator jacobinus*				Thicket	Breed Migrant
Cuckoo, Klaas's	*Chrysococcyx klaas*				Thicket	Breed Migrant
Cuckoo, Diderick	*Chrysococcyx caprius*				Thicket	Breed Migrant
Coucal, Burchell's	*Centropus burchellii*				Thicket	
Owl, Western Barn	*Tyto alba*				Terrestrial	Breed buildings

Common Name	Scientific Name	IUCN	SA	Endemic	Habitat	Notes
Eagle-owl, Spotted	*Bubo africanus*				Terrestrial	
Nightjar, Fiery-necked	*Caprimulgus pectoralis*				Terrestrial	
Swift, White-rumped	*Apus caffer*				Aerial	Breed Migrant
Swift, Little	*Apus affinis*				Aerial	Breed Migrant
Mousebird, Speckled	*Colius striatus*				Terrestrial	
Mousebird, Red-faced	*Urocolius indicus*				Terrestrial	
Kingfisher, Pied	*Ceryle rudis*				Coastal	
Kingfisher, Brown-hooded	*Halcyon albiventris*				Terrestrial	
Hoopoe, African	*Upupa africana*				Terrestrial	
Wood-hoopoe, Green	*Phoeniculus purpureus*				Thicket	
Barbet, Black-collared	*Lybius torquatus*				Thicket	
Barbet, Acacia Pied	*Tricholaema leucomelas*				Thicket	
Honeyguide, Lesser	*Indicator minor*				Thicket	
Woodpecker, Knysna	*Campethera notata*	NT	NT	E	Thicket	Pair in thicket near mine
Woodpecker, Cardinal	*Dendropicos fuscescens*				Thicket	
Lark, Cape Clapper	*Mirafra apiata*			E	Bontveld	
Lark, Red-capped	*Calandrella cinerea*				Bontveld, Dunes	
Swallow, Barn	*Hirundo rustica*				Aerial	Migrant
Swallow, White-throated	*Hirundo albigularis*				Aerial	Breed Migrant
Swallow, Pearl-breasted	*Hirundo dimidiata*				Bontveld	Breed Migrant
Swallow, Greater Striped	*Hirundo cucullata*				Aerial	Breed migrant
Swallow, Lesser Striped	*Hirundo abyssinica*				Aerial	Breed migrant
Martin, Rock	*Hirundo fuligula*				Aerial	
Martin, Brown-throated	*Riparia paludicola*				Aerial	
Saw-wing, Black (Southern race)	*Psalidoprocne holomelaena*				Thicket	
Drongo, Fork-tailed	*Dicrurus adsimilis*				Thicket	
Oriole, Black-headed	*Oriolus larvatus*				Thicket	
Crow, Pied	*Corvus albus*				Terrestrial	
Crow, Cape	*Corvus capensis*				Terrestrial	
Raven, White-necked	*Corvus albicollis*				Terrestrial	
Bulbul, Cape	*Pycnonotus capensis*			E	Thicket	
Bulbul, Dark-capped	*Pycnonotus tricolor*				Thicket	
Brownbul, Terrestrial	*Phyllastrephus terrestris*				Thicket	

Common Name	Scientific Name	IUCN	SA	Endemic	Habitat	Notes
Greenbul, Sombre	*Andropadus importunus*				Thicket	
Thrush, Olive	*Turdus olivaceus*				Thicket	
Chat, Familiar	*Cercomela familiaris*				Terrestrial	
Stonechat, African	*Saxicola torquatus*				Bontveld	
Robin-chat, Cape	*Cossypha caffra*				Thicket	
Scrub-robin, Karoo	*Cercotrichas coryphoeus*			E	Thicket	
Scrub-robin, White-browed	*Cercotrichas leucophrys*				Thicket	
Tit-babbler, Chestnut-vented	*Sylvia subcaerulea*				Thicket	
Warbler, Willow	*Phylloscopus trochilus*				Thicket	Migrant
Apalis, Bar-throated	*Apalis thoracica*				Thicket	
Apalis, Yellow-breasted	*Apalis flavida*				Thicket	
Crombec, Long-billed	*Sylvietta rufescens*				Thicket	
Camaroptera, Green-backed	*Camaroptera brachyura*				Thicket	
Cisticola, Cloud	*Cisticola textrix*			NE	Bontveld	
Neddicky	*Cisticola fulvicapilla*				Terrestrial	
Cisticola, Grey-backed	*Cisticola subruficapilla*			E	Bontveld, Thicket	
Prinia, Karoo	*Prinia maculosa*			E	Thicket	
Flycatcher, African Dusky	*Muscicapa adusta*				Thicket	
Flycatcher, Fiscal	*Sigelus silens*			E	Thicket	
Batis, Cape	*Batis capensis*				Thicket	
Paradise-flycatcher, African	*Terpsiphone viridis*				Thicket	
Wagtail, Cape	*Motacilla capensis*				Terrestrial	
Pipit, African	*Anthus cinnamomeus*				Bontveld	
Longclaw, Cape	*Macronyx capensis*			E	Bontveld	
Fiscal, Common (Southern)	*Lanius collaris*				Terrestrial	
Boubou, Southern	*Laniarius ferrugineus*			E	Thicket	
Tchagra, Southern	*Tchagra tchagra*			E	Thicket	
Bush-shrike, Olive	*Telophorus olivaceus*			E	Thicket	
Bokmakierie	*Telophorus zeylonus*			NE	Terrestrial	
Starling, Common	*Sturnus vulgaris*				Terrestrial	
Starling, Pied	*Lamprotornis bicolor*			E	Terrestrial	
Starling, Wattled	*Creatophora*				Terrestrial	

Common Name	Scientific Name	IUCN	SA	Endemic	Habitat	Notes
	cinerea					
Starling, Cape Glossy	*Lamprotornis nitens*			E	Terrestrial	
Starling, Red-winged	*Onychognathus morio*				Terrestrial	Breed buildings
Sunbird, Malachite	*Nectarinia famosa*				Thicket	
Sunbird, Greater Double-collared	*Cinnyris afer*			E	Thicket	
Sunbird, Southern Double-collared	*Cinnyris chalybeus*			E	Thicket	
Sunbird, Grey	*Cyanomitra veroxii*				Thicket	
Sunbird, Collared	*Hedydipna collaris*				Thicket	
Sunbird, Amethyst	*Chalcomitra amethystina*				Thicket	
White-eye, Cape	*Zosterops virens*			E	Thicket	
Sparrow, House	*Passer domesticus*				Buildings	
Sparrow, Cape	*Passer melanurus*			E	Terrestrial	
Sparrow, Southern Grey-headed	*Passer diffusus*				Terrestrial	
Weaver, Spectacled	*Ploceus ocularis*				Thicket	
Weaver, Cape	*Ploceus capensis*			E	Terrestrial	
Masked-weaver, Southern	*Ploceus velatus*				Terrestrial	
Quelea, Red-billed	*Quelea quelea*				Terrestrial	
Bishop, Southern Red	*Euplectes orix*				Terrestrial	
Waxbill, Swee	*Coccopygia melanotis*			E	Thicket	
Firefinch, African	*Lagonosticta rubricata*				Thicket	
Waxbill, Common	*Estrilda astrild*				Terrestrial	
Whydah, Pin-tailed	*Vidua macroura*				Terrestrial	
Canary, Cape	*Serinus canicollis*				Terrestrial	
Canary, Yellow-fronted	*Crithagra mozambicus*				Thicket	
Canary, Brimstone	*Crithagra sulphuratus*				Thicket	
Canary, White-throated	*Crithagra albogularis*			E	Thicket	
Seedeater, Streaky-headed	*Crithagra gularis*				Thicket	
Bunting, Cape	*Emberiza capensis*				Bontveld	
Bunting, Golden-breasted	*Emberiza flaviventris*				Thicket	

Threat Status: LC Least Concern; NT Near-Threatened; Vu Vulnerable; En Endangered; CR Critically Endangered.

Southern African Endemism: NE Near-Endemic; E Endemic to southern Africa

APPENDIX 5: IMPACT RATING SCALE

CES has developed the following impact rating methodology which has been developed in line with the Terrestrial Biodiversity Protocol, as well as the content requirements of Appendix 6 and the impact ratings required in Appendix 1 and 3 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- **Nature**: negative or positive impact on the environment.
- **Type**: direct, indirect and/or cumulative effect of impact on the environment.
- **Significance**: The criteria in Table A.1 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (**Error! Reference source not found.** A.1).
- **Consequence:** the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- **Extent:** the spatial scale defines the physical extent of the impact.
- **Duration:** the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Probability:** the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- **Reversibility:** The degree to which an environment can be returned to its original/partially original state.
- **Irreplaceable loss:** The degree of irreplaceable loss which an impact may cause, e.g. loss of non-regenerative vegetation or removal of rocky habitat or destruction of wetland.
- **Mitigation potential:** The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in **Error! Reference source not found.** A.1 below. Both the p ractical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table A.1: Impact rating criteria.

CRITERIA	CATEGORIES	DESCRIPTION
Overall nature	**Negative**	Beneficial/positive impact.
	Positive	Detrimental/negative impact.
Type	**Direct**	Direct interaction of an activity with the environment.
	Indirect	Impacts on the environment that are not a direct result of the project or activity.

CRITERIA	CATEGORIES	DESCRIPTION
	Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	**Short term**	Less than 5 years.
	Medium term	Between 5-20 years.
	Long term	More than 20 years.
	Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	**Localised**	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
	Study area	The proposed site and its immediate environments.
	Municipal	Impacts affect the municipality, or any towns within the municipality.
	Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
	National	Impacts affect the entire country.
Consequence	**Slight**	Slight impacts or benefits on the affected system(s) or party(ies).
	Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
	Severe/Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
Probability	**Definite**	More than 90% sure of a particular fact. Should have substantial supportive data.
	Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
	Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
	Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
Reversibility	**Reversible**	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
	Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable Loss	**Resource will not be lost**	The resource will not be lost/destroyed provided mitigation measures are implemented.
	Resource may be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
	Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
Mitigation Potential	**Easily achievable**	The impact can be easily, effectively and cost effectively mitigated/reversed.
	Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
	Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
	Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.
Impact Significance	**Low negative** / **Low positive**	Largely of HIGH mitigation potential, after considering the other criteria.
	Moderate negative / **Moderate positive**	Largely of MODERATE or partial mitigation potential after considering the other criteria.
	High negative / **High positive**	Largely of LOW mitigation potential after considering the other criteria.

APPENDIX 6: CURRICULUM VITAE OF PROJECT TEAM

APPENDIX 6: SPECIALIST DECLARATIONS