Grid Connection for the proposed Impofu Wind Farms

Grid Connection Basic Assessment Report: Draft

Red Cap Impofu (Pty) Ltd

Reference: 500571

Revision: 2

2019-09-06

DEA Ref. No.: 14/12/16/3/3/1/2018

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2	2019-09-06	Revised Draft BAR for PPP	Simamkele Ntsengwane	Charles Norman	-	Charles Norman

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Approval

Author signature		Approver signature	
Name	**Simamkele Ntsengwane**	Name	**Charles Norman**
Title	Senior Environmental Consultant, Environment and Planning	Title	Manager, Environment and Planning

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Guide to the Reader

This report serves as a revised Draft Basic Assessment Report for the application for environmental authorisation for the proposed Impofu Grid Corridor (DEA Ref. No.: 14/12/16/3/3/1/2018). In August 2018, a version of this report was circulated to the public as a pre-application BAR. It has since been updated in April 2019 to an official draft BAR based on comments received, ongoing landowner consultation, as well as further specialist input. Subsequently in August 2019, the Draft BAR has been updated to include a new alignment of the Grid Corridor. During the PPP process for the first draft BAR the developer was unable to find a feasible route through the Van Stadens area of the proposed corridor. Thus, a change to the corridor alignment had to be considered in this area. The main technical changes to this Draft BAR have been made on the basis of the adjustments to the Grid corridor alignment.

Kindly note that while this application seeks to apply for environmental authorisation for a corridor of approximately 2 km width, the impact of the overhead powerline will be limited to a 31 m servitude running within this corridor and only over land for which the landowner has given permission (provided the project is approved and constructed). Please refer to Section 6 for full project description.

Furthermore, this powerline will only be constructed if one or more of the proposed Impofu North Wind Farm (DEA Ref. No.: 14/12/16/3/3/2/1102), Impofu East Wind Farm (DEA Ref. No.: 14/12/16/3/3/2/1104) and Impofu West Wind Farm (DEA Ref. No.: 14/12/16/3/3/2/1103) are authorised and constructed. The Final EIRs for all three Wind Farm Applications were submitted to the Department of Environmental Affairs on 26 June 2019 for decision-making.

Should you wish to seek any clarity on the contents of this report or provide written comment as per the public participation process (refer to Section 4.2), please contact Mr Charles Norman of Aurecon with the details provided below.

Mr Charles Norman

Tel: 044 805 5433

Email: **ppp@aurecongroup.com / Charles.Norman@aurecongroup.com**

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Technical Details of the Impofu Grid

Component	Description/dimensions
Powerline capacity	132 kV.
Pylon Type	Monopole (see Table 20 of the BAR).
Height of powerlines	Up to 32 m (see Table 20 of the BAR).
Length and width of servitude	Approximately 120 km in length and 31 m wide.
Height of fencing	Approximately 2.4 m around substations.

NEMA requirements for Basic Assessment Reports		aurecon
Appendix 1	**Content as required by NEMA**	**Section**
3(1)	**A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include –**	
a	(i) details of the EAP who prepared the report; and	Section 2.3 Annexure A
	(ii) details of the expertise of the EAP to carry out scoping procedures.	
b	the location of the activity, including-	Section 6 Annexure B
	(i) the 21 digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
c	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Section 1, 4.1 and 6.3
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	N/A
d	a description of the scope of the proposed activity, including-	Section 1.2 and 6
	(i) all listed and specified activities triggered and being applied for; and	Section 3.2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 6
e	a description of the policy and legislative context within which the development is proposed including -	Section 3
	(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	
f	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 6.6
g	a motivation for the preferred site, activity and technology alternative;	Section 6
h	a full description of the process followed to reach the proposed preferred alternative within the site, including:	Section 5
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 4.2 and Annexure C
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 7
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 4.3
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcome of the site selection matrix;	Section 5
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 8
i	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -	Section 7
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	

	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
j	an assessment of each identified potentially significant impact of risk, including -	Section 7
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be avoided, managed or mitigated;	
k	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 8
l	an environmental impact statement which contains -	
	(i) a summary of the key findings of the environmental impact assessment;	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	Section 6.1 and 6.3
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 8
m	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	Section 8
n	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	
o	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 4.4
p	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8
r	an undertaking under oath or affirmation by the EAP in relation to-	Annexure A
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
s	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
t	any specific information that may be required by the competent authority; and	N/A
u	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

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Abbreviations

Acronym	Abbreviation
BA	Basic Assessment
BAR	Basic Assessment Report
BID	Background information Document
CBA	Critical Biodiversity Areas
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
GA	General Authorisation
GNR	General Notice Number
HV	High Voltage
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
MCDM	Multiple-Criteria Decision-Making Model
MV	Medium Voltage
NFEPA	National Freshwater Ecosystems Priority Areas
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NMBM	Nelson Mandela Bay Municipality
NWA	National Water Act (Act No. 36 of 1998)
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SABAP	Atlas of Southern African Birds
SDF	Spatial Development Framework

Glossary of Terms

Activity: An action either planned or existing that may result in environmental impacts through resource use. For this report, the terms 'activity' and 'development' are used interchangeably.

Alternatives: Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity.

Basic Assessment Report (BAR): A report as required in terms of the 2014 EIA Regulations, as amended, of the National Environmental Management Act, No. 107 of 1998 (NEMA), as amended, that describes the proposed activities and their potential impacts.

Biodiversity: The diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Biophysical: The biological and physical components of the environment.

Buffer: A buffer is an area that protects adjacent communities and sensitive areas from unfavourable conditions. In the context of this project, a buffer has been applied to a preferred alignment for the proposed overhead powerline to cover an area that the specialists have assessed.

Construction: The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

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

Development: The building, erection, construction or establishment of a facility, structure or infrastructure, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

Ecosystem: A dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment: In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;

ii. micro-organisms, plants and animal life;

iii. any part or combination of (i) and (ii), and the interrelationships among and between them; and

iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment Practitioner (EAP): The individual responsible for the planning, management and coordination of the environmental impact assessments, strategic environmental assessments, environmental management plans and/or other appropriate environmental instruments introduced through regulations of NEMA.

Environmental Authorisation: An authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Impact: An environmental change caused by some human act.

Environmental Impact Assessment (EIA): A study of the environmental consequences of a proposed course of action via the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental Management Programme (EMPr): A detailed plan of action to organise and co-ordinate environmental mitigation, rehabilitation and monitoring during the implementation and maintenance of the proposed development such that positive impacts are enhanced, and negative impacts are avoided/minimised.

Expansion: The modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Indigenous Vegetation: Vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

Interested and Affected Parties (I&APs): People and organisations that have interest(s) in the proposed activities, also referred to as stakeholders.

Maintenance: The replacement, repair or the reconstruction of an existing structure within the same footprint, in the same location, having the same capacity and performing the same function as the previous structure ('like for like').

Mitigation: Actions to reduce the impact of a particular activity.

Public Participation Process (PPP): A process of involving the public in order to identify issues and concerns and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on or raise issues relevant to specific project matters.

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1 INTRODUCTION AND BACKGROUND

1.1 Wind Energy in South Africa

Due to global concerns such as climate change, and the on-going exploitation of non-renewable resources, there is increasing international pressure on countries to increase their share of renewable energy generation. Renewable energy is recognised internationally as a major contributor in protecting the environment (including biophysical, social and economic), when compared to energy generation that relies on fossil fuels, such as coal fired power stations and the use of oil and gas. Renewable energy projects also provide a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability.

In South Africa, the national utility company, Eskom, sources up to 86.97 %[1] of its electricity needs from fossil-fuels. Eskom recognises that it '*is crucial that the private sector plays a role in addressing the future electricity needs of the country as this would reduce the funding burden on Government, relieve the borrowing requirements of Eskom and introduce generation technologies that Eskom may not consider part of its core function which may play a vital role in the future electricity supply options in the country*.''[2]

As a result, the South African Government has developed an Integrated Resource Plan (IRP) (2010) in which a target was set to source 17,800 Megawatts (MW) of the country's electricity supply from renewable energy sources, over a 20-year period from 2010 to 2030[3]. An update to the IRP was drafted by the Department of Energy (DoE) and circulated for a 60-day public comment period in August 2018. The updated IRP indicates that the expected electricity demand for South Africa has decreased and that no new nuclear will be planned till sometime after 2030. Of the new build planned for 2030, 52% (18,746 MW) will come from renewable energy, half of which will be wind energy (9,462MW). In support of this strategic target, the DoE procures the energy through a competitive tendering process called the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) run by the DoE in conjunction with the National Treasury.[4] Red Cap Impofu (Pty) Ltd is proposing to construct and install a grid line to evacuate power generated from the proposed Impofu Wind Farms, known as Impofu North (DEA ref. no.: 14/12/16/3/3/2/1102), Impofu East (DEA ref. no.: 14/12/16/3/3/2/1104) and Impofu West (DEA ref. no.: 14/12/16/3/3/2/1103). The grid connection will consist of an approximately 120 km long 132 kV overhead power line between the wind farm project area and Port Elizabeth (refer to Figure 1).

Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed by Red Cap to undertake the Environmental Impact Assessment (EIA) process for the Impofu Wind Farms, and the Basic Assessment (BA) process for the associated Grid Connection Project. These services are to ensure compliance with the relevant environmental legislation and are to include applications to various Competent Authorities for the environmental authorisation, and any licenses and permits. These projects, which are described further below, would therefore contribute to South Africa's national commitment to transition to a low carbon economy. Renewable energy is the future and investments in this technology will not only benefit our generation, but many generations to come.

[1] World Atlas. 2017. Fossil Fuel Dependency by Country. Available: https://www.worldatlas.com/articles/countries-the-most-dependent-on-fossil-fuels.html [Accessed 26 June 2018].
[2] http://www.eskom.co.za/Whatweredoing/Pages/GuideIPP.aspx (Accessed 2 June 2018)
[3] https://www.ipp-renewables.co.za/ (Accessed 2 June 2018)
[4] http://www.energy.gov.za/files/renewables_frame.html **(**Accessed 2 June 2018)

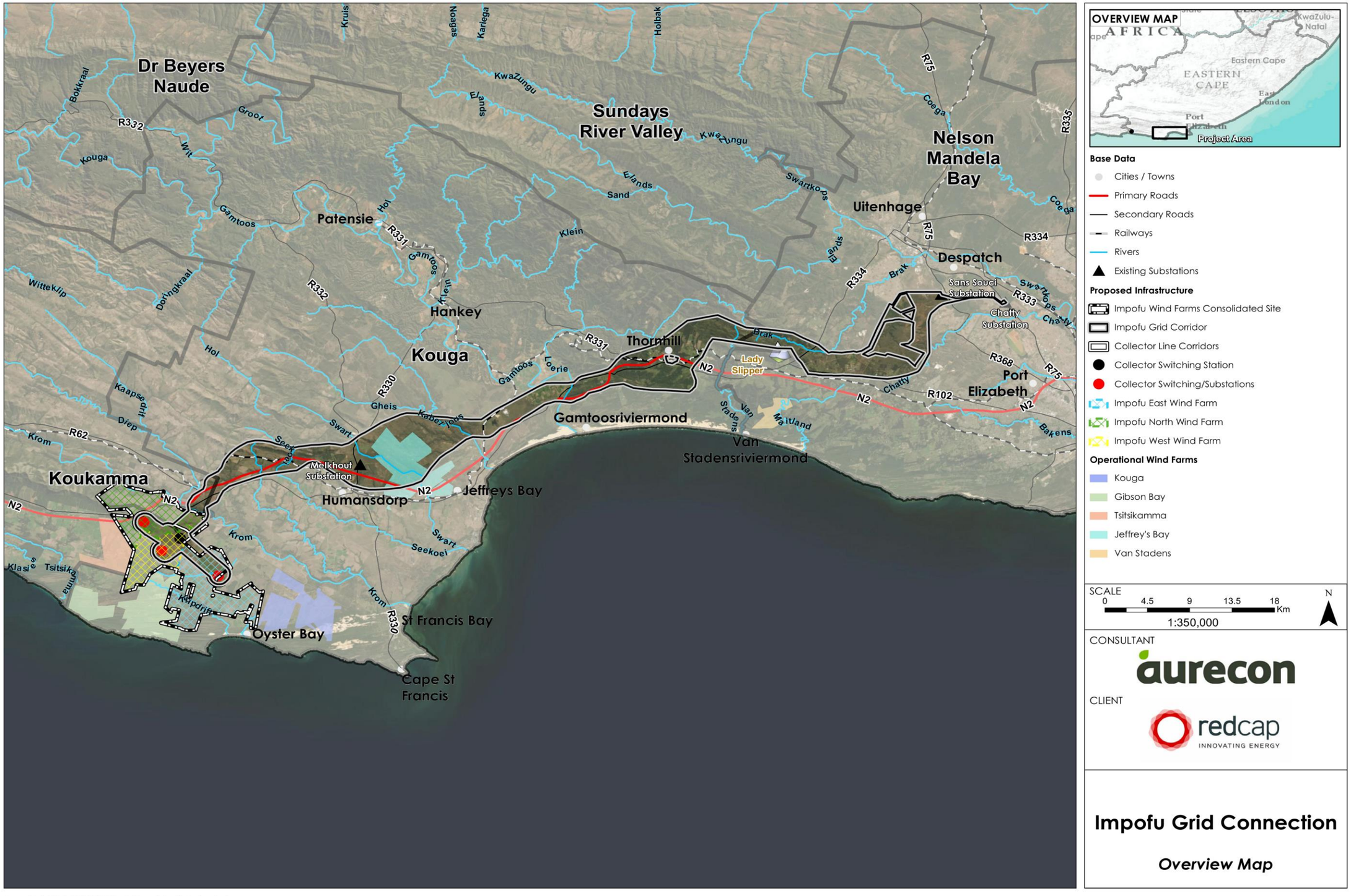

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Figure 1: Overview of the Impofu Wind Farms and Grid Connection project

1.2 Introducing the Project

To evacuate the power generated by the proposed Impofu North, Impofu East and Impofu West Wind Farms, a grid connection is required in the form of an approximately 120 km length 132 kV overhead power line between the wind farm project area and Port Elizabeth.

This grid connection includes three short separate overhead powerlines that originate at the three wind farms' switching stations. These three short powerlines run to a combined central "collector switching station" situated on one of the wind farms' properties.

From this collector switching station, a single power line will run within the corridor towards the Eskom Melkhout substation located just north of Humansdorp. From here the corridor continues to the Gamtoos River valley roughly following the N2 and existing Eskom 132 kV lines and then on towards Thornhill. It then heads north into the forestry areas north of Thornhill and then east through the valley behind Lady's Slipper Mountains and back down to the R102/ N2. It then continues to the western outskirts of Port Elizabeth where it connects into the Nelson Mandela Bay Metropolitan Municipality (NMBM) Sans Souci substation. From Sans Souci substation, the line continues to the NMBM Chatty substation where the grid connection will terminate. The reason the power line may go through the Eskom Melkhout substation and the NMBM Sans Souci substation is to improve the evacuation capacity and technical parameters of the grid connection, as well as improving the overall stability and reliability of the Eskom and NMBM networks. Currently the intention is for the powerline to link into the existing Eskom Melkhout substation, however there is a possibility that prior to construction Eskom may choose not to connect there based on an assessment of their network. Should this be the case, the line will run past Melkhout and the short section of line linking into the substation will not be constructed.

Due to the complexity of aligning linear infrastructure to avoid environmental sensitivities, adhere to technical specifications and satisfy the concerns of affected landowners and other interested and affected parties, this BA considers a 2 km corridor within which the proposed overhead powerline, and associated 31 m servitude, will be located. Please note however that the impact upon completion of the powerline will be limited to the 31 m servitude. This is further detailed below in Sections 5 and 6.

The Applicant (or its successor in title) will be responsible for the construction phase of the development. After construction is complete, ownership of the grid connection infrastructure will be transferred to Eskom (as per Eskom's requirements), and Eskom will then be responsible for the operation and maintenance of the infrastructure, as well as decommissioning should the need to decommission the infrastructure arise.

1.3 Purpose of the Basic Assessment Report

The purpose of this BAR is to apply for environmental authorisation (EA) in terms of the EIA regulations (GN R982 of 2014, as amended) pursuant to the National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, for the proposed grid connection infrastructure. Since the project is associated with energy generation, and energy projects are dealt with by the national authority, the competent authority for this project is the National Department of Environmental Affairs (DEA).

In order to meet the requirements of the EIA regulations (GN R982 of 2014, as amended) pursuant to NEMA, this Draft Basic Assessment Report includes the following sections.

- **Section 1 – Introduction:** introduces the project in the context of the renewable energy industry in South Africa and provides an indication of the environmental process to be undertaken for the project.
- **Section 2 – Role-players:** introduces the different role-players involved in the environmental authorisation process.
- **Section 3 – Legal and planning context:** provides an outline and analysis of the legal framework and policies relevant to the project.
- **Section 4 – BA methodology:** provides an overview of the basic assessment process, highlighting the various phases that have been undertaken for this project; outlines the public participation process; and defines the assessment methodology used in the impact assessment, as well as highlighting the assumptions, limitation and gaps in knowledge.

- **Section 5 – Consideration of alternatives:** provides a summary of the detailed screening process that was undertaken for this project as well as a motivation as to why no alternatives, beyond the No-Go alternative, have been assessed in this BAR.
- **Section 6 – Description of the proposed project:** outlines the nature of the proposed activities, specific to the Impofu Grid Connection, and then considers the need for the proposed project.
- **Section 7 – Biophysical and socio-economic impact assessment:** separated by environmental aspects, this section explores the current state of the receiving environment, identifies and assesses the impact that the proposed project will have on the landscape, and provides mitigation measures to address these impacts. Each aspect also explores the potential cumulative impact that may occur, considering the other linear projects in the area. Each section concludes with a specialist impact statement on the proposed Impofu Grid Connection.
- **Section 8 – Conclusions and way forward:** summarises the potential environmental issues and impacts that could arise from the project, provides the recommendations and opinion of the EAP highlighting the level of confidence in the assessment, and concludes with the way forward.

2 ROLE-PLAYERS

2.1 Introduction

There are several role-players involved in the environmental application process. The details of each are briefly set out below, based on the definitions and requirements within GN R982 (2014) of NEMA.

2.2 Proponent

The proponent “means a person intending to submit an application for environmental authorisation and is referred to an applicant once such application for environmental authorisation has been submitted”.

Red Cap Impofu (Pty) Ltd, hereafter referred to as Red Cap is the proponent and applicant for this proposed project.

2.3 The Environmental Assessment Practitioner

The Environmental Assessment Practitioner (EAP) means “the individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instruments introduced through regulations”.

It is the role of the independent EAP to manage and undertake the application for environmental authorisation for the project on behalf of the applicant, as required in terms of NEMA (as amended). Mr Charles Norman from Aurecon is the responsible EAP and has relied on inputs from a selected team of highly experienced specialists and multi-disciplinary practitioners to execute the project in a professional and unbiased manner. Neither Aurecon nor any of its sub-consultants are subsidiaries of Red Cap. Furthermore, all these parties do not have any interest in downstream developments that may arise out of the authorisation of the proposed project.

The contact details of the EAP are provided in Table 1, and the expertise of the individuals responsible for the process are presented in Table 2.

Table 1: Contact details of EAP

EAP	Mr Charles Norman
Company	Aurecon South Africa (Pty) Ltd
Postal address	Box 509, George, 6530
Telephone number	044 805 5433
Email address	Charles.Norman@aurecongroup.com

Aurecon’s environmental management systems policy provides a quality management system which includes a number of tiers with various responsibilities for each job grade level based on experience in the environmental field. This requires environmental practitioners to prepare reports and gain experience whilst being guided by a senior colleague. The EAP is ultimately responsible for reviewing the reports and signing off on the requisite reports and declarations and taking responsibility for the EIA process. Refer to Annexure A for the signed declaration of interest of the EAP as well as full CVs of the EAPs involved in this BA process.

Table 2: Details of EAP experience

EAP	Charles Norman	Kirsten Jones
Role	EAP; Project lead	EAP for Impofu Wind Farms
Qualifications	MPhil (Environmental Law)	MSc (Environmental Science)
Years of experience	30	13
Environmental management experience	Screening studies and constraints analyses / feasibility assessments, Scoping and environmental impact assessment (S&EIA) reports, Permitting Processes for Environmental Impact Assessments and Basic Assessment Reports, Environmental and socio-economic impact assessment (ESIA)	Environmental and socio-economic impact assessment (ESIA), Scoping and environmental impact assessment (S&EIA) reports, Basic assessment reports (BARs), Environmental management plans and programmes (EMPs/EMPrs), Screening studies and constraints analyses / feasibility assessments, and Public participation processes
Industries of experience	Energy (renewable, hydropower and transmission), mining, roads, water, infrastructure and manufacturing	Energy (renewable, gas, and transmission), mining, roads and bridges and urban regeneration projects
Countries of experience	South Africa, Tanzania, Australia, Ethiopia, Malawi, Uganda, Zambia, Mozambique, Rwanda, Burundi	South Africa, Namibia, Mozambique, Nigeria, UK
Memberships	International Association for Impact Assessment South Africa (IAIAsa),	Professional natural scientist with the South African Council for Natural Scientific Professions (SACNASP), International Association for Impact Assessment South Africa (IAIAsa), and International Association for Public Participation (IAP2)

2.4 Specialists

A specialist means “a person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies”.

Several specialist disciplines have been identified as relevant to the nature of the proposed development and the receiving environment. Specialists have been appointed to undertake the necessary studies specific to their discipline and their inputs have been a key informant to the iterative alignment process undertaken to date. The specialist CVs, or summaries thereof, are included in their respective reports, in Annexure D, and their details can be found in Table 3 below.

Table 3: Details of specialists

Role	Consultant	Company
Terrestrial ecology	Simon Todd	3 Foxes Biodiversity Solutions (Pty) Ltd
Agriculture	Johann Lanz	Private Consultant
Avifauna	Chris van Rooyen	Chris van Rooyen Consulting
Aquatic ecology, incl. geohydrology	Dr Brian Colloty	EnviroSci (Pty) Ltd

Role	Consultant	Company
Archaeology	Dr Peter Nilssen	Private Consultant
Palaeontology	Dr John Almond	Natura Viva
Socio-economic/ tourism	Matthew Keeley and Thomas Parsons	Urban Econ Development Economists
Visual	Bernard Oberholzer and Quinton Lawson	Bernard Oberholzer Landscape Architects (BOLA)

The EIA Regulations set out the content requirements for Specialist Reports (Appendix 6 of GN R982). These have been applied to the assessment reports undertaken to date.

2.5 Interested and Affected Parties

Interested and Affected Party (I&AP), "for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v), and which includes –

- Any person, group of persons or organisation interested in or affected by such operation or activity; and
- Any organ of state that may have jurisdiction over any aspect of the operation or activity."

Details of the principles and processes for stakeholder engagement are set out in Section 4.2 and Annexure C, which includes a database of all I&APs involved in the Pre-Application and Basic Assessment Phases thus far.

2.6 Competent Authority

A competent authority, "in respect of a listed activity or specified activity, means the organ of state charged by this Act with evaluating the environmental impact of that activity and, where appropriate, with granting or refusing and environmental authorisation in respect of that activity".

In this case, the competent authority is the Department of Environmental Affairs (DEA) and their details are set out in Table 4 below, whilst their duties are further described in Section 4.

Table 4: Competent authority details

Name	Department of Environmental Affairs (DEA): Integrated Environmental Authorisations	
Contact	Thabile Sangweni (Case Officer)	Muhammad Essop
Postal Address	Private Bag X447, Pretoria, 0001	
Physical Address	473 Steve Biko Road, Arcadia, Pretoria, 0001	
Telephone Number	012 399 9409	012 399 9406
Fax Number	012 359 3625	
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3 LEGAL AND PLANNING CONTEXT

There are a host of legal and policy documents and guidelines to consider in undertaking such a Project. These have been detailed in the following sections below.

3.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 5.

Table 5: Relevant legislation, policies and guidelines considered in preparation of the BAR

Title of legislation, policy or guideline	Applicability to the project	Administering authority
National Legislation		
Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)	The purpose of this Act is to ensure that natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. Red Cap together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the Regulations that may pose a problem as a result of the proposed project. Measures to mitigate this potential impact will be included in the EMPr that will form an annexure to the Draft BAR.	Department of Agriculture, Forestry & Fisheries (DAFF)
Electricity Regulation Act, No. 4 of 2006 National Energy Act, No. 34 of 2008	This project together with the proposed Impofu Wind Farms would facilitate new generation capacity through renewable technologies, namely wind, as listed in the IRP and all REIPPPP which will be undertaken in accordance with the specified capacities and technologies as listed in the IRP.	Department of Energy (DoE)
National Environmental Management Act, No. 107 of 1998 (NEMA), as amended	Several listed activities (detailed in Section 2.2 below) have been triggered by the proposed grid connection infrastructure in terms of the 2014 EIA Regulations (GN R982, as amended). As these activities are listed in GN R983 (as amended), the application for EA must consist of a BA process.	Department of Environmental Affairs (DEA)
National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)	The act calls for the management of all biodiversity within South Africa. As a number of listed species may occur on the site, it is imperative to ensure their long-term survival and conservation. The vegetation type found within the proposed grid connection corridor has been determined through an ecological impact assessment and is described further below in Section 6.1. The specialist ecological report is also included in full in Annexure D.	Department of Environmental Affairs (DEA)
National Environmental Management: Waste Management Act, No. 59 of 2008 (NEM: WA)	During construction, the aim is to prevent and reduce pollution and ecological degradation by implementing waste management measures. By adhering to the regulations and schedules in terms of this Act, waste generated on site will be minimised and reused where possible and a waste licence will be obtained if any listed activities are triggered.	Department of Environmental Affairs (DEA)
National Forests Act, No. 84 of 1998, as amended (NFA)	There are 47 protected tree species in terms of the NFA, that may not be cut, destroyed, damaged or removed unless a license has been granted by the DAFF. By adhering to the regulations in terms of this Act, measures to mitigate the potential impact to Forests will be included in the EMPr that will form an annexure to the Draft BAR.	Department of Agriculture, Forestry & Fisheries (DAFF)
National Heritage Resources Act, No. 25 of 1999 (NHRA)	In terms of the NHRA, any person who intends to undertake "any development … which will change the character of a site exceeding 5, 000 m^2 in extent", "the construction of a road…powerline, or pipeline…exceeding 300 m in length" must at the very earliest	South African Heritage Resources Agency (SAHRA)

Title of legislation, policy or guideline	Applicability to the project	Administering authority
	stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency. The relevant provincial heritage agency (ECPHRA) has indicated that a full Heritage Impact Assessment (HIA) is not required, only a palaeontological and archaeological study is to be submitted for approval. See Annexure D (archaeological and palaeontological specialist report) for more information on heritage legislation relevant to this project and see further below in Section 7.6 for heritage resources discussed in this report.	Eastern Cape Provincial Heritage Resources Agency (ECPHRA)
National Water Act, No. 36 of 1998 (NWA)	Project activities will potentially require potential applications in terms of the NWA, where required. Specifically, any activities such as access tracks within the identified watercourses or their 32 m buffer (or the 1:100 floodline, whichever is the greatest) of the rivers and drainage lines or 500 m from the boundary of the wetlands will require a Section 21 c and i Water Use License (mostly likely a General Authorisation (GA) if all other Section 21 uses are below the GA thresholds).	Department of Water and Sanitation (DWS)
Occupational Health and Safety Act (No. 85 of 1993) (the OHS Act)	The health and safety of all people involved in the project before and after construction will be protected.	Department of Labour (DoL)

3.2 Listed Activities in terms of NEMA

The National Environmental Management Act 107 of 1998 (NEMA) as amended, provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a "*duty of care and remediation of environmental damage*" on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) or BA process in terms of the EIA Regulations (GN R982, as amended). The following listed activities, as shown in Table 6, have been identified as being applicable to this project:

Table 6: Listed activities triggered by the proposed grid connection

Listed activity as described in GN R983 and R985	Description of proposed activity
GN R983 (as amended): Listing Notice 1	
Activity 11: The development of facilities or infrastructure for the transmission and distribution of electricity- (i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV;	The proposed 132 kV overhead powerline would connect the proposed Impofu Wind Farms to the national grid at the Melkhout, Chatty and Sans Souci substations. The bulk of the power line will run within rural and agricultural areas.
Activity 12: The development of – (ii) infrastructure or structures with a physical footprint of 100 square metres or more; Where such development occurs - (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of the watercourse;	Wetlands and drainage lines are scattered along the proposed grid connection corridor. Existing tracks and roads will be used as far as possible to minimise any new impacts on these systems, while all pylons are to be placed 32 m from a watercourse and 50 m from a wetland.

	It is highly unlikely that new access roads will fall within a watercourse, however as the final power line route is not finalised, this activity could be applicable.
Activity 19: The infilling or depositing of any material of more than 10 cubic metres (m^3) into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	Wetlands and drainage lines are scattered along the proposed grid connection corridor. Existing tracks and roads as far as possible will be used to minimise any new impacts on these systems, while all pylons are to be placed 32 m from a watercourse and 50 m from a wetland. It is highly unlikely that the pylons and new access roads will fall within a watercourse, however as the final power line route is not finalised, this activity could be applicable.
Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, **except** where such clearance of indigenous vegetation is required for- (i) undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The switching stations will each (three in total) have a total footprint of approximately 11,250 m^2 (1.125 ha). The single collector switching station will have a footprint of approximately 22,500 m^2. Ground and vegetation clearance would be required for the switching stations and the collector switching station which would therefore trigger this activity. Additionally, an area around the existing Melkhout, Sans Souci and Chatty substations may be impacted to allow for the new line but would be no larger than 50m^2 around Melkhout and Chatty, and 150m^2 adjacent to the Sans Souci substation. **Note**: Only the switching stations, as outlined above, trigger this activity, the power line itself is considered a linear activity and therefore would not be applicable.
Activity 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 1 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	The proposed development is considered to constitute "industrial development". Some of the farms within the Grid Corridor are zoned as game and agricultural land.
GN R985 (as amended): Listing Notice 3	
Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **a.** Eastern Cape i. Outside urban areas: (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans adopted by the competent authority or in bioregional plans.	Although existing roads will be used as far as possible, new access tracks may be required. In some exceptional cases, it may be required that the road be wider than 4 m where access is constrained, or where a wider road is required for passing purposes, or where it will reduce the risk of soil erosion. However, roads will almost always be less than 4 m. The selected grid corridor within the Nelson Mandela Bay metropolitan area is located in a CBA as demarcated in the NMBM bioregional plan, while majority of the western portion of the Grid Corridor is within the Garden Route Biosphere Reserve's buffer or transition areas. The corridor does not fall within the core area of the Biosphere Reserve.
Activity 12: The clearance of an area of 300 m^2 or more of indigenous vegetation… **a.** Eastern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area	Approximately 90,000 m^2 (9 ha) of vegetation clearance may be required for the construction of the three switching stations and collector switching station, and connection into the existing Melkhout, Sans Souci and Chatty substations. Although this will not be located in a sensitive environment (i.e vegetation that is critically endangered or endangered), parts

that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; v. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	of the line do fall within CBAs identified in bioregional plans. In addition, the clearance of vegetation, although minimal, required for the pylon foundations and track development will add to the cumulative development footprint.
Activity 15: The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, such land was zoned open space, conservation or had an equivalent zoning, on or after 02 August 2010. a. Eastern Cape i. Outside urban areas	The area around the base of the pylons, together with the footprint of the proposed switching stations and collector switching station will be greater than 1000 m^2. The area will be transformed from wilderness or agricultural land to industrial.
Activity 18: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. a. Eastern Cape i. Outside urban areas: (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined.	The corridor is located within 5 km of a protected area as per NEMPAA, namely the Van Stadens River Wild Flower Reserve. The corridor is also located within 5 km of a core area of the Garden Route Biosphere Reserve. Access tracks for the proposed development, which will include extensions of existing farm tracks may be lengthened by more than one kilometre within 100 m from the edge of a watercourse. Furthermore, in some exceptional cases, it may be required that the existing may need to be widened by more than 4 m where access is constrained, or where a wider road is required for passing purposes, or where it will reduce the risk of soil erosion. However, roads will almost always be less than 4 m.

3.3 Relevant Policies

In South Africa, the national utility company, Eskom, sources up to 90 % of its electricity needs from fossil-fuels[5]. Against the backdrop of heightened climate change awareness and a growing concern around the reliance and environmental impacts of using fossil fuels, as well as an increasing projected electricity demand in the country, a number of policies were developed that aim at diversifying the electricity generation mix for South Africa. These include the White Paper on the Energy Policy of the Republic of South Africa (1998), the White Paper on Renewable Energy (2003) and the National Climate Change Response Policy White Paper (2011) (see Figure 2).

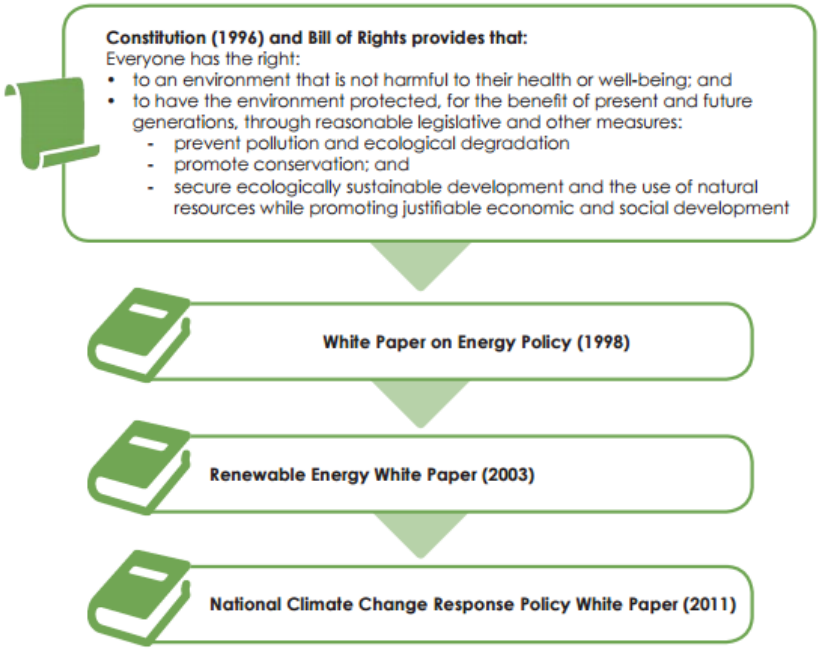

Figure 2: Key policies for initiating renewable energy in South Africa (DoE, 2015)

However, despite the proactive policy stance from the early 2000s, by the end of the decade there was an electricity shortage that resulted in rolling black outs in 2008. In direct response to these electricity shortages, the Integrated Resource Plan (IRP) (2010) was issued as a medium-term strategy which set the target for renewable energy supply to 17.8 GW over a 20-year period from 2010 to 2030. An update to the IRP was drafted by the Department of Energy (DoE) and circulated for a 60-day public comment period in August 2018. This updated IRP indicates that the expected electricity demand for South Africa has decreased and that no new nuclear will be planned until at least after 2030. Of the new build planned by 2030, 52% (18,746 MW) will come from renewable energy, half of which will be wind energy (9,462 MW). These renewable energy targets are procured through a competitive tendering process called the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) run by the DoE. The success of this programme has been internationally recognised, with the United Nations Environmental Programme (UNEP) 2014 Report placing South Africa among the top-10 countries in respect to renewable energy investment.

In South Africa, renewable energy forms an important part of our energy mix. 32 700 GWh of energy[5] has been generated by renewable energy sources procured under the REIPPPP since the first project became operational. It has also led to substantial foreign direct investment flowing into South Africa through the Renewable Energy Independent Power Producer projects and by December 2018 this amounted to about R42.8 billion[6]. Additionally, beyond the foreign investment, localised socio-economic benefits have also been realised through job creation, skills development, funding of enterprise development and socio-economic development projects as well as the establishment of Community Trusts. Approximately 38,701 job years[7] for South African citizens have been created to date[6], R779 million spent on socio-economic development contributions and R250.3 million on enterprise development. Over and above this carbon emission reductions of 33.2 Mton CO_2 and water savings of 39.2 million kilolitres have been achieved.

[5] http://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Understanding_Electricity.aspx (accessed 05 August 2019)
[6] IPPPP Quarterly Report, 31 December 2018. Downloaded from: https://ipp-projects.co.za/Publications.
[7] A job year is the equivalent of a full-time employment opportunity for one person for one year.

The proposed Impofu Wind Farms would therefore have both national and global significance as it aligns with national policy direction as well as contributing to South Africa being able to meet some of its international climate change obligations, by aligning domestic policy with internationally agreed strategies and standards as those set by the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, as well as the recent Convention of the Parties (COP) 21 in Paris 2015, to all of which South Africa is a signatory. The Impofu Grid Connection proposed in this application is an important component of realising the benefits of the proposed Impofu Wind Farms. For without it, the energy produced by the Wind Farms would not be able to connect to the National Electricity Grid. It is these potential positive impacts and the alignment with government policy of this development that needs to be weighed up against its potential negative environmental impacts.

3.4 Planning Context

The renewable energy industry has substantial support in the South African planning context, which is detailed in the following national and provincial plans:

- National Development Plan;
- National Integrated Energy Plan (2016)
- National Integrated Resource Plan for Electricity (2010-2013);
- National Infrastructure Plan;
- Renewable Energy Independent Power Producer Procurement Programme (REI4P)
- Eastern Cape Provincial Economic Development Strategy, 2017
- Eastern Cape Sustainable Energy Strategy (SES), 2012; and
- Eastern Cape Climate Change Response Strategy 2011.

More specifically, the proposed Impofu grid corridor and wind farms fall within the jurisdiction of the Kouga and Koukamma[8] Local Municipality and the Sarah Baartman District Municipality, as well as the NMBM. An evaluation of the 'need and desirability' of the project (Section 5.2) considers the strategic context of the project with regard to the municipal Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) as follows:

- Sarah Baartman IDP 2019-2020
- Sarah Baartman SDF 2013
- Sarah Baartman Tourism Master Plan (2009)
- Kouga IDP 2017-2022
- Kouga SDF 2015
- Kouga Heritage Plan (2015)
- Kouga Responsible Tourism Plan (2004)
- Nelson Mandela Bay IDP 2016/17 – 2021/22
- Nelson Mandela Bay SDF 2015
- Nelson Mandela Bay Tourism Master Plan (2007)

4 BA METHODOLOGY

The objective of the basic assessment process is to, through a consultative process -

a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b) identify the alternatives considered, including the activity, location, and technology alternatives;
c) describe the need and desirability of the proposed alternatives;
d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural

[8] Given the small size of the Koukamma Local Municipality traversed by the proposed grid corridor (~8 km of ~120 km), and the limited number of people that are likely to be affected by this section of the grid, this report does not consider the policy planning environment, nor the socio-economic context for the municipality. Representatives of the municipality have however been included in the stakeholder database and will be included in the public participation process.

sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine –

i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and;
ii) the degree to which these impacts -

(aa) can be reversed;
(bb) may cause irreplaceable loss of resources; and
(cc) can be avoided, managed or mitigated;

e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to-

i) identify and motivate a preferred site, activity and technology alternative;
ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
iii) identify residual risks that need to be managed and monitored.

The proposed Impofu Grid Connection is a complex project given its linear nature, length spanning nearly 120 km over many properties and coverage of a heterogenous landscape (further detailed in Sections 4 and 5). As such, the proposed approach to the BA process has been designed intentionally to adequately assess the potential environmental impacts and goes beyond the minimum requirements provided for by the NEMA. This methodology is further described in the sub-sections that follow.

4.1 Approach to the Project

The project team have actively sought to identify the best practical environmental option possible for the identified Grid Corridor through a rigorous, iterative and multi-disciplinary process, that has drawn on the considerable body of existing knowledge and specialist expertise relating to the study area. This approach aligns with the NEMA principles advocating for sustainable development through the adoption of the mitigation hierarchy as set out in Section 2 of NEMA and depicted below in Figure 3. Through application of this hierarchy, 'avoidance' of environmental impacts was then the basis for the approach to this process.

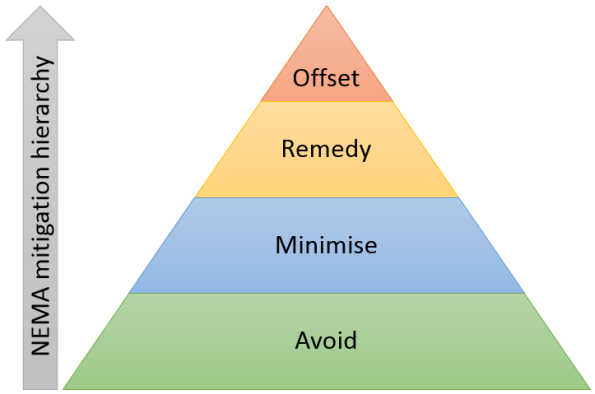

Figure 3: Mitigation hierarchy

The regulated EIA and BA processes are tightly bound by legislative timeframes in terms of NEMA, and thus provide limited opportunity to incorporate and respond to issues raised by interested and affected parties (I&APs). In a precautionary approach, it was therefore assumed by Red Cap and Aurecon that an additional public comment period would enable the project team to better incorporate and communicate the views of the I&APs into the proposed development.

As outlined in Figure 4 below, there are therefore four distinct phases in this BA process, namely Screening Phase, Pre-Application Phase, BAR Phase and the Revised BAR Phase. A description of the activities which have been, and will be, undertaken during each phase is provided in the following sections. Note that this report covers the fourth phase, *viz.* the revised BAR Phase.

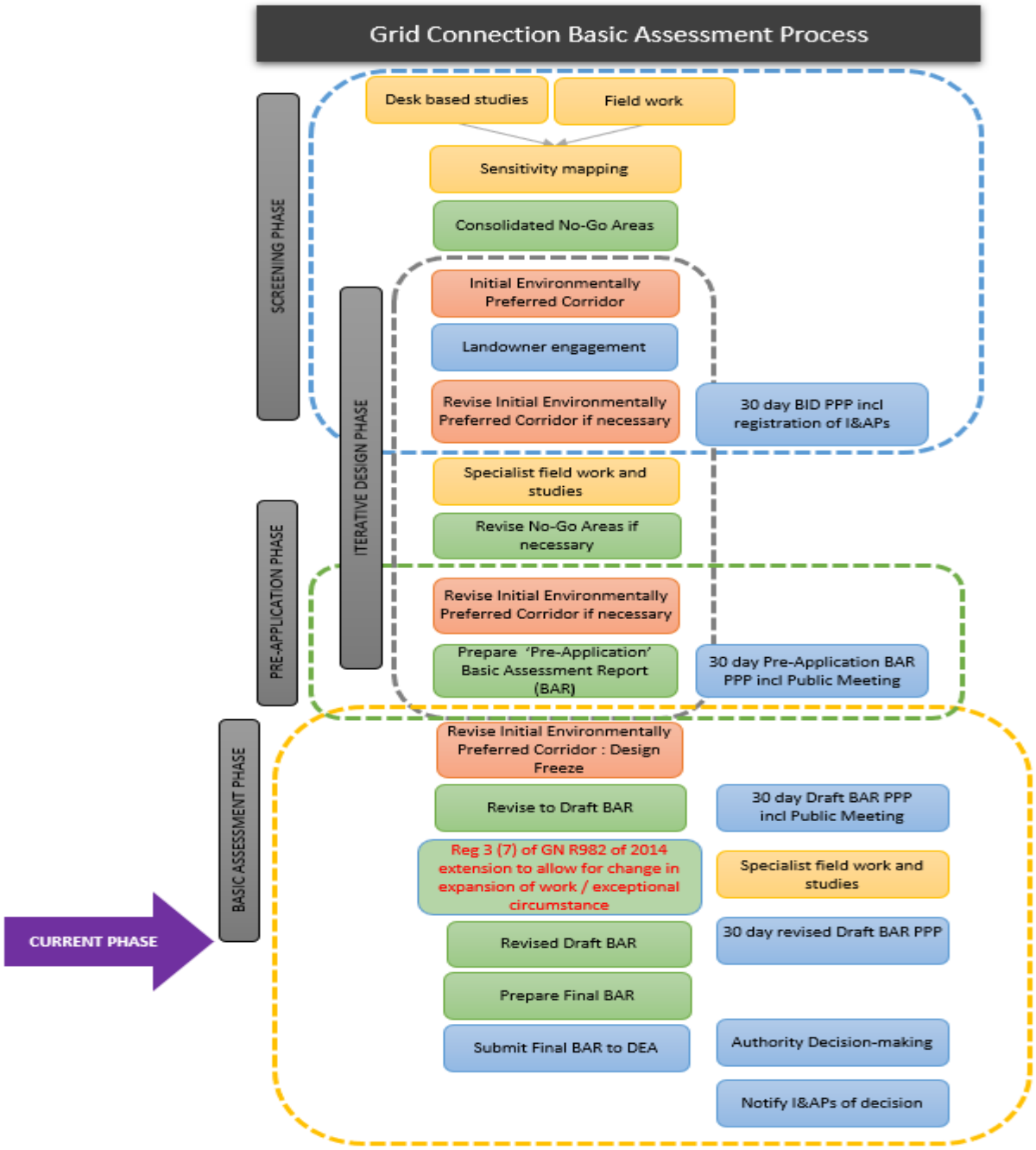

Figure 4: Environmental assessment process for the project

As illustrated in Figure 4, three stages of public participation are included in the BA process of this project, at the Screening phase, Pre-Application and the BAR phase, respectively. More information on the Public Participation Process (PPP) is included in Section 4.2 below.

4.1.1 The Screening Phase

A detailed screening assessment was undertaken at the pre-feasibility stage of the project to allow environmental and socio-economic impacts to be considered early in the project lifecycle and evaluated in an integrated manner with the engineering design considerations. Designs based on screening input are therefore sensitive to environmental and socio-economic constraints, reducing project risks and supporting application of the mitigation hierarchy (as advocated in the principles of the NEMA, section 2), in the form of avoidance and minimisation of impacts. By adopting this precautionary approach, all parties (proponent, engineers, specialists, authorities,

I&APs, etc.) can gain more accurate, detailed and relevant multi-disciplinary information early in the process. This approach ensures that it is more likely that once the project is subject to the detailed and time restricted legislated BA process, potential significant impacts have already been identified and avoided (where practicable) which reduces the likelihood of significant issues needing to be dealt with during the time restricted legislated BA process. Therefore, the precautionary approach leads to a more robust impact assessment which allows for DEA to make a more informed decision.

Through desktop and field based assessments, the screening process for the Impofu Grid Corridor used sensitivity mapping to identify environmental No-Go areas which were overlaid with technical spatial information. This mapping guided the process of identification of a number of environmentally and socio-economically favourable alignment alternatives within the study area. This process was undertaken collaboratively with the project engineers who provided input regarding the technical considerations, as well as the specialists who have been used in this BA process (Table 3). These alignments were then taken through a Multi-Criteria Decision-Making (MCDM) process, allowing the most preferable option overall to be identified using a rigorous quantitative process (further information on this approach can be found in Section 5).

4.1.2 The Pre-Application Phase

Stakeholder engagement is an important aspect of sustainable development. In order to meet the ecological, social and economic needs of present generations without comprising the needs of future generations, one needs to understand what those needs are. It is important that this occurs at a local level, as communities such as farmers, or families who have lived in small towns for a long time often understand the landscape well.

However, given the expansive area that the proposed Impofu Grid Corridor covers, it is anticipated that a large network of stakeholders may be interested and affected by the proposed infrastructure. As highlighted above, the regulated EIA and BA processes are tightly bound by legislative timeframes in terms of NEMA, and thus provide limited opportunity to incorporate and respond to issues raised by interested and affected parties (I&APs). In a precautionary approach, it was therefore assumed by Red Cap and Aurecon that an additional public comment period would enable the project team to better incorporate and communicate the views of the I&APs into the proposed development.

Furthermore, the proposed Impofu Grid Corridor will only be constructed if the associated Impofu Wind Farms are authorised and constructed, therefore the decision by the DEA needs to be made holistically. To ensure that this is achieved the Basic Assessment process for the Impofu Grid Corridor (this project) and the Environmental Impact Assessment processes for the Impofu North, East and West Wind Farms needed to be undertaken in such a manner that the processes overlapped. This overlap will ensure that the DEA understands the impacts of all these projects together when making their decisions so that, if they approve one project, DEA can then make an informed decision on the others. The wind farm legislated EIA process includes a scoping and EIR phase and is thus longer than the legislated grid BAR process. Therefore, the submission of the BAR to DEA was delayed so as to coincide closely with the submission of the draft EIR for the wind farms. This delay allowed for an extensive pre-application phase to be undertaken. In the pre-application phase, the Pre-App BAR and associated Pre-App Scoping Reports were compiled and circulated for a five-week public comment period prior to submission of the application forms to DEA.

4.1.3 The Basic Assessment Phase

This Draft BAR has been produced from updates to the Pre-App BAR by considering and incorporating comments that were received during the pre-application public comment period. The submission of the application for EA with the DEA in April 2019 triggers the start of a 90-day period within which the final BAR must be submitted to DEA for decision-making, having undergone a further 30-day public comment period. DEA had an opportunity to comment on the Draft BAR. A request for extension of the legislated timeframes was approved by DEA on 12 July 2019 (Aurecon requested an extension on the submission of the Final Basic Assessment Report (BAR) in terms of Regulation 3(7) GN R982 to incorporate the assessment of the new corridor alignment into the BAR).

4.1.4 The Revised Basic Assessment Phase

An extension of the timeframe to submit the Final BAR was requested in terms of Regulation 3(7) GN R982. This was to allow additional time to firstly define a new corridor alignment and then to sufficiently assess the new corridor alignment. A 30 day public comment period will be held to collect comments on the Revised BAR which documents the changes to the Grid corridor.

The Final BAR will be submitted no later than, 24 February 2020.

DEA must then, within 107 days of receipt of the final BAR and EMPr, in writing -

a) grant EA in respect of all or part of the activity applied for; or
b) refuse environmental authorisation.

Table 7 below provides a summary of the key dates of the BAR process for the project to date, and provisional dates going forward.

Table 7: Summary of BA process for the project

BA task	Date
Screening Phase	
Pre-application consultation with DEA	17 October 2017
Multi day Screening site visit by EAP and specialists	10 – 15 September 2017
Identification of initial stakeholders and circulation of background information document (BID) and Screening PPP	December 2017 – Mach 2018
Focus group meetings	6 – 8 February 2018
Pre-Application Phase	
Field work by specialists	September 2017 – May 2018
Five-week PPP on Pre-App BAR	1 August – 7 September 2018
Public meetings	21 – 23 August 2018
BAR Phase	
Submission of application form to DEA with draft BAR	11 April 2019
30-day PPP on draft BAR – refer to Section 3.2 and Annexure C for details	12 April 2019- 16 May 2019
Application for extension	14 June 2019
DEA granting of extension	12 July 2019
Revised BAR	
Site visit by specialist	July 2019
Submission of revised draft BAR to DEA	13 September 2019
30-day PPP on revised draft BAR - refer to Section 3.2 and Annexure C for details	16 September 2019 – 18 October 2019
Submission of final BAR to DEA	05 November 2019
DEA Decision: Grant/ Refuse Environmental Authorisation	13 February 2020

4.2 Stakeholder Engagement (Public Participation)

Stakeholder engagement has been described by the International Finance Corporation (IFC) of the World Bank Group as a broad, inclusive and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. The aim of stakeholder engagement differs at different stages of the project lifecycle. During the BA process, the aim is to provide an opportunity for stakeholders to be informed of projects occurring in their area and that may affect them directly or indirectly. It also aims to provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and to ensure that these

are used to guide the new development, and ongoing operations, in a responsible manner that complements the local socio-economic environment and enhances the benefit of a given project.

South African legislation and guidelines (refer to Section 2) have formalised stakeholder engagement in the EIA (and BA) process and refer to it as the Public Participation Process (PPP). PPP therefore forms an integral component of this investigation and enables I&APs to identify their issues, concerns, and suggestions during the BA process. This PPP has been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the BA process. These stages are summarised below in Figure 5. Please refer to the Public Participation Report in Annexure C for more detailed information and proof of the PPP.

Screening and Iterative Design Phase	• A **pre-application meeting** was held on 17 October 2017 with the competent authority, DEA, to ensure that an appropriate EIA process would be followed. • **Advertisements** in Afrikaans, English and isiXhosa were placed in the provincial newspaper, Eastern Cape Herald newspaper, on 14 December 2017 and placed in the local newspaper, Kouga Express, on 21 December 2017 notifying the broader public of the initiation of the EA processes and inviting them to register as I&APs. • Trilingual **site notices** (Afrikaans, English and isiXhosa) were erected at various public entrances and public libraries, in December 2017. • A **Background Information Document (BID)** was compiled which provided a high-level introduction to the project. This was distributed to landowners, identified key stakeholders as well as any registered I&APs between December 2017 and February 2018. • Three **focus group meetings** were held in PE and St Francis Bay between 6-8 February 2018 with local authorities, landowners and adjacent landowners (of the wind farms) and key identified stakeholders such as conservation bodies and local community groups. The meetings introduced both the Wind Farms and the Grid Connection, however they did focus more on the wind farms. (Meeting notes are included in Appendix 4)
Pre-Application Phase	• The **pre-application BAR** was made available for a five-week public comment period from **1 August** to **7 September 2018** • Three **public meetings/open days** were held at the St Francis Bay Bowling Club (21 August 2018), Thornhill Hotel (22 August) and Innibos Lapa in Despatch (23 August). • **Notification** of the public comment period and public meetings were sent in writing (via post or email) to all registered I&APs between 25 and 31 July 2018. • Trilingual **advertisements** of the public comment period and invitation to attend the public meetings were published in the Eastern Cape Herald and the Kouga Express on 30 and 26 July 2018, respectively. • The **existing site notices** were updated to indicate the start of the public comment period and announce the details of the public meetings. • **Hard copies** of the pre-application BAR were made available at the following locations: Kouga Municipality, St Francis Bay; Oyster Inn/ Oyster Bay Estate Agent; Humansdorp Library, Thornhill Hotel and Allan Ridge Library (in Uitenhage). • **Electronic copies** of the report were made available on Dropbox, Aurecon's PPP website, and via CD on request.
BAR Phase	• The **draft BAR** was made available for a 30-day public comment period from **18 April to 23 May 2019** • Three **public meetings** were held at the St Francis Bay Bowling Club (2 May 2019), and Thornhill Hotel and Innibos Lapa in Despatch (3 May 2019). • **Notification** of the public comment period and public meetings were sent in writing (via post or email) to all registered I&APs. • Trilingual **advertisements** of the public comment period and invitation to attend the public meetings were published in the Eastern Cape Herald. • Trilingual **Site notices** were placed at the same locations used previously to indicate the start of the public comment period and announce the details of the public meetings. • **Hard copies of the draft BAR** were made available at: St Francis Bay Library, Oyster Inn, Humansdorp Library, Thornhill Hotel and Allan Ridge Library (in Uitenhage). • **Electronic copies** of the report were made available on Dropbox, Aurecon's PPP website, and via CD on request. • The **revised Draft BAR** will be made available for a 30-day public comment period from **16 September** to **18 October 2019.** • **Hard copies of the revised draft BAR** will be made available at: St Francis Bay Library, Oyster Inn, Humansdorp Library, Thornhill Hotel and Allan Ridge Library (in Uitenhage). • **Electronic copies** of the report will be made available on Dropbox, Aurecon's PPP website, and via CD on request. • Notification of the public comment period will be sent in writing (via post or email) to all registered I&APs.

Figure 5: Public participation in this BA process

4.2.1 Relevant Stakeholders

A database of I&APs was developed for the proposed Impofu Wind Farm developments and the proposed Impofu Grid Connection (this application) during the Screening and Pre-Application Phase. This database was initiated by including the details of the following affected parties (refer to Annexure C for the comprehensive list):

- Potentially affected landowners, adjacent landowners and occupiers of their land;
- Farmers/ agricultural associations;
- Relevant district and local municipal officials;
- Relevant national and provincial government officials;
- Key stakeholders in renewable energy projects in the area;
- Organisations in the area;
- Provincial and local authorities and parastatal organisations;
- National departments and organisations; and
- Other national/ provincial departments where deemed necessary.

4.2.2 Summary of Concerns

During the pre-application PPP process and the initial draft BAR PPP process, a few concerns were highlighted by I&APs as summarised below. More details are provided in Annexure C (Public Participation Report) which also describes the manner in which the comments have been addressed. Valuable discussion around concerns have also been captured from the public meetings held in St Francis and Thornhill and is available in the summary meeting notes in Annexure C.

Table 8: Summary of issues raised by I&APs

Theme	Issues
Technical	• Interference of the associated grid connection with the ability of adjacent wind farms to export generation capacity.
Landowners/ size of impact	• An extensive exercise has been undertaken by Aurecon and Red Cap to identify the potentially affected landowners within and adjacent to the proposed corridor. In response to these engagements, many landowners have had a keen interest to learn how the potential grid connection will impact them. Red Cap have been and will continue to engage directly with the landowners on whose land the powerline will potentially be located. • In the public meetings it was evident that landowners in the area were concerned that the size of impact proposed by the Impofu Grid Corridor would be similar to that of the recent Thyspunt EIA process which included five alignments of 400kV Transmission powerlines. |This is obviously not the case given this process is only considering one 132kV distribution power line.
Services	• SANRAL conditions supplied for activities in proximity to national roads; and • Eskom conditions supplied mostly regarding servitude restrictions.
Process	• Positive feedback on the approach undertaken to avoid sensitive areas in layout; and • Positive feedback on the approach undertaken to identify landowners along the grid corridor.
Ecological	• A concern was raised on the impact of the powerline on bees.
Route Alignment	• A concern was raised on the impact of the powerlines and route alignment on local tourism and scenic routes.

4.3 Assessment Methodology

4.3.1 Specialist Assessments

To provide a scientific assessment that is transparent and robust, a clear methodology is required. Although each specialist required a methodology that was specific to their investigation (detailed in their reports in Annexure D), they were each required to comply with the following general requirements:

4.3.1.1 General Specialist Report Requirements

All reports prepared by the Specialist shall include the following information:

- Details of the individual/s who prepared the report, and details of the project team members who undertook or contributed to the specialist studies informing the report, including their responsibilities, relevant expertise to undertake the specialised study or specialist process, as well as a Declaration of Independence;
- An indication of the scope of, and the purpose for which the report was prepared;
- A description of the methodology adopted in preparing the report or undertaking the specialist process, including the consideration of the latest specialist guidelines;
- A description of any assumptions made and any limitations to the study, as well as uncertainties or gaps in knowledge;
- A description of any consultation processes that were undertaken during the course of undertaking the study; and
- When considering the impact to species, consider and assess the potential impact to any species that is important in providing vital ecosystem services. I.e. do not only talk to Species of Conservation Concern.

All specialist reports were updated in January 2019 and again in August 2019 to accommodate the revised corridor alignment (prior to the circulation of the revised Draft BAR for public comment) to take account of input from the I&AP's to date, further assessment by the specialists and changes to the corridor alignment.

4.3.2 Assessment Methodology

4.3.2.1 Overview

For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative and generated through a spreadsheet but requires professional judgement in the application of the criteria. There is provision for comment on the significance if the specialists disagree with the level that is auto-calculated.

When assessing impacts, broader considerations are to also be taken into account, these include the confidence with which the assessment was undertaken, the reversibility of the impact and the resource irreplaceability.

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent).

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

The following tables show the scales used to classify the above variables and define each of the rating categories.

4.3.2.2 Intensity

The intensity refers to the degree of alteration of the affected environmental receptor. The relevant descriptor for intensity is selected by the user (refer to Table 9).

Table 9: Description of intensity and assigned numerical values

Numerical Rating	Intensity*	
	Category	Description
1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
2	Very low	Natural and/ or social functions and/ or processes are slightly altered
3	Low	Natural and/ or social functions and/ or processes are somewhat altered
4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
5	High	Natural and/ or social functions and/ or processes are notably altered
6	Very high	Natural and/ or social functions and/ or processes are majorly altered
7	Extremely high	Natural and/ or social functions and/ or processes are severely altered

*NOTE: Where applicable, the intensity of the impact is related to a relevant standard or threshold or is based on specialist knowledge and understanding of that particular field.

4.3.2.3 Duration

The duration refers to the length of permanence of the impact on the environmental/social receptor. The relevant descriptor for duration is selected by the user (refer Table 10).

Table 10: Description of duration and assigned numerical values

Numerical Rating	Category	Descriptors
1	Immediate	Impact will self-remedy immediately
2	Brief	Impact will not last longer than 1 year
3	Short term	Impact will last between 1 and 5 years
4	Medium term	Impact will last between 5 and 10 years
5	Long term	Impact will last between 10 and 15 years
6	On-going	Impact will last between 15 and 20 years
7	Permanent	Impact may be permanent, or in excess of 20 years

4.3.2.4 Extent

The extent refers to the geographical scale of impact on the environmental/social receptor. The relevant descriptor for extent is selected by the user (refer Table 11).

Table 11: Description of extent and assigned numerical values

Numerical Rating	Category	Descriptors
1	Very limited	Limited to specific isolated parts of the site
2	Limited	Limited to the site and its immediate surroundings

Numerical Rating	Category	Descriptors
3	Local	Extending across the site and to nearby settlements
4	Municipal area	Impacts felt at a municipal level
5	Regional	Impacts felt at a regional / provincial level
6	National	Impacts felt at a national level
7	International	Impacts felt at an international level

4.3.2.5 Probability

To calculate the significance of an impact, the probability (or likelihood) of that impact occurring is also taken into account. Refer to Table 12.

Table 12: Definition of probability ratings

Numerical Rating	Category	Descriptors
1	Highly unlikely / None	Expected never to happen
2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
4	Probable	Has occurred here or elsewhere and could therefore occur
5	Likely	The impact may occur
6	Almost certain / Highly probable	It is most likely that the impact will occur
7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

4.3.2.6 Significance

These are auto-calculated in the spreadsheet as described above and includes the following categories in Table 13.

Table 13: Application of significance ratings

Range		Significance rating
-147	-109	Major (-)
-108	-73	Moderate (-)
-72	-36	Minor (-)
-35	-1	Negligible (-)
0	0	Neutral
1	35	Negligible (+)
36	72	Minor (+)
73	108	Moderate (+)

Range		Significance rating
109	147	Major (+)

When assessing impacts, broader considerations should also be taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 14, Table 15 and Table 16, respectively.

Table 14: Definition of confidence ratings

Rating	Descriptor
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 15: Definition of reversibility ratings

Rating	Descriptor
Low	The affected environment will not be able to recover from the impact – permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 16: Definition of irreplaceability ratings

Rating	Descriptor
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

4.3.1 Assessment of Cumulative Effects

The cumulative impacts of the proposed overhead powerline are an important consideration for the proposed grid given the context of the project. There are several existing and proposed grid connections associated with the existing and proposed wind farms in the western section of the corridor, as well as an existing Eskom 132 kV overhead powerline that runs the length of the proposed corridor. The proposed project will add another approximately 120 km to this network of lines.

Cumulative impact, in relation to an activity, means the past, current and reasonable foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may be significant when added to the existing and reasonable foreseeable impacts eventuating from similar or diverse activities (NEMA EIA Reg 1).

4.3.1.1 Approach

The cumulative impacts for the project will be considered for any linear infrastructure in addition to the assessment taken against the baseline and the proposed overhead power line (described in Section 3). The cumulative scenario will focus on proposed future overhead powerlines that have a valid EA at the commencement of the study.

Collectively these existing and future projects represent known or anticipated activities that may occur in the project vicinity. The project has the potential to contribute to the cumulative impact thereof. The tabulated projects will not all interact with the preferred overhead power line along its entire route.

The relevant projects with potential associated cumulative impacts have been identified as detailed in Table 17 and illustrated in a Cumulative Map in Figure 6.

Table 17: Overhead powerlines to be considered in the assessment of cumulative impacts

Project	Overhead power line	Length	Status
Melkhout-Kromrivier	132 kV line from Melkhout substation to Kromrivier substation, Eastern Cape – Upgrade existing line to a double circuit line to accommodate Oyster Bay	± 26 km	EA issued, out to tender
Oyster Bay Wind Energy Facility grid connection	132 kV line from Oyster Bay Wind Energy Facility to Melkhout substation	±4.3 km	EA issued; Construction to commence in Quarter 1 2019
Dieprivier-Kareedouw	Construction of 132 kV distribution lines from Dieprivier to Kareedouw, Sarah Baartman District Municipality (formerly Cacadu District Municipality)	±36 km	Amendment authorised in May 2017

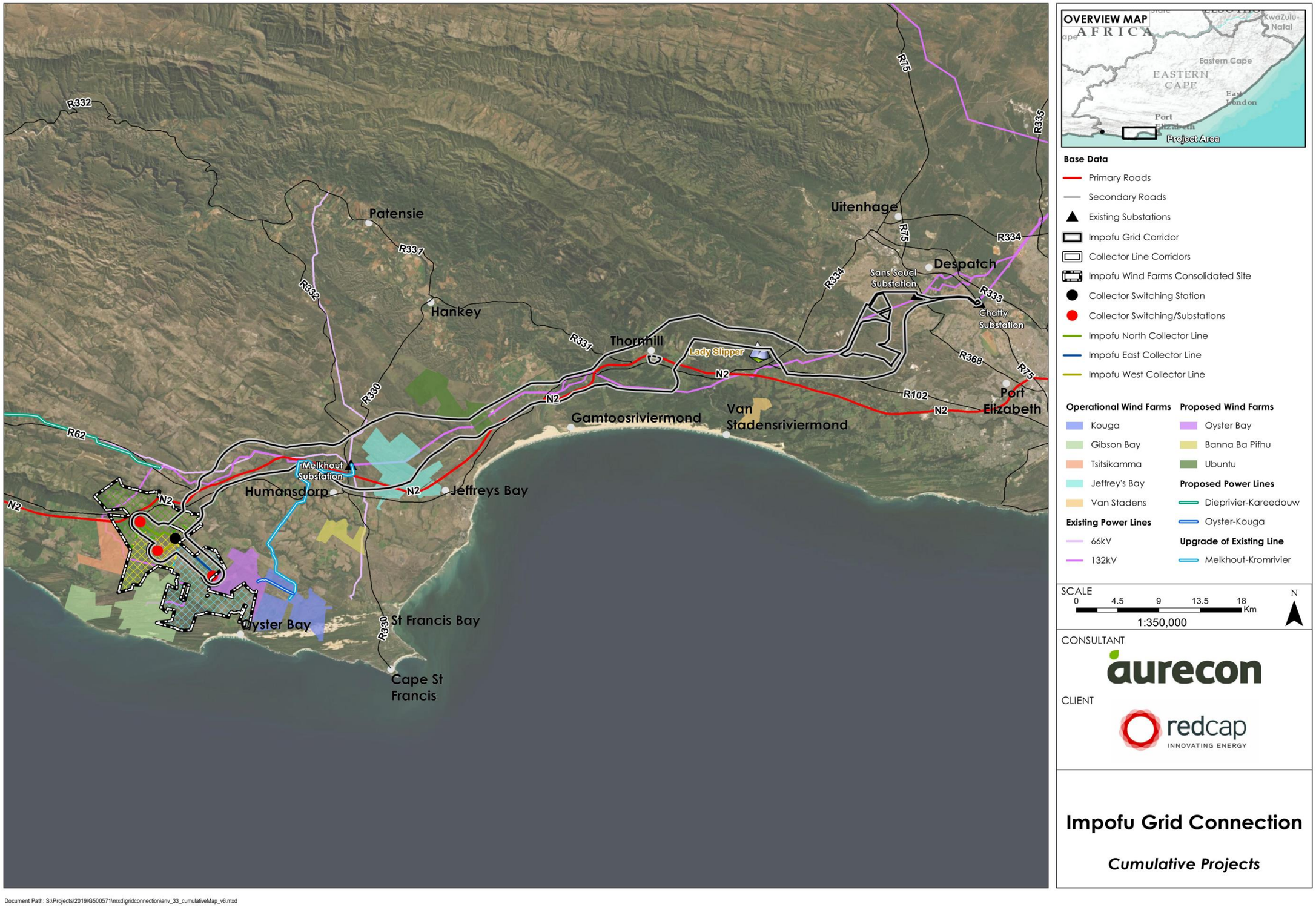

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Figure 6: Overhead powerlines to be considered in the assessment of cumulative impacts

Cumulative impacts have been assessed by each of the specialist studies as part of their assessments according to the scenarios illustrated below in Figure 7. The cumulative assessment is included per environmental aspect in Section 7.

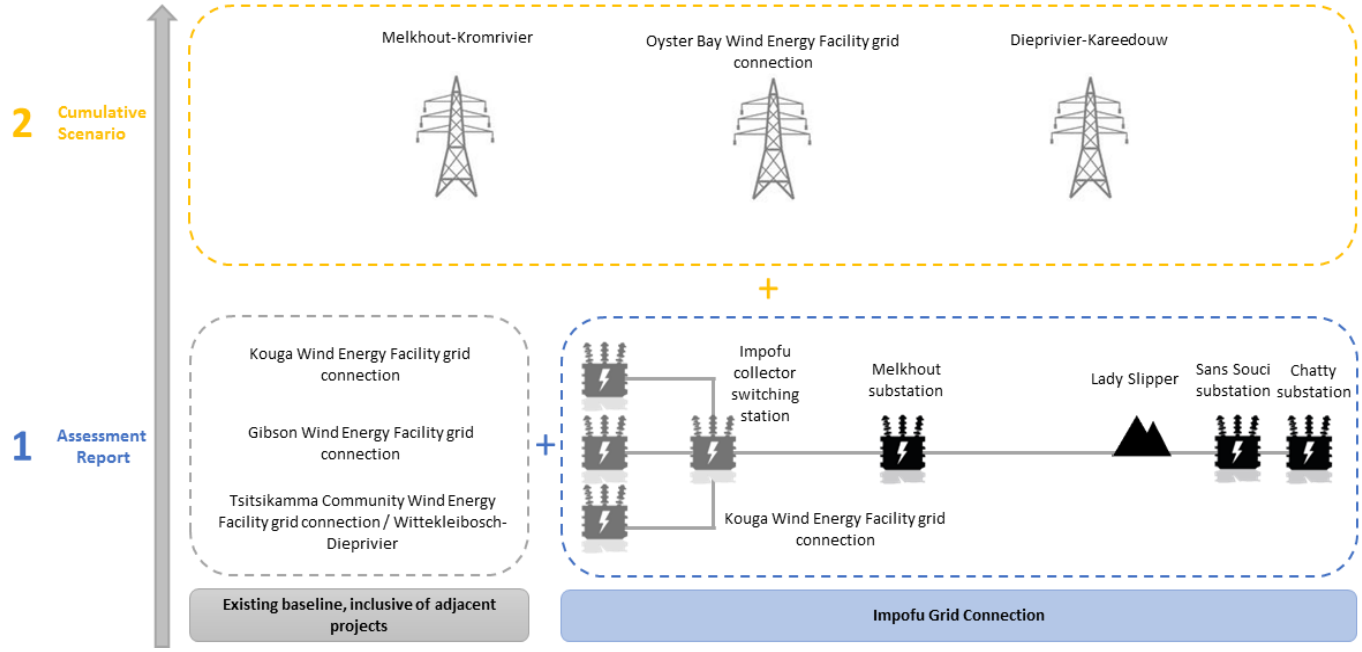


Figure 7: Concept for assessing cumulative impacts

4.4 Assumptions, Limitations and Gaps in Knowledge

Various methods and sources were used to identify the potential social and environmental aspects associated with the proposed project and used to develop the Terms of References (ToRs) for the specialist studies.

The sources of information for the preparation of this report include, *inter alia*, the following:

- Collection of information specific to the project, as provided by the Proponent:
  - Project description;
  - Methodology for construction of the various project components;
  - Methodology during operations and decommissioning;
  - Expected timeframe for project development;
  - Maps and figures, outlining the proposed facilities; and
  - Technical information relating to design.
- Other relevant BARs/ EIRs prepared for Bas/EIAs undertaken in the area;
- Environmental baseline literature and desktop spatial surveys for this site and surrounding areas;
- Environmental baseline surveys for this site and surrounding areas from site visits undertaken by the specialists;
- Consultation with the project team (including specialists); and
- Consultation with I&APs, including authorities.

In undertaking the investigation and compiling the BAR, the following has been assumed:

- The information provided by the Proponent is accurate and unbiased, and no information that could change the outcome of the BA process has been withheld.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed grid connection infrastructure. The environmental impacts of the proposed three Impofu Wind Farms have been investigated in three separate EIA processes.
- The BA process is based on Best Practice Guidelines which were available at the time of writing this report.
- The final power line layout will occur within the 2 km corridor that was assessed by the EAP and specialists.
- For the purpose of this assessment, it is assumed that as a worst case all three Impofu Wind Farms will be constructed. If none of the wind farms reach construction, the associated infrastructure in this application will not be constructed.
- Additional linear infrastructure, such as roads, will use existing access tracks as far as possible. The preferred powerline alignment route will fall within the assessed 2 km corridor, with a 31 m servitude.
- The requisite water use authorisations and other necessary permits required for construction will be applied for, prior to or upon the receipt of environmental authorisation as required.
- The grid connection infrastructure is unlikely to be decommissioned, however, the potential impacts associated with the decommissioning phase are anticipated to be similar to the construction phase.

Limitations and gaps in knowledge pertaining to the BA process include:

- Six variations of pylon type (due to different pylons being needed were the line runs straight or turns, or where the line crosses a large gorge or goes up a steep mountain etc) have been assessed by the EAP and specialists. The first three standard monopole variations will be used almost exclusively along the route but there may be very limited instances where the other three are required for technical reasons and this will only be ascertained once final design and walk through by the relevant specialists is completed.
- Specific sources of water for the development has not yet been identified.
- No indication of commencement date of construction phase.

Any limitations and gaps in knowledge that have been encountered by the specialists are identified in their respective assessments (Annexure D).

The assumptions, limitations and gaps in knowledge will not undermine the EAPs assessment or findings of the proposed grid connection infrastructure.

5 CONSIDERATION OF ALTERNATIVES

The NEMA requires that alternatives are considered during the EIA/BA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

However, Appendix 1 (Contents of a BAR) of GN R982 of 2014, as amended, Section 3(1)(g) and (h) also states that 'a motivation for the preferred site, activity and technology alternative' and 'a full description of the process followed to reach the proposed preferred alternative within the site…' must be provided. The subsections that follow here therefore provide a detailed description of the process that was taken to arrive at the proposed Impofu Grid Corridor which is assessed in this report.

5.1 Overhead powerline corridor

As detailed below in Section 6.6, the need for this grid connection is directly linked with the proposed development of three proposed wind farms. Based on the existing electricity grid infrastructure in the area, it was determined that a 132kV overhead powerline would need to be constructed between the proposed wind farms near Oyster Bay, and the nearest reasonable substations that could evacuate the electricity generated by the wind farms. It was determined that this would require the establishment of a 132kV powerline between the Kouga area (Dieprivier/ Melkhout substations) and Port Elizabeth (Grassridge/ Chatty substations), covering a distance of approximately 120 km.

High-level environmental screening was subsequently undertaken which included high-level biodiversity, avifauna, surface water, soils, agricultural potential and landowner issues as criteria. It also made use of the significant amount of information on grid alignments and impacts in this area that was acquired during the Thyspunt 400kV EIA process that was undertaken by Eskom but never received an Environmental Authorisation. Results of the screening study identified three alternative alignments (with deviations) for the 132kV line with a preference ranking for each (based on cumulative sensitivity of all criteria). However, given the scale at which this study was done, it did not take account of practicalities such as cadastral boundaries, existing infrastructure like farm buildings or powerlines, etc. The findings did however provide the project team with an initial grid assessment corridor (see black polygon in Figure 8) in which to identify a smaller corridor for the BA process.

Following the appointment of Aurecon, a screening phase (Section 4.1.1) was undertaken to refine the proposed assessment corridor. In September 2017, the team of specialists[9] (listed above in Table 3), EAPs, engineers and Red Cap met on site for a multi-day site visit, as well as a set of workshops. The screening workshop commenced with each specialist reporting on their desk-based findings of the initial grid assessment corridor, which had been groundtruthed to a certain degree either prior to the site visit through field work; driving sections of the corridor; and/or a helicopter flight over the corridor for the terrestrial ecology, aquatic ecology and avifauna specialists. During the workshop, specialists also reported on the criteria that they used to identify and establish their specialist specific No-Go areas and the highly sensitive, moderately sensitive and low sensitivity developable areas. By taking this proactive approach as a team, the synergies and overlaps between the specialists' spatially sensitive areas were identified. Examples include watercourses (wetlands, rivers and dams), which are sensitive ecosystems in their own right, but which also provide habitat for certain species of bird. In this instance, the bird specialist whose sensitivity areas included aquatic ecosystems, used the data from the aquatic specialist for consistency.

Input was provided by Red Cap and the grid engineer who described the technical criteria relating to the project such as the requirement for a 3 km corridor (which has since been reduced to the 2 km assessed within this report) width to allow for uncertainty regarding landowner permissions; the preference for following existing overhead power line corridors; and the technical considerations for steep valley crossings.

[9] The socio-economic, palaeontology and visual specialists were not present, however they did provide input prior to and during the workshops.

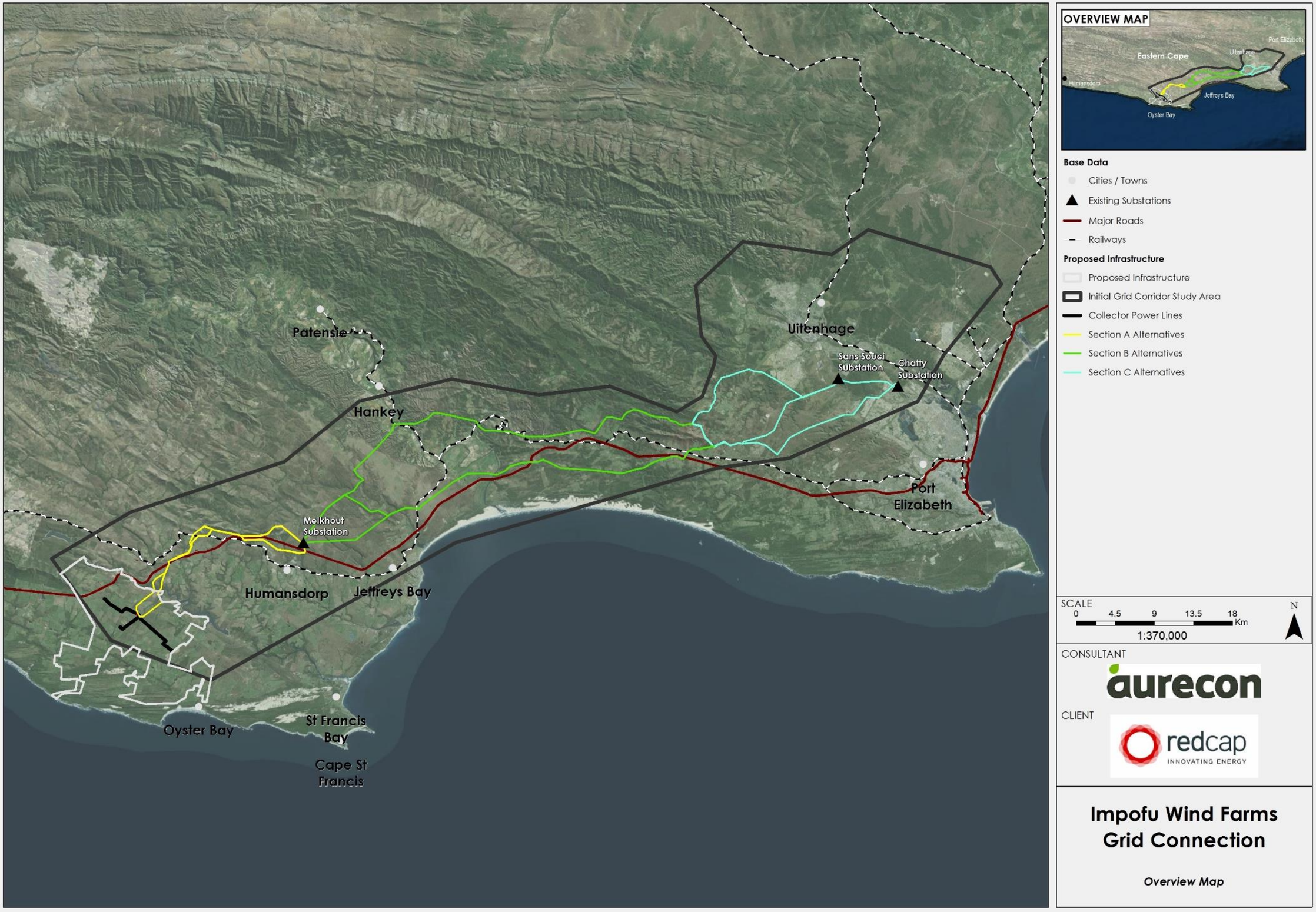


Figure 8: Overview of the Impofu Grid Connection screening

Based on the information shared by all the disciplines, the team identified, in an interactive manner, a number of alternative alignments within the initial grid assessment corridor. Most of these were identified based on existing linear infrastructure in the area, such as the existing Eskom 132kV overhead powerline, or pipelines, etc. The initial grid assessment corridor was later divided into sections for the purposes of the Multi-criteria Decision-making Model (MCDM) (refer to Section 6), as illustrated in Figure 8.

Specialists had the opportunity to revise their mapping following the workshop to take into account the synergies with other disciplines and this was used to provide a final mapping layer as included in this report. Since the specialists were involved in the identification of the alternative alignments, most No-Go areas could be avoided, and there was a strong preference from all members of the team to follow existing powerline routes. The bird and visual No-Go areas were the only No-Go areas that the alignment needed to traverse. In the case of birds, No-Go areas are not applicable in cases where an alignment follows an existing overhead power line or where the specialist has assessed the specific area and approved it. Similarly, for visual No-Go areas, the No-Go areas are not applicable in cases where an alignment follows an existing overhead powerline. These No-Go areas are further detailed within the environmental aspect sections below in Section 6.

Given the level of detail already researched by the project team, a number of alternative alignments were identified within the initial corridor by the project team. These alternatives were assessed by undertaking an MCDM analysis with the specialists which is further described in the sub-sections that follow.

5.1.1 Multi-criteria Decision-making Model workshop

The MCDM is an open, transparent and interactive process that can be used for optimal site and/or route selection based on the major issues that will influence the viability and suitability thereof. It is a discipline aimed at supporting decision-makers who are faced with making numerous and potentially conflicting evaluations based on input from a multi-disciplinary team (specialists, engineers, proponent) who may often have conflicting input. It highlights conflicts and derives a way to reach a recommendation in a transparent process. This process is well-suited to address complex technical, strategic and planning challenges, and is typically required in an alternatives assessment, since the MCDM prioritises options against a set of agreed and predetermined criteria. In a typical MCDM, options could typically include project, technology, biophysical and sequencing alternatives.

As illustrated below in Figure 8, the entire grid connection length was divided into four geographical sections (namely, Sections A, B and C and the Collector Section (see Section 4.3 above). This was necessary, as the points of confluence would add multiple unnecessary options for the MCDM process. As the Collector Section was common to all potential alternative options and routes, only Sections A, B and C would be considered for the MCDM process. Eight alternative route options were identified for Section A (from the collector switching station to the existing Eskom Melkhout substation); three for Section B (from the Eskom Melkhout substation to the Lady Slipper mountain); and six for Section C (from the Lady Slipper mountain area to either the Sans Souci or Chatty substations). The various alternative route options were identified per Section at the Screening Workshop in consultation with all the specialists and technical experts. Factors that were considered when identifying the alternative options were:

a) Consideration of existing linear infrastructure such as existing power lines and water pipeline servitudes.
b) Following the farm boundaries and/or roads as far as possible.
c) To avoid the predominant No-Go areas identified by the specialists at the Screening Workshop.
d) Consolidate the various route alternatives such that the most feasible routes remained. Note that there was a limit of a maximum of eight alternatives per Section allowed within the MCDM framework used.

5.1.1.1 Criteria for route selection

The site selection criteria were chosen based on a broad definition of sustainability, which encompasses the technical (including financial), biophysical and socio-economic criteria outlined below. Prior to the MCDM workshop, specialist and technical input was obtained to draw up the criteria, which are deemed to have most relevance to the selection of route alignments. While there are a number of criteria that will need to be considered in the EIA when assessing the significance of the potential impacts related to the proposed Grid Connection, the only criteria that were considered in the route selection process were those that differentiated the route options from one another. In the instance where criteria would have resulted in uniform ratings across all the route options, these criteria were excluded, as they would not assist in determining a preference for one route option over another. For example, the criterion "*Social: Proximity to existing large villages or towns and distance to*

communities" was originally identified, but this criterion would not assist in differentiating one route option from another. This criterion was also already somewhat captured in some of the other socio-economic criteria and was therefore disregarded.

The criteria used to assess the potential route alignments fall into specific categories, described below and detailed in Table 18:

- ***Technical category.*** This relates to the impact of a specific route alignment with regard to achieving the technical goals of the project while reducing cost and increasing ease of both construction and maintenance activities. Although financial considerations are not explicitly mentioned in this category, they are closely related to the technical aspects, and technical issues can therefore be regarded as a proxy for financial issues.
- ***Environmental category.*** This component refers to the need to select a route that minimises the risk to ecosystem functioning and environmental integrity. Therefore, the environmental criterion prioritises the anticipated impacts on both the terrestrial and aquatic fauna (especially avifauna who are negatively impacted by high voltage power lines) and flora.
- ***Socio-economic category.*** This aspect considers the impact of route alignment on the surrounding communities and users of the land (including tenants). Where possible, specifically avoiding residential areas, areas where assets and livelihoods may be affected (e.g. the loss of agricultural land for pylon structures), and the need for compensation. Visual impacts and the impacts on heritage resources are also important considerations in routing powerlines. During the MCDM workshop, it was determined that landowner willingness, with respect to farmers agreeing or disagreeing to have a powerline or additional powerline (in some instances) traversing their property, should also be considered. This criterion was not originally identified as a stand-alone criterion, it was assumed to fall within the Socio-economic Category of 'Compensation'. However, whilst compensation directly relates to the number of property owners that would be affected, and the financial responsibility of Red Cap to compensate for the disruption of resources and assets on these properties, it did not take into account the willingness of the property owners. This criterion was therefore added to the socio-economic category on the day of the workshop.

Table 18: MCDM criteria

Category	Criteria	Description
Technical (incl. Financial)	T1. Access	Accessibility with regards to construction and maintenance
	T2. Slope	Avoid steep slopes more than 1:10
	T3. Length	Line length and associated cost
	T4. Interference	Crossings and interference with other infrastructure
	T5. Alignment	Crossing properties and keeping a straight alignment as far as possible
Biophysical	B1. Terrestrial	Impact on terrestrial ecology and ecological services
	B2. Aquatic	Impact on surface water and wetlands
	B3. Avifauna	Potential impact on avifauna
Socio-economic	S1. Visual	Visibility from communities / impacts to sense of place
	S2. Heritage	Impact on palaeontological and archaeological resources and impact to cultural landscape
	S3. Agriculture	Loss of agricultural potential / disruption of infrastructure
	S4. Compensation	Homes or other assets that will require resettlement or other compensation
	S5. Landowners	Properties that are likely to present issues with regards to landowner willingness

The following weighting was allocated equally[10] to the criteria categories, and was considered as the base case:

- Technical: 34%
- Biophysical: 33%
- Socio-economic: 33%

This is deemed a fair weighting scenario for a base case, and variations on this scenario were considered in the sensitivity analysis as described in Section 5.1.1.2. The aim of the sensitivity analysis was to confirm and test the robustness of the outcome.

As introduced in the bullets above, various factors were considered by the multi-disciplinary specialist and technical team when undertaking the rating/ ranking exercise of the various alternative grid lines per Section. These have been summarised below in Table 19. It is important to note that all the specialists and the engineers rated/ ranked the criteria to ensure the outcome is based on sound and multi-disciplinary input.

Table 19: MCDM rating considerations

Category	Criteria	Considerations
Technical (Incl. Financial)	T1. Access	• Access roads close the routes for ease of construction and maintenance. • Existing access roads are preferred since the more (new) access roads that need to be developed, the greater the cost, and the greater the logistics and landowner issues.
	T2. Slope	• Terrain for each route, based on the knowledge of the area and Google Earth imagery. • The more undulating the terrain, the greater the logistics and cost.
	T3. Length	• The longer the power line route, the greater the cost and logistics.
	T4. Interference	• The more interference with other infrastructure, such as existing Eskom and Municipal overhead lines, Telkom lines, N2 road crossings, Provincial and District road crossings, the more complex and expensive the design.
	T5. Alignment	• Construction and material costs increase with more bend points, as they require strained structures which are more expensive and result in more logistical issues. • The straighter the alignment, the easier and cheaper to construct.
Biophysical	B1. Terrestrial	• Major sensitivities within the affected area, such as: - Forest patches, - Extensive wetland habitats, - Steep and mountainous areas, and - Areas of intact thicket vegetation. • Routes which align adjacent to existing powerlines or other linear infrastructure features such as roads are preferred.
	B2. Aquatic	• The number of **new impacts** on wetlands and watercourses: • The routes that have the least new impacts are preferred over others. • Routes that follow existing alignments or servitudes, with established access tracks or roads, are strongly preferred. • New alignments that avoid upper catchments or important catchment divides that pose a risk with regard erosion and sedimentation. • New tracks with steep grades, pose a risk to aquatic environments and result in a greater degree of erosion. • Avoid where possible, rather than span any natural wetlands, particularly pans / depressions. • Pans have a high sensitivity with regards to power lines, i.e. pylon footings and tracks alter a significant portion of the wetlands' catchment.

[10] The intention was to have a scenario of equal weighting across all categories, however to avoid decimals, the technical category was rounded up to a whole number. This has no bearing on the outcome, as is demonstrated in Section 5.2.2 where a sensitivity analysis is undertaken on various extreme weighting scenarios.

Category	Criteria	Considerations
		• Avoids steep river valleys, with intact riparian vegetation, that would require new tracks, which presents a risk with regard to erosion and sedimentation. This is the case even in the absence of any direct aquatic environments.
	B3. Avifauna	• Proximity to Important Bird Areas (IBA). • Proximity to known focal points (roosts, leks, nests). • Potential impact on Red Data avifauna. • Proximity to waterbodies (avifaunal focal points). • Proximity to existing high voltage lines: - Lines that run alongside an existing high voltage line will not create a new impact but will be an extension of the existing impact. - Routes that follow existing alignments are preferable from a collision and displacement (habitat fragmentation) perspective. This was an overriding factor, even where an alignment crossed a potential No-Go area.
Socio-economic	S1. Visual	• Avoiding intact / pristine natural landscapes – mainly scenic mountainous areas / ridge skylines. • Avoiding steep slopes i.e. steeper than 1:4 – the least steep slopes encountered being the preferred alignment. • Avoiding human settlements – the furthest away being the preferred alignments. • Avoiding nature reserves – the furthest away being the preferred alignments. • Avoiding crossing major arterial / scenic routes (e.g. N2) – the fewest crossings being the preferred ones. • Utilising existing disturbed / industrialised areas, as well as existing powerline corridors, as far as possible.
	S2. Heritage	• The potential impact to tangible heritage resources as well as impact to sense of place / aesthetic heritage. • Existing developments and disturbances would prevent the creation of new heritage impacts.
	S3. Agriculture	• The amount of cultivated land that is traversed by the various route alternatives (that is the length of corridor which crosses cultivated land). The longer, the bigger the impact. • The intensity of agricultural production on that land. The significance of agricultural impact is proportional to the productivity of the land. The more productive it is, the higher the significance of impact resulting from any disturbance to it. Satellite imagery was used as an inference to agricultural productivity and intensity of cultivation – irrigated land versus non-irrigated. • The amount of actual agricultural disturbance that is likely to result from a power line. This is influenced by the span of agricultural land that needs to be crossed and therefore where pylons would need to be positioned in relation to agricultural activities on that land. The greater the pylon footprint within agricultural land, the more significant the impact. If pylons can be positioned between pivots or on the edges of fields the impact is lower than if pylons would need to be in the centre of fields.
	S4. Compensation	• Visibility of the grid connection infrastructure and its impact on the aesthetic environment, specifically in relation to tourism and amenity potential and its direct correlation to property values. The worse the potential impacts, the higher the potential compensation claims. • The density of residential/ populated areas.
	S5. Landowners	• The number of properties that would be affected by the power line infrastructure, which is directly proportional to the number of landowners that would need to be engaged and are willing to be engaged with. • Known willingness or resistance encountered through Red Cap's ongoing process of engaging directly with landowners along preliminary routes within the initial grid corridor.

Category	Criteria	Considerations
		• Known objections of landowners to other power line proposals within the initial grid corridor.

The MCDM, built using Microsoft Excel, then arithmetically collated preference scores from all those taking part in the workshop and provided an overall ranking of the options per Section of the grid corridor. The MCDM Model works on the premise that an experienced professional can readily determine which options are preferred when considered against certain criteria, e.g. environmental, without the need for detailed assessment. The preferred option from Sections A, B, and C, respectively, were chosen to form the overall preferred grid corridor for the project. It is important to note that all criteria were rated without considering mitigation measures.

5.1.1.2 Sensitivity analysis

The ratings presented in Section 5.1.1 above, were the base case (with an equal[10] weighting of technical 34%, biophysical 33% and socio-economic 33%). To test whether the overall outcome of the base case is robust and accurate, a sensitivity analysis was done by plotting the relative preference, i.e. changing the weighting of technical, biophysical and socio-economic criteria, in alternative scenarios.

Five sensitivity analyses were therefore undertaken, per Section of the grid line route, by changing the overall weighting of the three main criteria categories as follows:

- Sensitivity 1 (Technical 50%, Biophysical 25% and Socio-economic 25%)
- Sensitivity 2 (Technical 0%, Biophysical 50% and Socio-economic 50%)
- Sensitivity 3 (Technical 100%, Biophysical 0% and Socio-economic 0%)
- Sensitivity 4 (Technical 0%, Biophysical 100% and Socio-economic 0%)
- Sensitivity 5 (Technical 0%, Biophysical 0% and Socio-economic 100%)

The sensitivity analysis confirmed that the overall preferred route option per section would remain as per the findings of the MCDM model, namely Sections A4, B2 and C2. The maps on the following pages, illustrate the preferred alignment per section overlain on the consolidated No-Go map showing environmental and social sensitivities. The preferred alignment alternative was provided with a 3 km corridor to illustrate what would be further assessed by specialists. In October 2017, Aurecon met with the DEA for a pre-application meeting and it was advised that a smaller corridor be assessed to reduce risk relating to the level of assessment that was possible. Following their advice, the average width of the corridor has been reduced to 2 km to allow for the uncertainties with regard to landowner consent and ensuring that robust specialist studies can still be undertaken. Based on preliminary consultation between Red Cap and the landowners within the 2 km corridor, and adjusted with confidence levels of the receiving environment (environmental, technical and social constraints), some areas have been pinched to the preferred alignment, and others are wider than 2 km. The preferred alignment of the proposed Impofu 2 km grid corridor is illustrated in Figure 16 to Figure 19 in Section 6 , within which a 31m servitude of the proposed power line will be located.

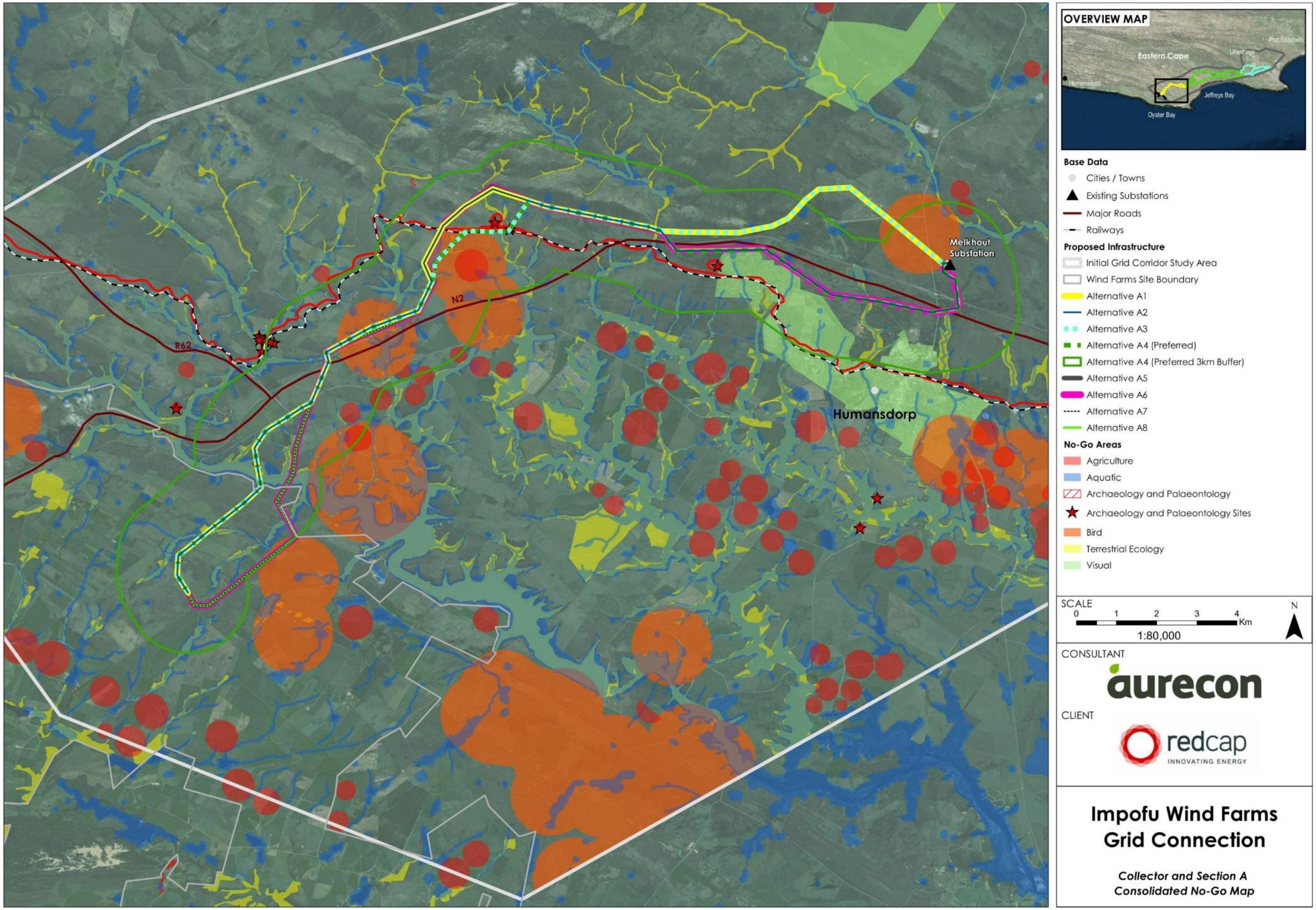


Figure 9: Consolidated No-Go map showing preferred alignment with 3 km corridor for the Collector Section and Section A

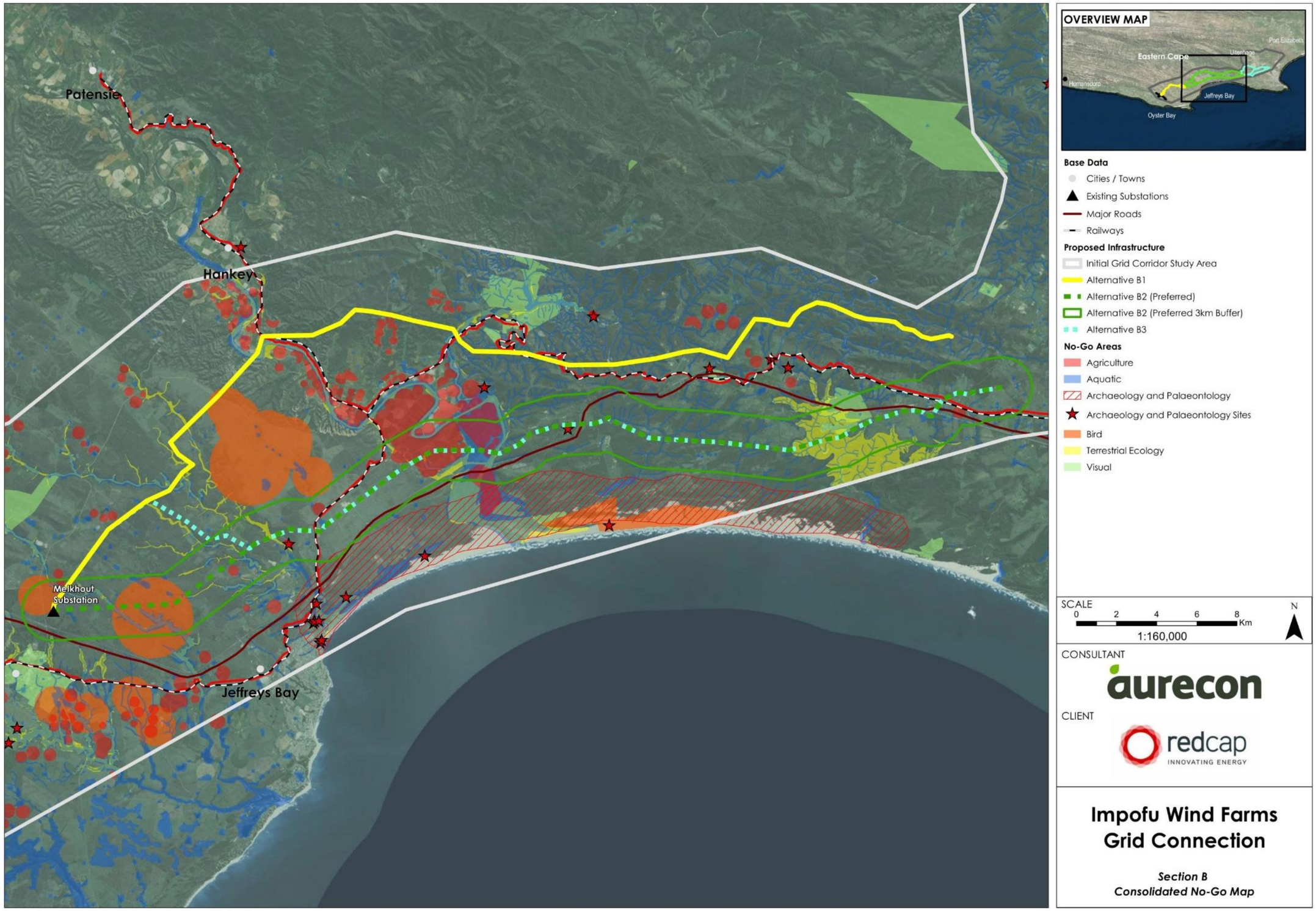


Figure 10: Consolidated No-Go map showing preferred alignment with 3 km corridor for Section B

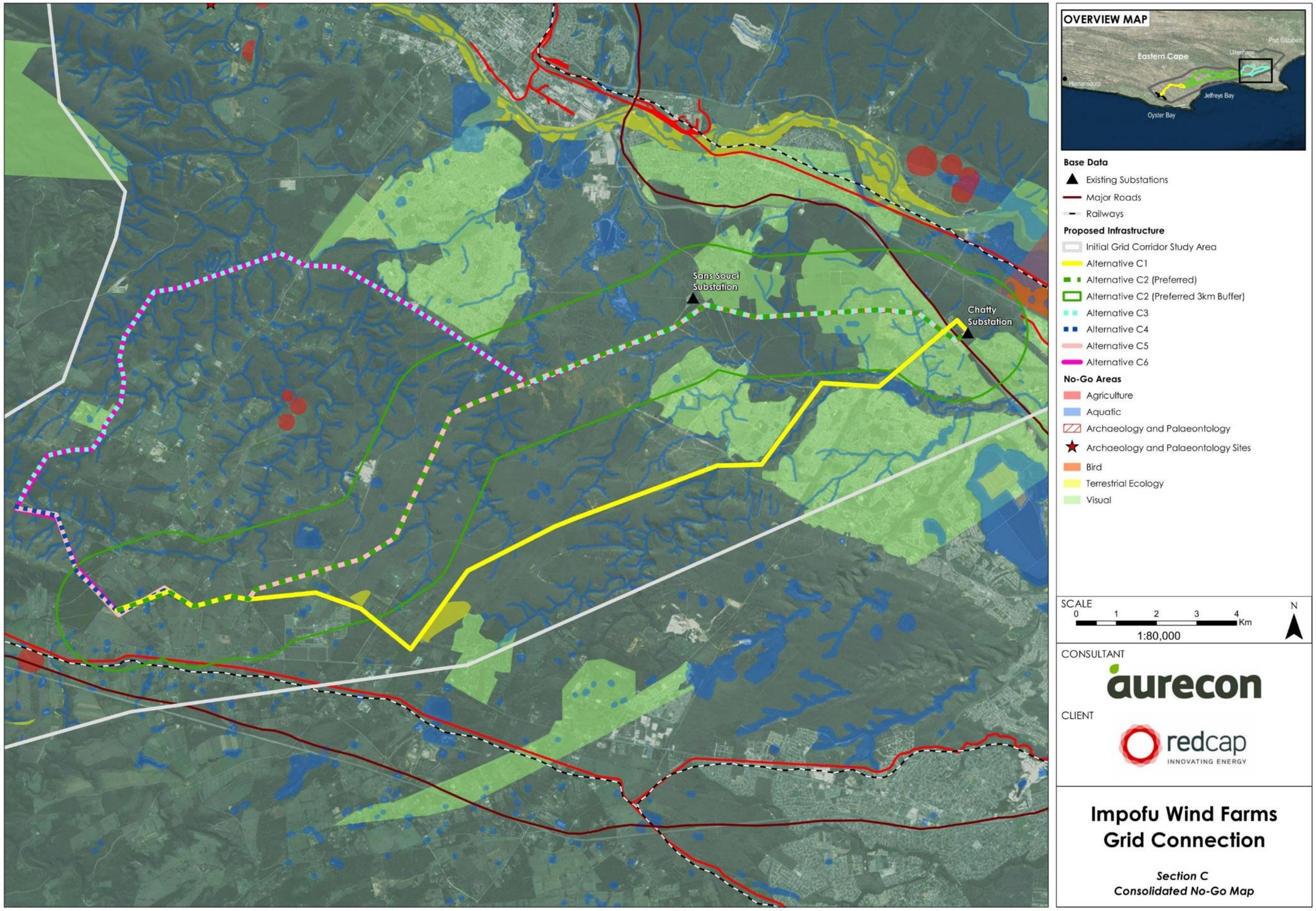


Figure 11: Consolidated No-Go map showing preferred alignment with 3 km corridor for Section C

Given the detailed investigation into the potential alignments in the screening phase undertaken by the full project team, which found one option to be the most reasonable and feasible alignment, no alternative corridors have been assessed in the BAR for the 132kV overhead powerline. However, during the PPP process for the first draft BAR the developer was not able to find any feasible route through the Van Stadens area of the proposed corridor due to environmental constraints and land owner engagement. Thus, a change to the corridor alignment had to be considered in this area. This revised draft BAR assesses this revised corridor, which includes this alignment change. The change to the corridor results in the corridor now heading north from Thornhill to miss the Van Stadens area around the N2/ R102 and heads into the forestry areas north of Thornhill, excluding Thornhill itself. It then heads east through the valley behind Lady's Slipper Mountains and back down to the R102/ N2 were it joins the old corridor East of the Van Stadens area. The iterative screening process for the grid connection corridor undertaken thus far is summarised in Figure 12 below:

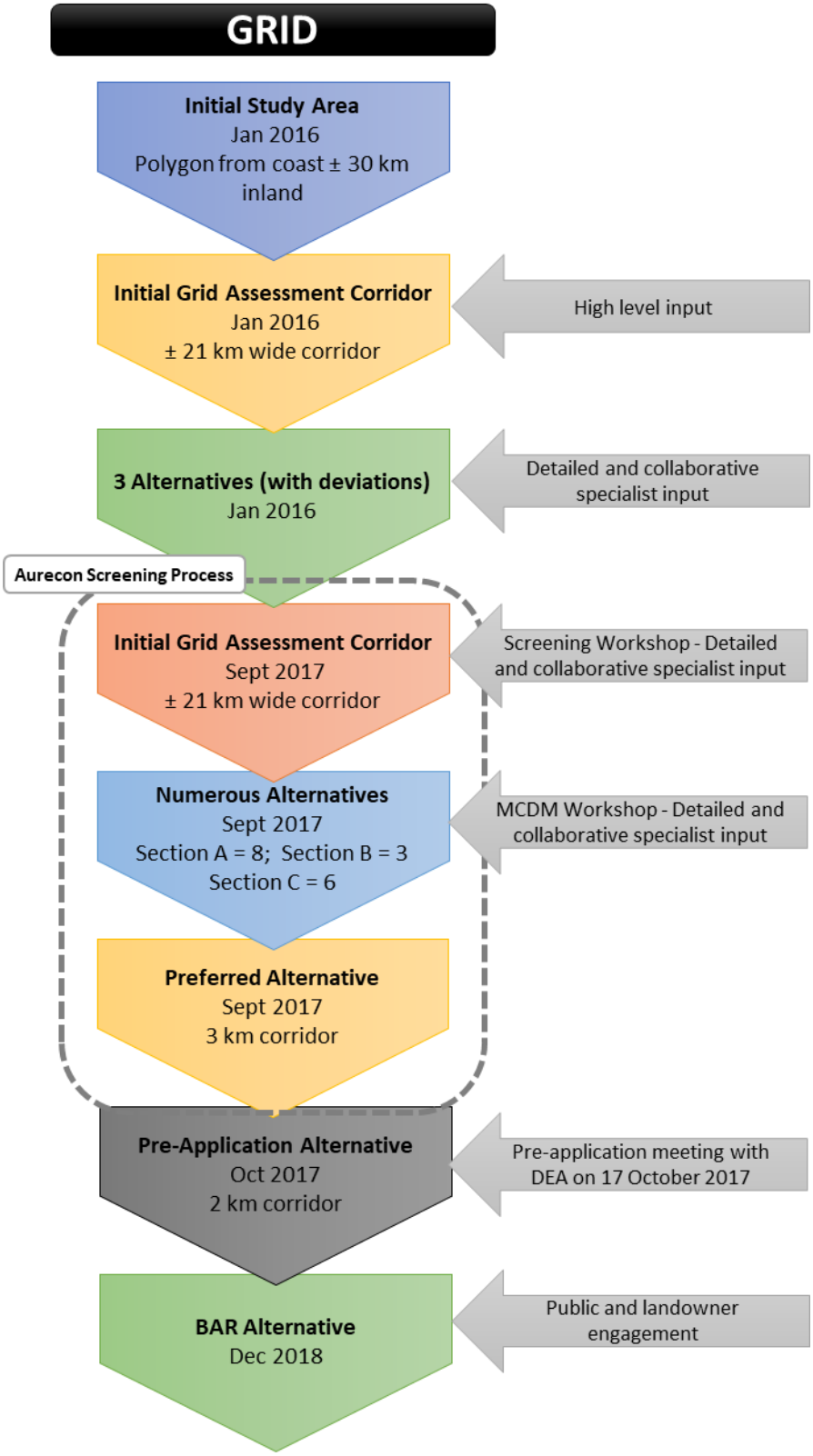


Figure 12: Screening process to establish the preferred grid corridor alignment

5.2 Pylons

As detailed below in Section 6.4.2.1, a range of monopole pylon types will be used depending if they are at straight sections in the line or at bends, and how sharp the bend is. Only for very large spans will multiple monopole structures or lattice structures be considered. These will all be to Eskom specification and have had the input from the avifaunal specialist. As such, no alternative assessment has therefore been undertaken for the type of pylon.

5.3 Switching Stations and Collector Section

The location of the substation/collector switching stations and the short HV overhead powerlines were developed iteratively (with input from landowners, specialists & engineers) during the prelim design stage and these locations /alignments were then assessed during screening and were further refined. These were then settled on as the preferred alternative locations/alignments as they were the least environmentally sensitive, most landowner friendly and most technically feasible.

5.4 No-Go alternative

The No-Go alternative assumes that the project is not developed, and the activity does not go ahead. This alternative can provide the baseline scenario against which other alternatives can be compared. In this case the benefits of the project would be foregone and the opportunity to provide renewable energy contributing to national targets would not be achieved in this instance. Similarly, potential negative and positive impacts assessed in Section 7 would not be incurred.

5.5 Concluding statement on alternatives

As detailed above, Red Cap have proactively sought to identify the best practical environmental option possible for the identified project site through a rigorous, iterative and multi-disciplinary process, that drew on the considerable body of existing knowledge and expertise relating to the study area. This approach aligns with the NEMA principles advocating for sustainable development through the adoption of the mitigation hierarchy as set out in section 2 of NEMA and depicted in Figure 13. Through application of this hierarchy, 'avoidance' of environmental impacts was then basis for the approach to the process.

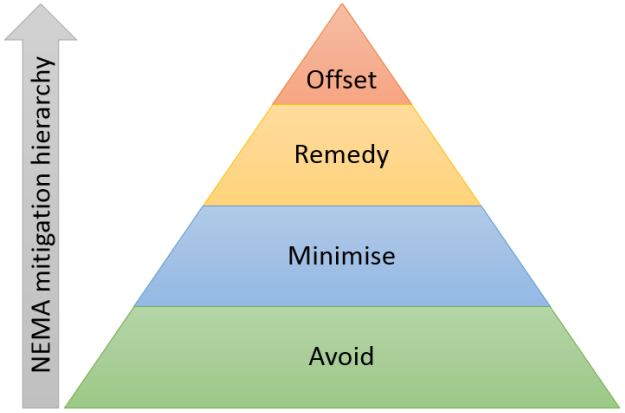


Figure 13: Mitigation hierarchy

Given the level of detail considered in this screening phase, the project team are confident that the most reasonable and feasible alternative has been considered in this BA process, and no further alternatives are considered in this report.

6 DESCRIPTION OF THE PROPOSED PROJECT

The proposed grid connection infrastructure will be used as the grid connection for the three proposed Impofu Wind Farms and will occur within a 2 km corridor as described above in Section 5. The following subsections provide more information on the project context, location, components, activities and alternatives.

6.1 Project Overview and Location

The proposed development entails the construction of the grid connection infrastructure required to connect the proposed Impofu North, Impofu West and Impofu East Wind Farms to the NMBM Chatty substation. Most of the currently preferred corridor would follow existing powerline servitudes and it is anticipated that existing access roads will be employed as far as possible. A list of affected properties is provided in Annexure B.

The following components, further described below in Section 6.4, would be required to evacuate the power generated by the proposed Impofu Wind Farms:

- Approximately 120 km length 132 kV overhead power line between the wind farm project area and Port Elizabeth.
- Three switching stations (footprint of 75 x 150 m) located adjacent to the three wind farms' substations and a collector switching station of 150 x 150 m.
- Three short separate 132kV overhead powerlines that originate at the three wind farms' switching stations and carry the power to the collector switching station.
- Access roads/ tracks required to construct and maintain the infrastructure.
- Associated infrastructure such as permanent fencing around the switching stations, and temporary construction site camp and lay down areas (to be rehabilitated once development is complete).
- Potential area for expansion around the existing Melkhout, Sans Souci and Chatty substations. An area of 150 m^2 has been identified to the southwest of the existing Sans Souci footprint, and a 50 m buffer has been applied to the existing footprints of the Melkhout and Chatty substations.

The three short powerlines run to a combined central "collector switching station" situated within one of the wind farms. From this collector switching station, a single 132kV HV power line will continue towards Port Elizabeth via the Eskom Melkhout Substation. Due to the complex nature of navigating linear infrastructure, this assessment considers a 2 km corridor within which a 31 m servitude will be required for the construction of the powerline. Within this corridor, a line may pass through the Eskom Melkhout substation located just north of Humansdorp and will continue, via the new corridor adjustment north of Lady's Slipper, to the western outskirts of Port Elizabeth where it connects into the NMBM Sans Souci substation. From Sans Souci substation the line then continues to the NMBM Chatty substation where the grid connection terminates. The reason the power line goes through the Eskom Melkhout substation and the NMBM Sans Souci substation is to improve the evacuation capacity and technical parameters of the grid connection, as well as improving the overall stability and reliability of the Eskom and NMBM networks. Currently the intention is for the powerline to link into the existing Eskom Melkhout substation, however there is a possibility that prior to construction Eskom may choose not to connect there based on an assessment of their network. Should this be the case, the line will run past Melkhout and the short section of line linking into the substation will not be constructed.

If constructed, the Impofu Wind Farms are expected to have an operational life span of at least 20 years, after which they will either be reconfigured and replaced, or fully decommissioned. Because this grid infrastructure will improve the evacuation capacity of the grid network and improve the overall stability and reliability of the Eskom and NMBM networks, it is unlikely that the grid connection infrastructure will be decommissioned.

The Grid Connection is described in geographical sections from west to east. These are presented below along with the interface between the wind farm components and grid connection components.

6.2 Interface with Wind Farm

Each wind farm application will include an on-site substation with transformer. The transformer will transform/ convert the power received from the turbines from either above ground or underground lines (33 kV or lower) to

132 kV. The three on-site substations are part of the wind farm applications. Alongside each substation will be a switching station. **The associated switching stations are part of the grid connection application**.

An illustration of the interface between the wind farms and grid connection is provided on the following page in Figure 14.

The blue, yellow and green blocks represent the scope of each of the wind farm applications, and the grey block represents the scope of the grid connection application. The other icons represent the following:

Legend:

Wind farm including associated infrastructure

On-site substation (with transformer) – transforming power from MV (33 kV or lower) to HV (132 kV)

Proposed Eskom switching station

Existing Eskom / NMBM substation

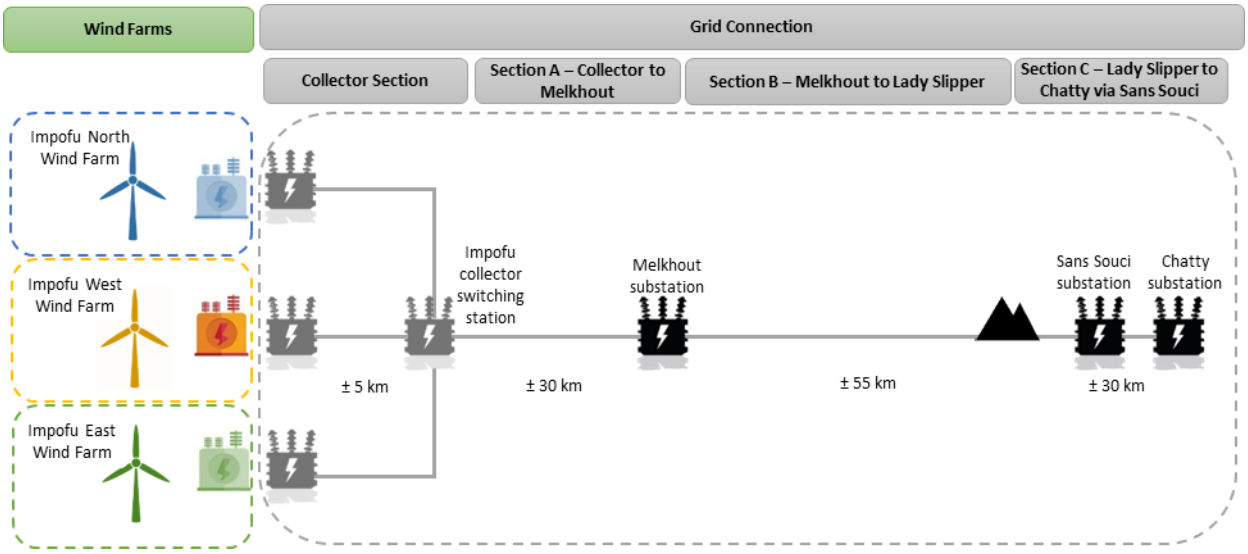


Figure 14: Interface between wind farm and grid connection electrical components for environmental application

6.3 Geographical Sections

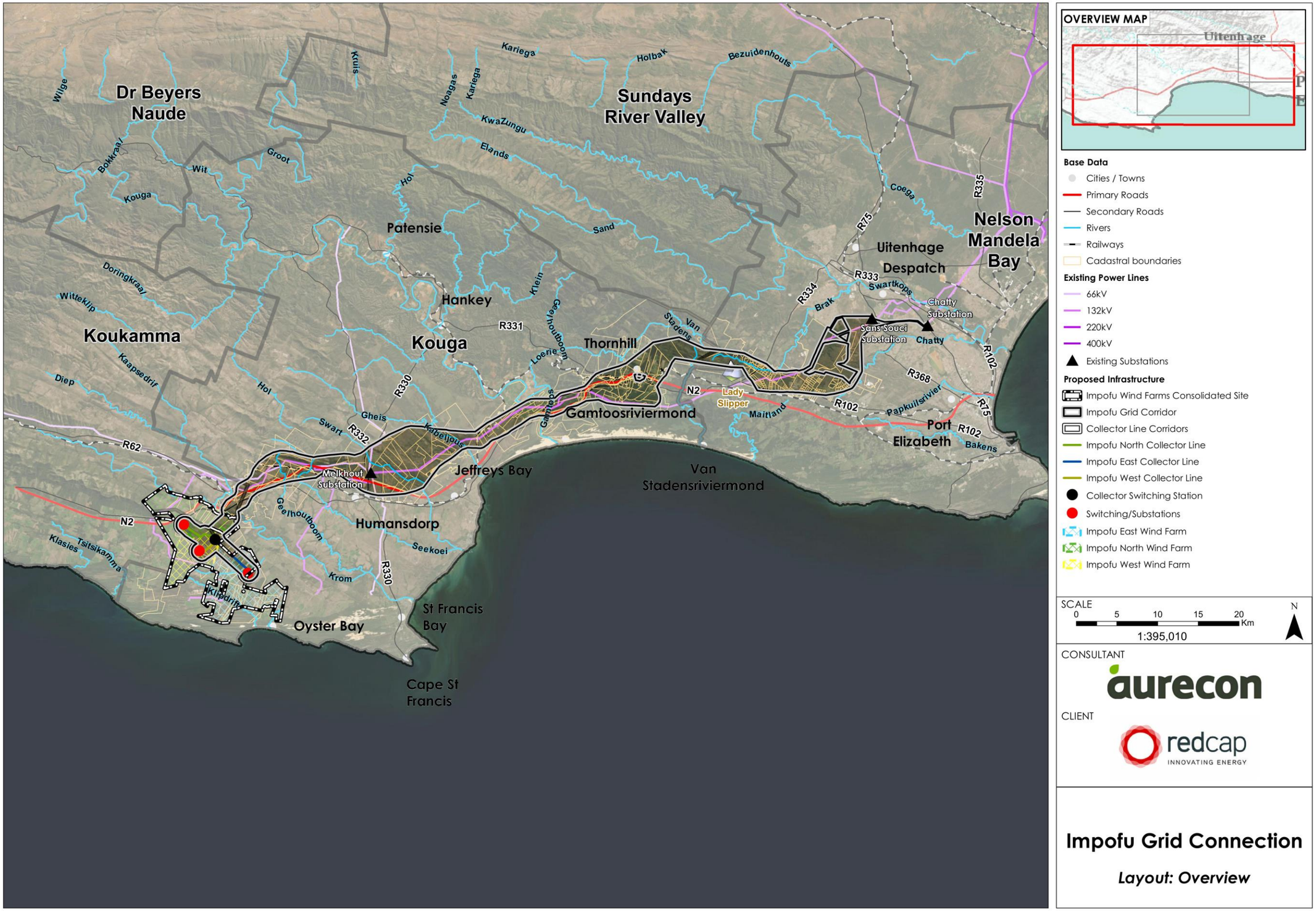
Refer to Figure 14 above and the descriptions below of the four sections of the grid connection. Note that this description encompasses all the alternative alignments within the initial grid assessment corridor as identified during the screening process (refer to Section 4.1 for the approach and Section 5 for full description of alternative assessment).

6.3.1 Collector Section

The first section of the grid connection is located on the wind farm site and includes the three Eskom switching stations (alongside the Impofu North, Impofu West and Impofu East substations), as well as the three short separate 132 kV lines that link up each of the three switching stations (one for each wind farm) on the wind farms to a combined central collector switching station (Impofu collector switching station).

The line from the Impofu North Wind Farm switching station to the Impofu collector switching station is approximately 5 km, whilst the line from Impofu West is approximately 3 km, and the line from Impofu East approximately 7 km.

The role of the collector switching station is to consolidate the three powerlines from the wind farms into one, such that a single line continues from here onwards. This will also allow Eskom more control over the management of the wind farms' connections into the national grid.



Base Data
- Cities / Towns
- Primary Roads
- Secondary Roads
- Rivers
- Railways
- Cadastral boundaries

Existing Power Lines
- 66kV
- 132kV
- 220kV
- 400kV
- Existing Substations

Proposed Infrastructure
- Impofu Wind Farms Consolidated Site
- Impofu Grid Corridor
- Collector Line Corridors
- Impofu North Collector Line
- Impofu East Collector Line
- Impofu West Collector Line
- Collector Switching Station
- Switching/Substations
- Impofu East Wind Farm
- Impofu North Wind Farm
- Impofu West Wind Farm

SCALE
0 5 10 15 20 Km
1:395,010

N

CONSULTANT
aurecon

CLIENT
redcap
INNOVATING ENERGY

Impofu Grid Connection

Layout: Overview

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Figure 15: Layout of proposed Impofu Grid Corridor: Overview

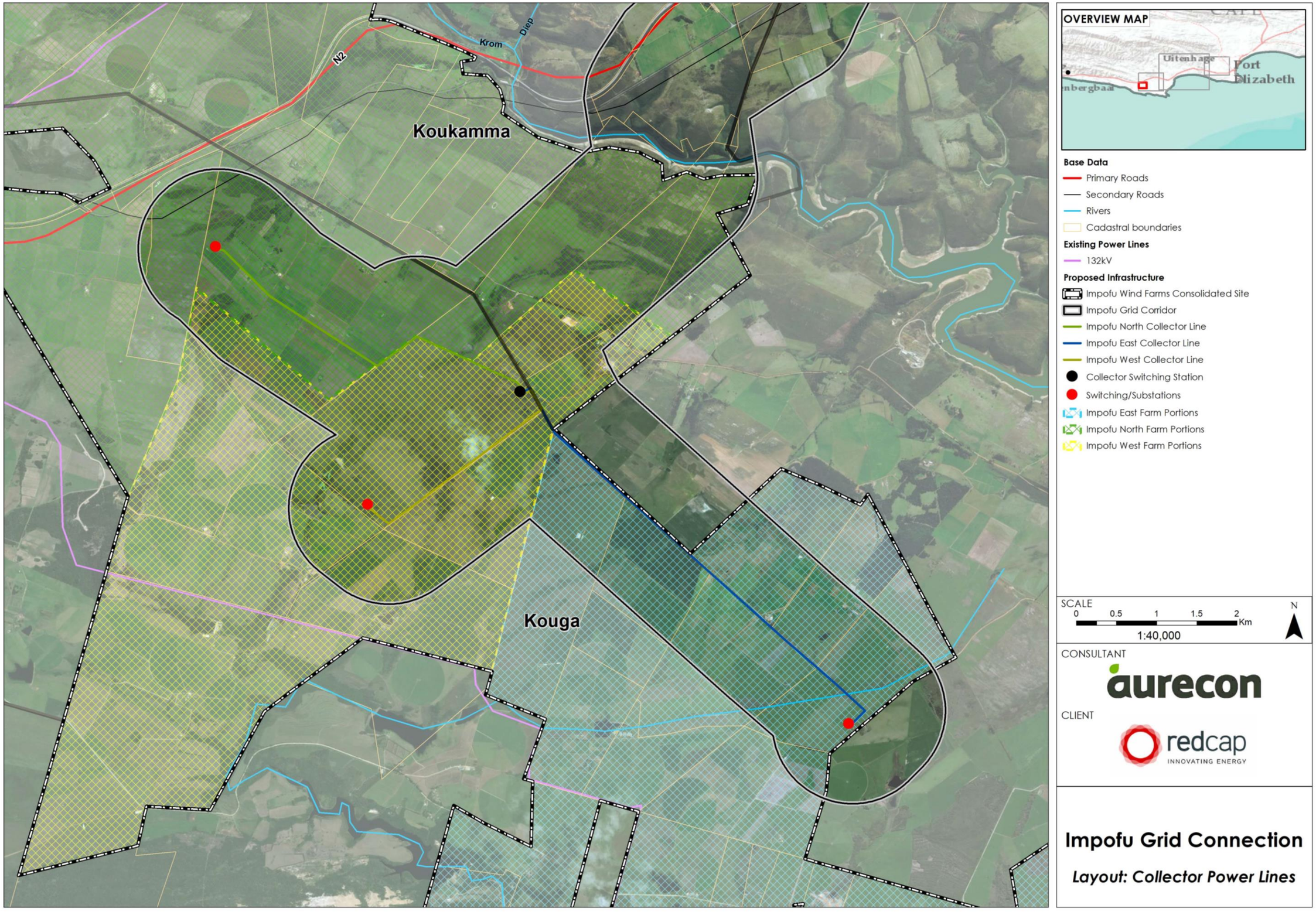


Figure 16: Layout of proposed Impofu Grid Corridor: collector section

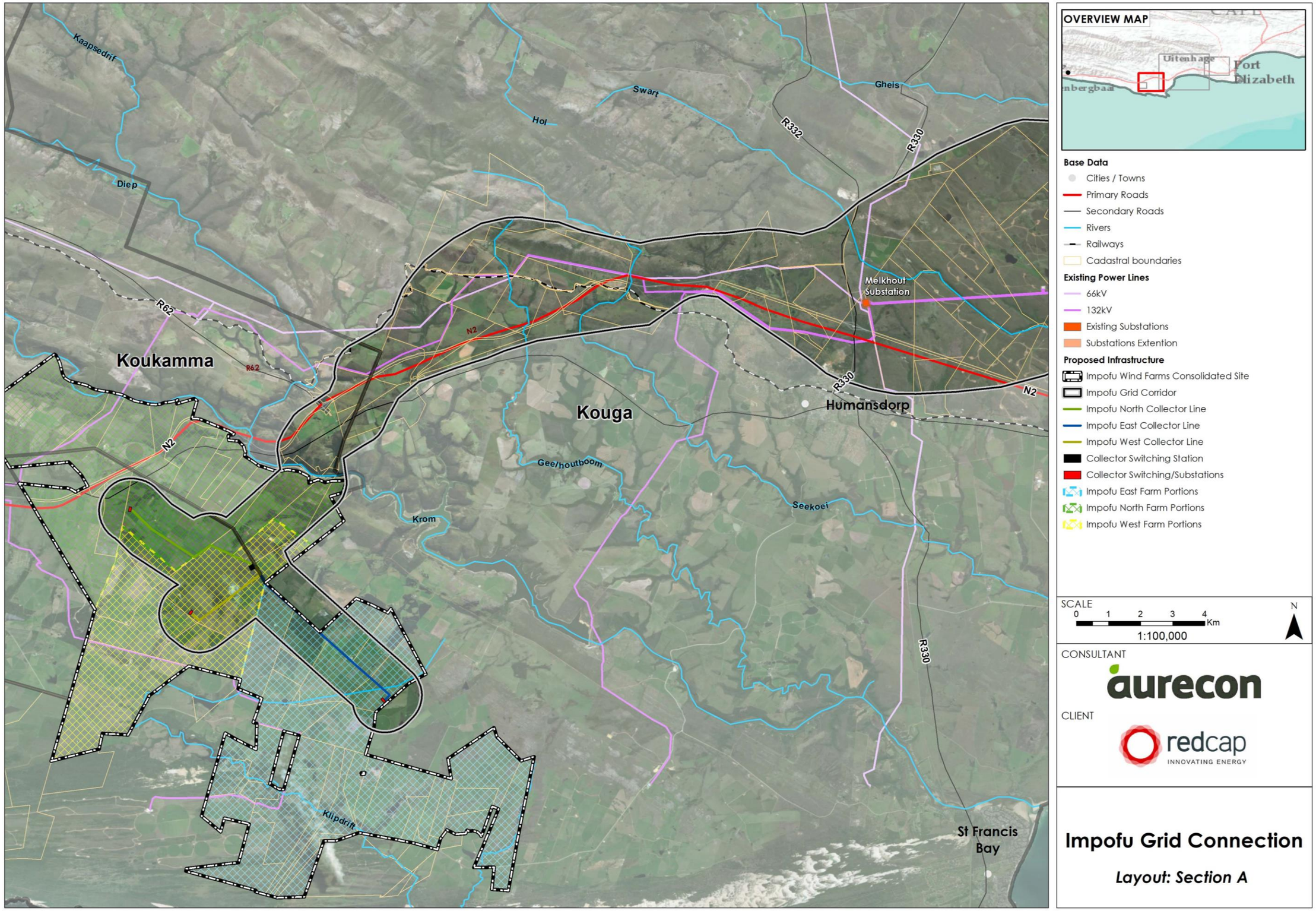
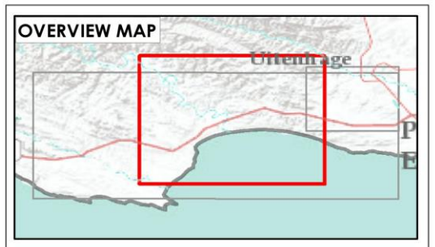


Figure 17: Layout of proposed Impofu Grid Corridor: section A

OVERVIEW MAP



Base Data
- Cities / Towns
- Primary Roads
- Secondary Roads
- Rivers
- Railways
- Cadastral boundaries

Existing Power Lines
- 66kV
- 132kV
- Existing Substations

Proposed Infrastructure
- Impofu Wind Farms Consolidated Site
- Impofu Grid Corridor

SCALE
0 2.5 5 7.5 10 Km
1:200,250

N

CONSULTANT
aurecon

CLIENT
redcap
INNOVATING ENERGY

Impofu Grid Connection

Layout: Section B

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Figure 18: Layout of proposed Impofu Grid Corridor: section B

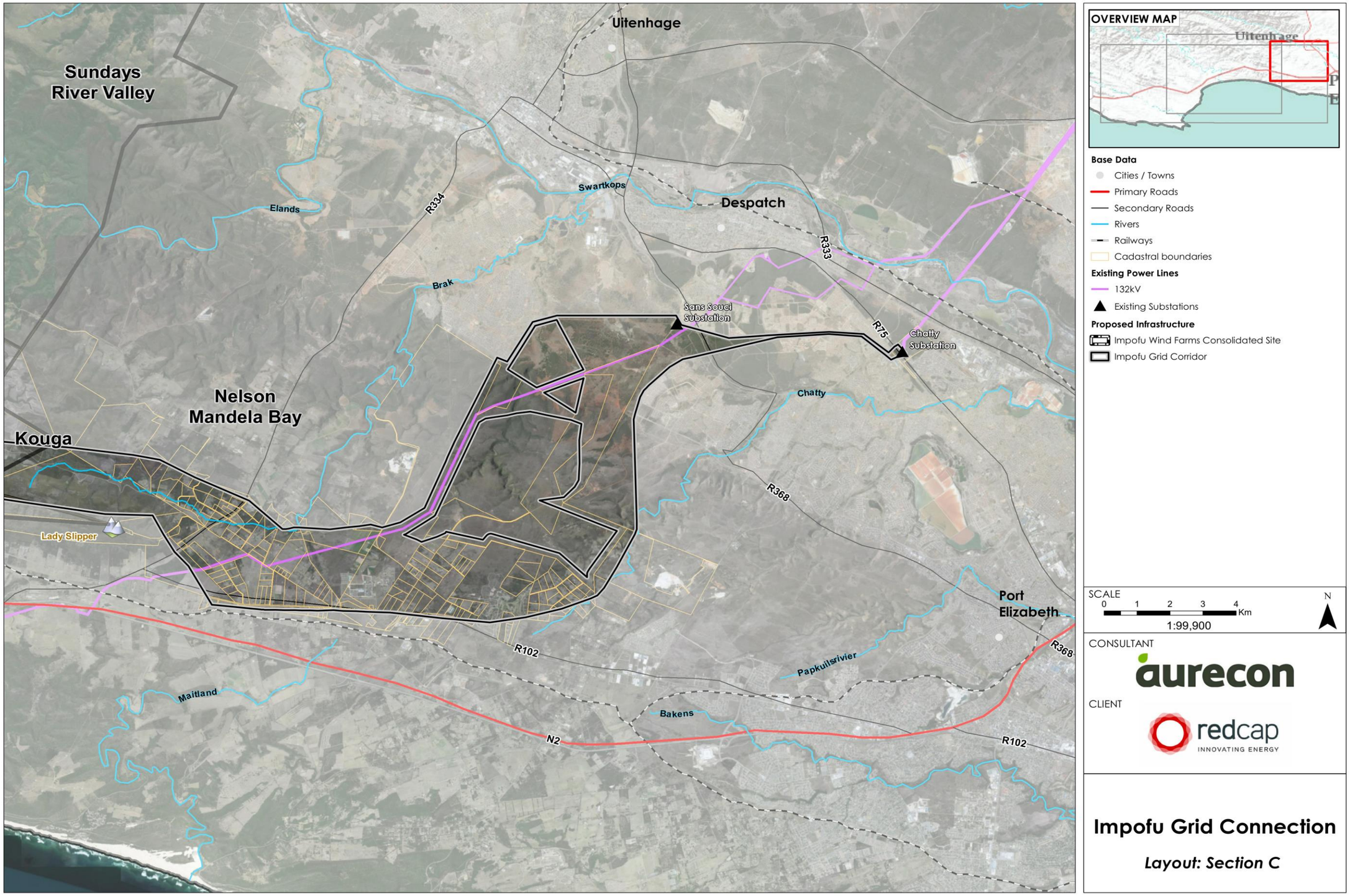

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Figure 19: Layout of proposed Impofu Grid Corridor: section C

6.3.2 Section A

Section A (Figure 17 above) follows the Collector Section. It is a single line connection between the collector switching station and the existing Eskom Melkhout substation located to the north of the N2 and north of the town of Humansdorp. This section of the proposed 132 kV line is approximately 30 km in length[11].

6.3.3 Section B

Section B (Figure 18 above) continues as a single 132 kV line and it runs between the Eskom Melkhout substation and Thornhill. This is the section of the corridor that has been adjusted since the first Draft BAR. The corridor now runs from the Melkhout substation, around / through the Jeffrey's Bay Wind Farm, across the Mondplaas area and Gamtoos River valley (roughly alongside the R102) towards Thornhill. It then heads north from Thornhill to miss the Van Stadens area around the N2/ R102 and into the forestry areas north of Thornhill, then east through the valley behind Lady's Slipper Mountains and back down to the R102/ N2 where it joins the old corridor East of the Van Stadens area. This section of the proposed 132 kV line is approximately 55 km in length.

6.3.4 Section C

Section C (Figure 19 above) runs from the Lady Slipper mountain area, passed the St Alban's correctional facility where it passes around or possibly through the Hopewell Conservation Estate. It then heads further east, where rural settlements and townships become more densely developed until the San Souci and Chatty Substations are reached. This section of the proposed 132 kV line is approximately 30 km in length.

6.4 Infrastructure

6.4.1 Substations and Switching Stations

6.4.1.1 Proposed new build

The three on-site substations (part of the wind farm applications) and associated switching stations (part of the grid connection application) will each have a total footprint of approximately 75 x 150 m (11,250 m^2) (but could also be rectangular in shape depending on the topography). The substation areas will include all the standard substation electrical equipment/components, such as transformers and bus bars and will also house control, operational, workshop and storage buildings/areas. Since the three on-site substations will form part of the wind farm, and the switching component will be owned by Eskom, there will be a physical barrier between the two in the form of a 2.4 m high perimeter fence (refer to Figure 20 below for the Kouga Wind Farm as an example). The Eskom switching stations will each have a total footprint of approximately 150 x 75 m (11,250 m^2). The single collector switching station will have a total footprint of approximately 150 x 150 m (22,500 m^2). An illustration of the project components is presented in Figure 21 for ease of reference.

During construction, the area will be levelled and compacted, with a fence erected around its perimeter. If required, imported material will be sourced, or excess material from the Impofu turbine foundations will be used as fill. The area may be covered with a permeable geotextile and surfaced with approximately 50 mm of crushed stone. This may serve as a fire protection measure and prevent erosion and dust production.

[11] Based on an average length of each of the potential identified alternatives per section.

Figure 20: Example of a substation and switching station on the Kouga Wind Farm

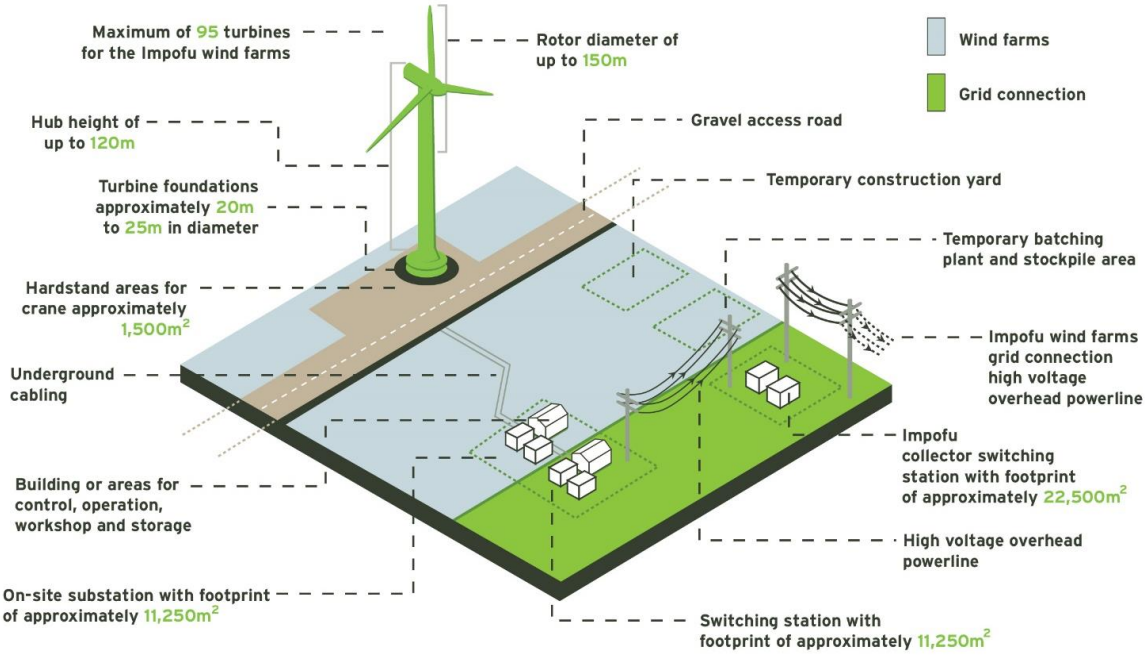


Figure 21: Typical wind farm layout and associated grid connection (green area)

6.4.1.2 Potential extension to existing substations

It is possible that the existing Melkhout, Sans Souci and Chatty substations may need to be extended to allow for the proposed Impofu powerline to connect. As such, an area of 150 m^2 to the southwest of Sans Souci, as well as a 50 m buffer area around Melkhout and Chatty substations has been assessed by the EAP and specialists.

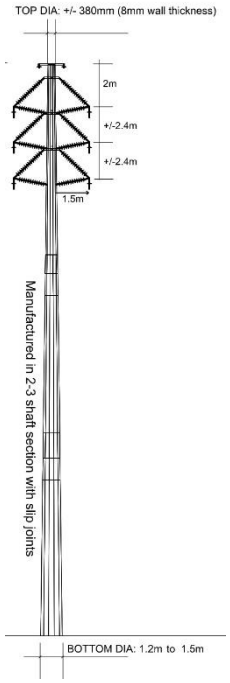
6.4.2 Relevant Infrastructure

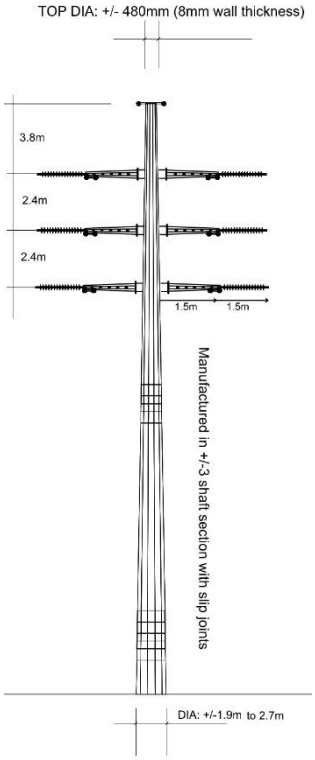
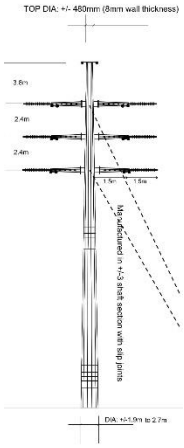
The infrastructure considered for the 132kV overhead powerline includes the structure (pylon) that will hold up the power lines, the foundations required for the pylons and the access roads.

6.4.2.1 Pylon options

A monopole type pylon structure will be used for the proposed line. However, as there are likely to be a few sections that will require very long spans (such as crossing of the Gamtoos River) multiple monopoles or lattice towers will likely be used but only at these specific areas that require long spans of about 500 m). A variety of different monopole pylon options are required, depending if they are along a straight section in the line or at bends and how sharp the bend is. The descriptions are included in Table 20 below. The type of pylon and distance of the spans depend on the topography and alignment of the line. These vary from Monopole Intermediate structures to Strain Lattice Tower (247 type) structures. As indicated, the latter would only be used where very long spans (about 500 m) across valleys and rivers are required. The spans (distance between pylons) on the monopole structure (without stays) will be on average 260 m.

Table 20: Types of pylons

No.	Pylon Type	Description and purpose	Graphic
1.	Monopole intermediate Double Circuit with Twin Tern Conductors	Self-supporting galvanised steel Suspension structure with no stays/anchors. For general use as intermediate structures between turning/angle points. Height: 26-32 m. Base diameter: 1.2 m to 1.5 m.	 

No.	Pylon Type	Description and purpose	Graphic
2.	Monopole strain (0º-30º angle) Double Circuit with Twin Tern Conductor	Self-supporting galvanised steel Strain Angle structure with no stays/anchors. For general use up to 30º turning/angle points. Height: 26-32 m Base diameter: 1.9 m to 2.7 m.	 
3.	Monopole strain (30º-90º angle) Double Circuit with Twin Tern Conductor	Self-supporting galvanised steel Strain Angle structure with additional stays/anchors. For general use between 30º to 90º at turning/angle points. Height: 26-32 m Base diameter: 1.9 m to 2.7 m 5 to 7 stays/anchors.	 
4.	Monopole strain (30º-90º angle) 2 x Single Circuit Twin Tern Conductor	2 x Strain Angle galvanised steel structure with stays/anchors. Two single circuit monopoles installed 10 m apart to accommodate a twin Tern Conductor attachment each. For general use between 30º to 90º at turning/angle points and where it is acceptable for the landowner. Height: 20 m – 24 m 5 to 7 stays/anchors.	

No.	Pylon Type	Description and purpose	Graphic
5.	Triple pole structure. 2 x Single circuit with Twin Tern Conductor	For long spans (>350 m to 500 m) across valleys and rivers. Strain structure with three single monopoles per circuit. 5-9 stays per triple pole structure depending on angle configuration. Typical 18 to 16 m in length. In a double circuit configuration, it will be a triple pole structure per circuit place at 10 m-15 m apart.	
6.	Strain Lattice Tower (247 type) for Double Circuit Twin Tern Conductor	For very long spans (>500 m) across valleys and rivers. Lattice structure with four legs. Height: 28 m to 32 m. Base of the tower with 4 legs in general 15 m x 15 m area.	

6.4.2.2 Pylon foundations

The monopoles are anchored to the soil through a suitable foundation system. A soil investigation through a geo-technical assessment must be performed prior to construction, at which point the prevailing soil or rock type classification is confirmed, and a suitable foundation system is designed for the various types of structure. Foundations are designed according to the following geotechnical classification:

- Type 1 – Hard engineering strong granular soil;
- Type 2 – Less competent soil, stiff clay or dense sand;
- Type 3 – Very incompetent soil i.e. loose sand or soft clay;
- Type 4 – Saturated or submerged soft ground below the seasonal water table;
- Hard rock – Solid continuous moderately fractured; and
- Soft rock – Very fractured, weathered or decomposed rock.

Load safety factors are incorporated into the foundation designs allowing for variations in geotechnical conditions, construction inconsistencies and long-term performance. The soil type nomination to be done by the construction

contractor will form the base for subsequent foundation selection, to be finalised on site during construction. Once the soil type nomination has been conducted, suitable foundations will be designed. Foundations can either be planted foundations, pad and plinth, or pile type foundations.

6.4.2.3 Pylon placement and servitudes

The exact final pylon locations will be determined during a pre-construction walk through that will determine the micro-sited location. Beyond the footprint of each pylon, a linear servitude would be required for the overhead line. This would need to remain for the lifespan of the power line. The standard servitude width as specified by Eskom for a 132kV power line is 31 m, with a distance of 15.5 m on either side of the centre line of the powerline. In general, it is proposed to position the powerline as close to the existing Eskom 132kV servitude that runs within the corridor to reduce the overall environmental impact, although this is not always possible.

For this reason, a 2 km corridor has been assessed by the specialists and is considered in this BAR. The assessment of a 2 km corridor will allow for servitude alignment deviations within the corridor should sensitive features be identified, problematic issues with landowners arise, or unsuitable founding conditions be discovered. The final pylon positions will therefore take into consideration the sensitive areas and/or no-go areas identified by the EAP and specialists (Section 7).

The final pylon position will only be determined once the project has received Environmental Authorisation, after negotiations with landowners have been finalised, and detailed geotechnical assessments and site walk-throughs completed. Pylon structures will be selected and installed in accordance with the latest industry standards, and according to Eskom's technical requirements at the time of construction, within the parameters of this assessment.

It is important for these lines, regardless of the technology chosen, to adhere to the Occupational Health and Safety Act No. 85 of 1993 which provides statutory clearances to ensure minimum safety standards. These standards include input from various organisations and institutions such as Eskom, the Roads Department, Transnet and Telkom, etc.

6.4.2.4 Access and service roads

Access roads would run the length of the proposed servitudes and generally would be below the power line. The roads/ tracks will be required for construction purposes and would remain in place for the operational lifespan of the infrastructure. Existing roads would be used as far as possible and upgraded if necessary. New access tracks (gravel tracks of approximately 4 m wide) will only be developed where no access road/track currently exists. The access network would be negotiated with all respective landowners to ensure that servitude agreements are in place, and security measures (such as access gates) are agreed upon.

6.4.2.5 Temporary laydown areas and site camps

During construction, temporary laydown and site camp areas will be required. These areas will be utilised for the temporary storage of materials, equipment and waste and will also serve as a logistical centre for construction activities. Eating and ablution areas may be provided for labourers. These temporary construction areas will be restricted to the minimum size practically required to facilitate construction and will be located in the most disturbed locations possible. Selection of the laydown areas will be done in consultation with the Environmental Control Officer (ECO), as per the requirements of the EMPr. The temporary construction camp and lay down areas will be rehabilitated once construction is complete.

6.4.2.6 Specifications for Bird Flight Diverters installation on a powerline

The avifaunal specialist identified that there is potential for several Red Data species (refer to Table 35) to be impacted by collisions with the proposed 132kV line (regardless of the alignment selected). It has therefore been recommended that Bird Flight Diverters (BFDs) be installed at specified sections along the overhead powerline. Further information on the efficacy of BFDs is detailed in the avifaunal specialist report in Annexure D.

It has been found in South Africa and internationally that most collisions happen with the power line itself along the inter-pylon spans. It is likely that this is because the power lines are thin and less visible than the conductors. Typically, birds with large wingspans have less manoeuvrability and therefore have limited time to react to the approaching line. BFDs are therefore installed to make the power line more visible, allowing birds to take evasive action earlier and thereby reducing the risk of collision.

Specifications: The avifaunal specialist has recommended that specified sections of the powerline should be marked with BFDs on the earth wire of the line, at five metre intervals, alternating between black and white.

Appendix D of the avifaunal report (Annexure D of the BAR) and the EMPr provide detail on the preferred BFDs that have been approved by Eskom: Distribution in April 2009.

6.5 Provision of Services Required During Construction

6.5.1 Labour Required

The construction phase would be approximately 18-24 months; however, this would vary depending on the seasonal and environmental conditions at the time of construction. Up to about 230 temporary employees will be required, with about 100 of the employment opportunities being unskilled, about 60 semi-skilled and 70 highly-skilled. The unskilled labourers are generally trained by the contractors and sourced from local communities. The power line should not be viewed in isolation as it creates the connection of the proposed Impofu Wind Farms and provides the combined benefits to the local communities. Refer to Section 6.5 for the socio-economic value of the activity.

6.5.2 Water Supply

Over the last few years, the western part of the Eastern Cape has been facing the worst drought in 100 years. In February 2018, the Kouga Dam water levels dropped to less than 10% capacity. With a reliance on surface water in the area, the towns are vulnerable to running out of potable water in periods of extended drought. As it is unlikely that this grid connection (if approved) would be constructed before 2021, it is unclear what water restrictions may be in place at the time of construction. However, cognisance that this landscape is a water scarce area must be taken, and that alternative water supply sources such as boreholes may need to be considered. Within the Kouga municipal area, five new production boreholes have been drilled since November 2017 in Oyster Bay and Jeffrey's Bay, and additional augmentation schemes proposed by the municipality include a 1Mℓ/day desalination plant at Paradise Beach and Oyster Bay, as well as the augmentation of Jeffrey's Bay Waste Water Treatment Works (WWTW) (Parliamentary Monitoring Group, 2018[12]). Furthermore, water saving measures in the Nelson Mandela Bay Metro require construction to use non-potable water where possible (Parliamentary Monitoring Group, 2018).

Water will be required during the construction phase for concrete mixing for the switching stations and pylon foundations, sundry construction purposes, and drinking water for the construction workers. Water will likely be trucked to site for this purpose, or alternately the construction contractor may obtain water from the site, subject to the necessary agreements with the landowners concerned, and receipt of the necessary authorisation from the Department of Water and Sanitation (DWS). The re-use and recycling of water is unlikely to be financially viable based on the small quantity of water required, however should be considered if possible.

6.5.3 Waste

According to the IDP of the Sarah Baartman District Municipality, landfill sites are located within the town areas of Hankey, Humansdorp, Jeffrey's Bay, Oyster Bay, Patensie and St Francis Bay within the Kouga Municipality, as summarised in the table on the following page.

[12] Parliamentary Monitoring Group. 2018. Western and Eastern Cape drought crisis: Water and Sanitation. Committee Meeting held on 7 February 2018. Notes available: https://pmg.org.za/committee-meeting/25770/ [Accessed 27 June 2018]

Table 21: List of landfill sites within the Kouga Local Municipality (source: Sarah Baartman IDP, 2017)

Town	Location	Landfill class	Registration/ permit status	Site suitability	Estimated lifespan	Infrastructure	Operation & management
Hankey	S33 48 21.8 E24 52 31.6	G:S:B -	Permitted	Good	Good	Poor	Inadequate
Humansdorp	S34 00 54.8 E24 46 24.9	G:M:B +	Registered	Good	Adequate	Good	Adequate
Jeffreys Bay	S33 58 43.3 E24 57 38.9	G:S:B +	Unknown	Good	Poor	Adequate	Adequate
Oyster Bay (old waste site)	S34 10 03.7 E24 39 36.2	G:C:B +	Unknown	Poor	Poor	Good	Inadequate
Oyster Bay (transfer station)	S34 10 04.4 E24 39 20.4	G:C:B +	Unknown	Good	N/A	Adequate	Inadequate
Patensie	S33 44 09.8 E24 47 30.5	G:S:B +	Unknown	Adequate	Poor	Good	Poor
St Francis Bay	S34 11 13.0 E24 49 24.2	G:M:B +	Unknown	Good	Inadequate	Inadequate	Adequate

The waste disposal system in the NMBM is somewhat more formalised as an integrated waste management plan was undertaken for the period of 2016-2020 in 2016. Three landfill sites are located within NMBM, namely Arlington, Koedoeskloof and Aloes Hazardous (which is privately owned by Enviroserv). Due to the location of the waste site, Koedoeskloof would be of most relevance to the proposed Impofu grid connection. The site accepts both general and hazardous waste and following the implementation of the planned site and storm water design, the lifespan of the site is expected to extend to 26 years. A number of drop-off centres and skips are also located in proximity to the proposed grid corridor, but it is not recommended that these be used for the project due to waste quantities. Importantly, it must be noted that the NMBM holds waste management by-laws which provide a schedule of offences and crimes as published in Provincial Gazette number 2322 dated 24 March 2010 (NMBM, 2016)[13].

Portable toilets will be used across the site and waste will be collected at regular intervals and transported to an equipped disposal facility.

Solid waste and effluent associated with the construction phase is anticipated to be of minimal volume and would be disposed of via the licensed municipal waste streams.

Please note however that the Proponent cannot commit to a specific waste disposal or treatment facility at this stage for solid waste or wastewater. This can only be confirmed closer to the time of construction, and once the Contractor has been appointed.

During the construction phase, the contractor will be responsible for collecting and disposing of waste at an appropriate disposal site. Wherever possible, waste must be diverted for recycling or reuse rather than disposal. During the operational phase, Eskom will take ownership of the grid connection infrastructure and will be responsible for disposing of the minimal amounts of waste generated during servicing/ maintenance operations.

6.5.4 Maintenance during the operational phase

The estimated lifecycle of the power lines will be many years more than the proposed wind farms as even if the wind farms stop operating the line will be a valuable asset to the national grid and particularly to the Eskom power line network between PE and Kouga. It will require intermittent maintenance and repair work. Eskom staff and contractors will undertake all maintenance and repair work.

[13] NMBM, 2016. Integrated Waste Management Plan 2016-2020. Prepared by GIBB. Available: http://www.nelsonmandelabay.gov.za/datarepository/documents/final-nmbm-iwmp-2016-2020.pdf [Accessed 27 June 2018]

6.6 Need and Desirability

The 'need and desirability' of the project should be evaluated against the strategic context of the development proposal along with the broader societal needs and public interest. According to the DEA Guideline on Need and Desirability (DEA, 2017[14]), the concept of 'need and desirability' relates to the "*nature, scale and location of development being proposed, as well as the wise use of land.*" The concept of 'need and desirability' can be explained in terms of the broader meaning of its two components, need primarily referring to time, and desirability to place. It is acknowledged that 'need and desirability' are interrelated and the two components collectively should be considered in an integrated and holistic manner.

According to the DEA Guideline (DEA, 2017), the strategic context for the need and desirability of an activity can be reviewed in light of what is envisioned for a specific area, specifically what has been proposed in a municipal Integrated Development Plan (IDP) and Spatial Development Framework (SDF). These planning tools provide direction as to the desired spatial form of a municipality. Similarly, municipal Environmental Management Frameworks (EMFs) also provide the desired spatial form in terms of the environmental context of an area. Furthermore, the DEA Guideline (DEA, 2017) states that the need and desirability of an activity should be evaluated against the principles of "*promoting justifiable economic and social development*" as well as the principles of "*securing ecological sustainable development and use of natural resources*" as set out in the bill of rights in the Constitution.

Table 22 below aims to provide more detailed responses with regard to the project specific responses to the questions raised in the Need and Desirability guidelines of DEA (2017) and the Western Cape Government: Department of Environmental Affairs and Development Planning (2013). The responses were compiled taking into consideration the Eastern Cape Provincial Spatial Development Plan, Eastern Cape Climate Change Response Strategy, IDPs, SDFs, EMFs, Local Economic Development (LED) strategy, Tourism Master Plans and the outcome of the project screening phase during which No-Go areas were identified based on environmental and socio-economic considerations (as described in Section 3).

Table 22: Need (Timing) of the proposed project (based on the 2017 DEA and 2013 DEA&DP guidelines): Promoting justifiable economic and social development

Question	Response
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	Renewable energy projects have been prioritised in strategies at various municipal scales in the area. At the provincial level, the Eastern Cape Provincial Economic Development Strategy (2017) seeks to create a clear, long-term vision and strategy for the growth and development of the province by building on six high potential economic sectors, one of which is sustainable energy. The Eastern Cape Sustainable Energy Strategy (2012) lays out the province's strategic direction in terms of the renewable energy industry focusing on encouraging sustainable, affordable and environmentally friendly energy production by creating an enabling environment for energy production and sustainable technology, skills and industry development. The Sarah Baartman District Municipality (SBDM) IDP identifies investment in renewable energy, particularly wind, as potential projects with significant economic spinoffs for the region. It also identifies renewable energy investment as a key means by which to address the electrical infrastructure backlog within the district. The SBDM SDF acknowledges this economic opportunity, but also considers the potential negative impact on ecotourism of the district due to the potential changes to the visual and cultural landscapes. Within the Kouga Local Municipality, renewable energy (specifically wind farms) has been identified as key contributors to the economy of the municipality. The local economic development (LED) plan and SDF

[14] DEA. 2017. Guideline on Need and Desirability, Integrated Environmental Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa.

Question	Response
	consider the role of the municipality managing potential conflicts with other economic development initiatives. More specifically, the development of the proposed Impofu Wind Farms would not be possible without the construction of the proposed Impofu grid connection. Capacity is limited within the current existing Eskom distribution infrastructure, as no new projects (after Oyster Bay) can be connected to the national grid at Melkhout. Therefore, the proposed Impofu overhead powerline will contribute to the stability and capacity of the Eskom infrastructure in the area. On the eastern side of the proposed grid line within NMBM, the area between and around Booysens Park and Kwanobuhle has been earmarked for future housing developments. Therefore, these planned developments need to be taken into consideration during the detailed design of the grid alignment.
2. Should development, or if applicable, expansion of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?	Yes. The proposed project is in line with the SBDM's medium term strategic framework that focuses on investment in alternative energy sources, e.g. wind, that will stimulate secondary opportunities for economic growth. The proposed project also has both national and global significance as it aligns with national policy direction as well as contributing to South Africa being able to meet some of its international climate change obligations, by aligning domestic policy with internationally agreed strategies and standards as those set by the United Nations Framework Convention on Climate Change. There are other reasons why timing is considered to be right for renewable energy within this landscape. Firstly, the nearby location for the proposed Thyspunt nuclear energy facility has not been selected as the preferred site for nuclear in South Africa in the long term. Secondly, with the recent construction of nearby wind farms in the landscape, a host of locally based manufacturing and training facilities have been established in the surrounding areas like Port Elizabeth.
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	Yes. The SBDM and NMBM both identify a green economy (including, but not limited to renewable energy and ecosystem services) as a focal point for economic development in the district, noting that such investments are likely to have significant economic spinoffs for the region. The proposed Impofu grid connection will strengthen the electricity network within the two municipalities and will benefit both residents and business owners by improving the reliability of current supply and provide an opportunity for future electricity supply. With the provision of the Impofu grid connection, the proposed Impofu Wind Farms would also directly benefit the local community. Firstly, it would be a source of income to the landowners of the properties on which the wind turbines are located and would improve the economic viability of the landowner's current farming operations. Secondly, it would also create direct and indirect job opportunities for the local community; who have already been exposed to the work required since the construction of the Jeffrey's Bay Wind and Kouga Wind Farms in 2012-2014. Secondary economic benefits may include an increase in service amenities through an increase in contractors and associated demand for accommodation and other services. A percentage of the operational revenue of the wind farms will be utilised to support local socio-economic development initiatives, due to the requirements in this regard of the Renewable Energy Independent Power Producer Procurement Programme (REI4P). The local municipality will play a role in guiding how the funds are utilised, thus ensuring that relevant and pressing needs in the community will be addressed.

Question	Response
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	No municipal services (water, sewerage, electricity) will be required at the site, as the project contractor or appointed sub-contractor/s will be responsible for providing the necessary services to the site during the construction and decommissioning phases. The eventual owner of the infrastructure (Eskom) will be responsible for supplying the necessary services during the operational/maintenance period of the development and may sub-contract these services to appropriate private service providers as needed. Electricity will be supplied to the site via existing Eskom lines, generators and/or on-site renewable energy installations (e.g. solar panels), Waste produced at the site will be collected and taken to an appropriate facility with sufficient capacity to accept the waste, for recycling, re-use, treatment or disposal (as appropriate). No municipal waste collection will be required at the site. Should any need for other services arise the relevant authority will be communicated with, and the necessary approvals/ agreements obtained before proceeding. The capacity of the municipal waste streams will need to be determined prior to construction, based on the available options highlighted in Section 6.5.3 above.
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	Yes. Although the project is not specifically mentioned in the municipal planning reports, reference is made in the NMBM IDP and SDFs to upgrading infrastructure pertaining to generation and distribution of electricity. The SBDM's IDP further notes that both the national and provincial governments have prioritised renewable energy, with the Eastern Cape placing particular emphasis on wind energy. The municipalities' (Sarah Baartman and Kouga) IDPs concurs with this, identifying the development of wind farms as major economic projects that have the potential to create employment and address poverty in the area. Water, sanitation and electrical services required for the construction and operation of the grid connection will be provided by the appointed contractor, and additional municipal services are not expected to be required for the proposed development (e.g. potable water will be trucked to site, or obtained from the property, waste water will be collected in conservancy tanks and transported to an appropriate wastewater treatment site, on-site generators will be utilised etc.). Should municipal services be required, these will be confirmed and agreed with the municipality prior to commencing. Should the municipality be unable to provide the necessary services, then the applicant (or their appointed contractor) will be responsible for providing the necessary services to the site via use of private service providers.
6. Is this project part of a national programme to address an issue of national concern or importance?	Yes. The establishment of the proposed facilities would strengthen the existing electricity grid for the area. Moreover, the project would contribute towards meeting the national energy targets as set by the DoE, of which a share of all new power generation being derived from IPPs. The 2010 Integrated Resource Plan (IRP) developed by the DoE for the 2010 to 2030 period aims to achieve a "*balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments*". The final IRP

Question	Response
	provides for an additional 20,409 MW of renewable energy in the electricity mix in South Africa by 2030. Furthermore, the National Development Plan (NDP) proposes to create 11 million jobs and grow the economy at an average rate of 5.4% per annum by 2030. In respect of renewable energy, the NDP seeks to ensure that half of the new future generation capacity comes from renewable energy sources. It furthermore recognises the importance of the transition to a low carbon economy. As such the NDP suggests the following: • Supporting carbon budgeting • Establishing an economy wide price for carbon by 2030 complemented by energy efficiency and demand management interventions • Setting a target of 5 million solar water heaters by 2030 • Implementing zero emission building standards that promote energy efficacy • Simplifying regulatory regime to encourage renewable energy, regional hydroelectric initiative and independent power producers (IPPs)
7. Do location factors favour this land use (associated with the activity applied for) at this place?	Yes. The proposed Impofu grid corridor is required in this location to connect the proposed Impofu Wind Farms to the national electricity grid, and the wind farms are suitably located based on the wind resources and its characteristics measured throughout the year. i.e. the area proposed for the Impofu Wind Farms lies on a section of coastal plain exposed to winds from the ocean from the south west and south east and is one of the best wind resources in the country.
8. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programmes?	According the Socio-economic study (see Section 7.4), the proposed Impofu grid corridor would have positive impacts related to GDP growth, limited local and preferential procurement (BBBEE, women-owned vendors, etc.), enterprise development, the creation of employment and skills development opportunities, which is compatible with the economic development vision of the SBDM, Kouga Local Municipality and the NMBM. It is unlikely that the proposed Impofu grid corridor would directly complement the local socio-economic initiatives, given the limited number of low skilled jobs required. However, the regional impact of the proposed Impofu grid corridor should not be seen in isolation from the proposed wind farms which would have a wider felt positive socio-economic impact. The Sarah Baartman Socio-economic and enterprise development (SEEDS) strategy (2016) identifies seven core strategies based both on international trends and other institutions in promoting development in the region. One of the core strategies is "*investment in natural capital which includes creating* ***new generation green jobs*** *and* ***local income streams rooted in renewable energy***". The proposed development is aligned to the LED and SEED strategy. According the Sarah Baartman Municipality (2017) the district aims to increase the rate of economic growth to create decent job opportunities and sustainable livelihoods. This includes continued investment in infrastructure, local economic growth and tourism that is supported by adequate services such as employment and electricity.
9. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The potential for the proposed Impofu grid corridor to negatively impact on the natural, social and economic environments has been recognised and a number of investigative steps have been identified to ensure a good understanding of these potential impacts throughout the project's life cycle. The first step involved a screening exercise undertaken with specialists to identify No-Go areas as well as potential impacts that could be considered fatal flaws. Based on the findings of this exercise, a number of feasible

Question	Response
	alternatives were identified (step two) as described in Section 5 to ensure a responsible project development proposal being assessed during the third step, namely the BA phase. The outcome of the BA phase, will culminate in an Environmental Management Programme (EMPr) that will be applicable to the pre-construction, construction, operational and decommissioning phases of the proposed Impofu grid connection (see Section 4.3) to ensure that an environmentally and socio-economically sustainable "cradle to grave" approach is implemented. The EMPr will be managed and implemented as a living document, to allow the development project to adapt to and accommodate unforeseen environmental and/or social and/or political and/or economic changes and needs. For more information on the anticipated impacts please refer to Section 6 of this report.
10. What measures were taken to ensure the participation of all interested and affected parties? What measures were taken to ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge?	The regulated EIA/BA processes are tightly bound by legislative timeframes in terms of NEMA. Due to the size and complexity of the proposed Impofu grid corridor, it was considered that a 30-day public comment period would not be sufficient for this BA process and would provide limited opportunity to incorporate and respond to issues raised by I&APs. In a precautionary approach, an additional public comment period was implemented prior to the official commencement of the BA Phase (linked with the submission of the application form to DEA) to enable the project team to better incorporate and communicate the views of the I&APs into the proposed development. Please refer to Section 4.1 and 4.2 for more detail on the public participation process undertaken to date and proposed for the remainder of the project.
11. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources for the proposed development alternative?)	Yes. Renewable energy projects have been prioritised in strategies at various municipal scales in the area. At the provincial level, the Eastern Cape Provincial Economic Development Strategy (2017) seeks to create a clear, long-term vision and strategy for the growth and development of the province by building on six high potential economic sectors, one of which is sustainable energy. The Eastern Cape Sustainable Energy Strategy (2012) lays out the provincial strategic direction in terms of the renewable energy industry focusing on encouraging sustainable, affordable and environmentally friendly energy production by creating an enabling environment for energy production and sustainable technology, skills and industry development. Please also refer to Sections 7.4 and 7.5 for further detail on potential issues and recommendations regarding anticipated agricultural and socio-economic impacts.
12. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	Stakeholder engagement is an important aspect of sustainable development to ensure that adverse environmental impacts are appropriately addressed and not result in discriminating distribution of these impacts. For this reason, the public participation process has been expanded to beyond what is legally required and to enable the project team to better incorporate and communicate the views of the I&APs into the proposed development (see Response 10). Furthermore, the Proponent has demonstrated their commitment to the local community by being part of the Greater Kromme Stewardship (GKS) initiative which allows private and communal landowners to directly participate and benefit from conservation by securing legal conservation status for their land, and which encourages and supports additional investment, from both the private and government sector into good environmental management.
13. How was a risk-averse and cautions approach applied in terms of socio-economic impacts?	Screening was undertaken at the pre-feasibility stage to allow environmental and social impacts to be considered early in the project lifecycle and evaluated in an integrated manner with the engineering design considerations. The screening process was specifically based on the

Question	Response
	identification and mapping of No-Go areas of the site to avoid all environmental, socio-economic and technical sensitive areas, and considered both impacts from fixed infrastructure such as the proposed switching stations and collector switching station, as well as the proposed overhead powerline (within the 2 km corridor). The results of the screening study showed that the project appeared to be viable and that there were no fatal flaws that should prevent the project moving forward. Specialist studies have been undertaken to refine results, improve knowledge gaps and confirm mitigation measures required where impacts cannot be avoided altogether. Please refer to Section 7 for the impact assessment of specific environmental aspects.

Table 23: Desirability (placing) of the proposed project (based on the 2017 DEA Guideline and 2013 DEA&DP Guideline): Securing ecological sustainable development and use of natural resources

Question	Response
1. Is the development the best practicable environmental option for this land/ site?	The land use within the project site boundary is mainly agriculture, until it crosses the urban edge of NMBM. During a screening exercise with the project specialists, No-Go areas were mapped and incorporated in the proposed layout. This is further detailed above in Section 5. By missing the no go areas and given that the majority of the land is transformed and that agricultural activities can continue under the line using this area for a power line is a good use of the land.
2. How will this development use and/or impact on non-renewable and renewable natural resources and the ecosystem of which they are part?	The screening process was undertaken as a precautionary approach to avoid and minimise impacts as the most preferred form of mitigation. This process and the outputs were collaborative and involved a large multi-disciplinary team of environmental specialists, the EAP, the project engineers and Red Cap as the developer, most of which have extensive knowledge of the area and experience in wind farm and associated infrastructure assessments generally. This process is further detailed in Section 4.1 and Section 5. Following the avoidance of sensitive features, Section 6 provides an assessment of potential environmental impacts, and suggestions on how to minimise negative impacts and enhance positive benefits where possible.
3. Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities?	No. The proposed development aligns with the Municipal IDPs which recognise the need for development of renewable energy and pursues economic development through renewable alternatives and promotion of energy efficiency. No fatal flaws or issues compromising IDPs and SDFs have been raised by municipal representatives to date.
4. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Frameworks (EMFs)), and if so, can it be justified in terms of sustainability considerations?	The proposed locations for the switching stations and collector switching station have been placed with the consideration of the affected landowners, as well as the environmental specialists and sensitive areas have been avoided. In terms of the overhead powerlines, the largest terrestrial and aquatic impacts would be caused by the specific location of each pylon foundation. The placement of these pylon locations will therefore be guided by the findings of the environmental specialists as detailed in Section 6. Along the corridor, the preferred alignment may cross areas of sensitivity demarcated within the NMBM EMF and Kouga spatial development framework, however as detailed in Section 5, a series of iterative processes have been undertaken to avoid sensitive features as far as possible, with consideration of how to align a piece of linear infrastructure to provide renewable energy to the national electricity grid.
5. How will the activity or the land use associated with the activity applied for,	As mentioned in Response 1, a screening exercise was undertaken to remove sensitive No-Go areas from the proposed layout area, as far as

Question	Response
impact on sensitive natural and cultural areas (built and rural/ natural environment)?	possible. Information on remaining potential impacts related to natural and cultural areas have been assessed in Section 7.
6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	The proposed Impofu grid corridor has the potential to impact on people's health and wellbeing in terms of visual character and sense of place, both of which have been assessed by the socio-economic specialists, visual specialist and archaeological (heritage) specialist. Although it is very difficult to mitigate the visual impact of an overhead powerline which may stand up to 32 m above ground level (refer to Section 7.7) a proactive approach has been undertaken to align the overhead powerline within a 2 km corridor that follows existing linear infrastructure. It is likely that for a lot of the corridor, the proposed overhead powerline will run adjacent to the existing Eskom 132kV overhead powerline. Where the line deviates from the existing infrastructure, consideration of the specialist findings detailed in Section 7 will guide the route where possible.
7. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?	A palaeontologist and archaeologist were appointed to undertake specialist investigations that would contribute towards the screening, pre-application and BA phases of this assessment (and associated wind farm investigations). No-Go areas were identified during the screening phase and have been avoided in the layout of the proposed infrastructure. Areas of higher sensitivity have been earmarked within the proposed grid corridor and will be avoided as far as possible with the preferred alignment, however are considered mitigatable if avoidance is not possible. The findings of these specialist assessments are complemented by previous heritage investigations undertaken in the area by the Eastern Cape Heritage Consultants, and the preliminary conditions of support from the Gamtkwa Khoisan Council, who have and will continue to be engaged with throughout this assessment process. For more detail on potential impacts related to heritage resources, please refer to Section 7.6 below.
8. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The approach developed for this project is based on the precautionary principles of NEMA and has tried to avoid and minimise impacts as the most preferred form of mitigation, as identified through spatial plans, specialist desktop and site-based research, and stakeholder engagement. However, all impacts cannot be avoided, and these are therefore assessed below in Section 7 with the support of specialist assessments. To minimise, manage and remedy the potential negative impacts, and enhance the positive impacts throughout the project cycle, a number of additional mitigation measures have been provided. These mitigation measures are detailed within Section 7 of this report, as well as within the EMPr. Furthermore, the Proponent is part of the GKS which was established by the St Francis Kromme Trust and a group of wind farms (Kouga, Jeffrey's Bay, Gibson Bay, Tsitsikamma Community, Oyster Bay Wind Farms and a wind farm developer called WKN Wind Current) and aims to identify and conserve important habitats and species found in the Kouga area where the wind farms operate, as well as secure ecological processes and ecosystem services.

7 BIOPHYSICAL AND SOCIO-ECONOMIC IMPACT ASSESSMENT

Several environmental aspects have been identified that may be impacted upon by the proposed Impofu Grid Connection. As detailed above in Sections 4.1 and Section 5, a series of iterative processes have led to the assessment of a 2 km wide corridor within which a 31 m servitude will be constructed to allow for a 132kV overhead powerline. The series of iterative processes have resulted in avoidance of environmental sensitivities being the first step of mitigation. The mapped No-Go areas, superimposed by the proposed Impofu Grid Corridor, are illustrated on the following page in Figure 22.Several impacts (positive and negative) specific to the proposed Impofu Grid Connection have been identified and assessed by both the EAP and relevant specialists in this section. It is important to note that these impacts have been identified following the avoidance of sensitive environments through the screening phase. Potential cumulative impacts caused by the proposed infrastructure in addition to other projects (refer to Section 4.3.1) in the area are also assessed.

For each impact assessed, mitigation measures have been proposed to further avoid, reduce (negative) or enhance (positive) the impacts. These mitigation measures have also been incorporated into the lifecycle EMPr to ensure that they are implemented during the pre-construction, construction, operational and decommissioning phases. The EMPr forms part of this BAR (Annexure F), and as such, its implementation will become a binding requirement should this project be authorised. The DEA Generic EMPrs for the development and expansion of substation infrastructure and for the transmission and distribution of electricity, gazetted in March 2019, are relevant to this application and have been incorporated into the EMPr.

The following environmental aspects are further described in the following subsections:

- Terrestrial ecology;
- Avifauna;
- Aquatic ecology;
- Heritage (incl. Archaeology and Palaeontology);
- Socio-economic;
- Agriculture; and
- Visual.

For each of these sections, a brief introduction will be provided giving context to the study. This will be followed by a description of the current environment and will highlight the No-Go areas that were avoided from the screening phase. An assessment has been undertaken for each impact assessed. This has been presented in a table format, linking the proposed mitigation measures to each impact. A cumulative impact assessment is then undertaken to consider the impact of the proposed Impofu Grid Connection in addition to the other electricidal infrastructure projects proposed in the area. Following this, the No-Go alternative is discussed. In conclusion to each environmental aspect, an impact statement is presented.

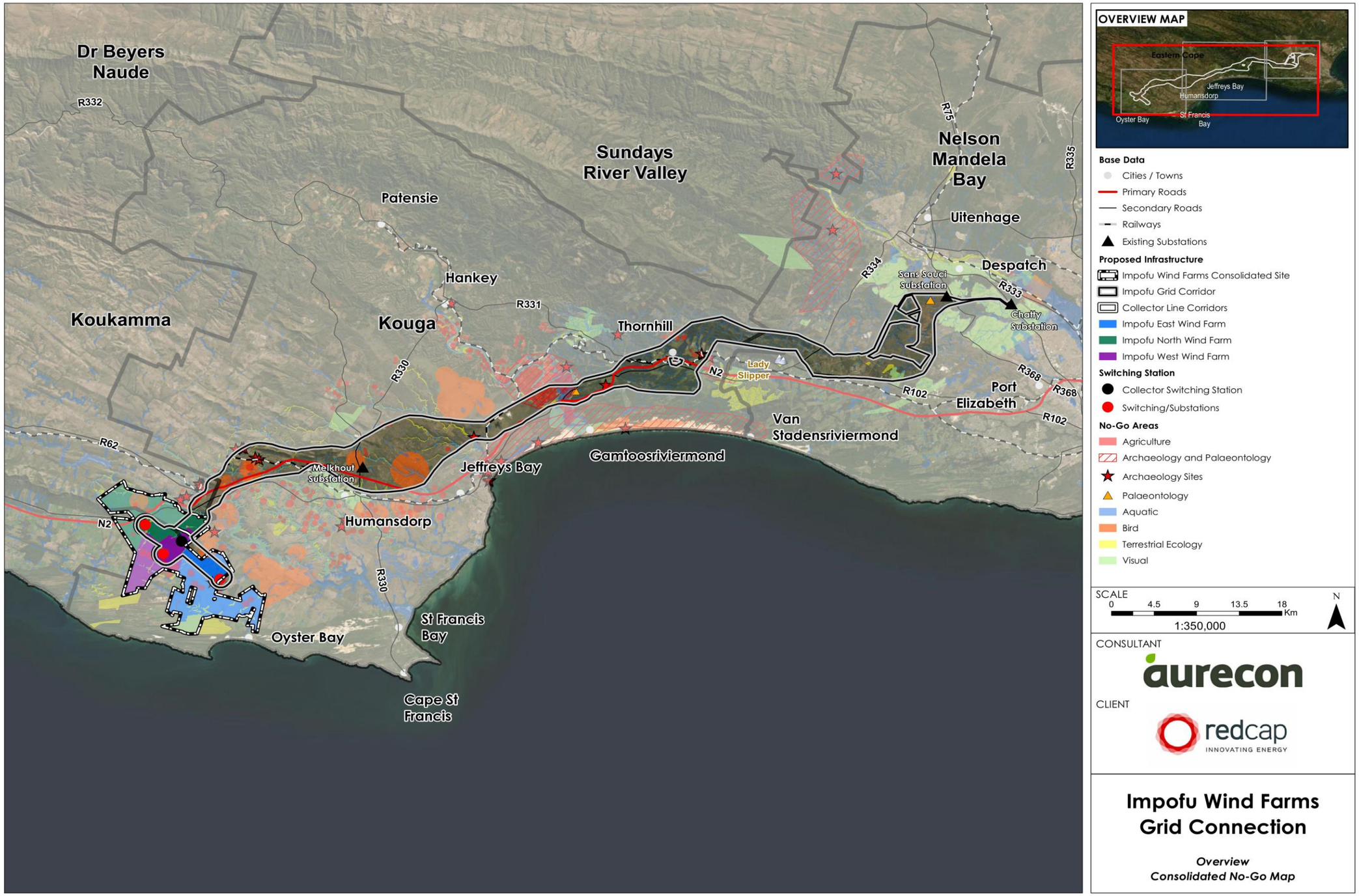


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Figure 22: Consolidated map of environmental sensitivities overlain by proposed Impofu Grid Corridor

7.1 Terrestrial Ecology

The construction of the proposed switching stations, collector switching station and pylons for the overhead powerline will require land to be transformed/ disturbed which will lead to potential impacts on the terrestrial ecology associated with disturbance, habitat loss and transformation of intact vegetation and faunal habitat. The loss of this natural vegetation and groundcover has the potential to impact the ecological systems and processes that currently exist. It was therefore deemed necessary to investigate the status quo and potential impacts that the infrastructure may pose on the biophysical environment. This section therefore assesses the impact of the proposed Impofu Grid Connection infrastructure on the terrestrial ecology of the area which includes the floral and faunal components of the environment. Avifauna (birds) have been excluded from this section and are dealt with separately in Section 7.2, due to the direct impacts they experience from overhead powerlines. Aquatic ecology has also been considered separately in Section 7.3.

Mr Simon Todd, of 3 Foxes Consulting, was appointed to undertake a fauna and flora specialist impact assessment which has been included in full in Annexure D. Mr Todd's study has been informed by his extensive experience in renewable energy projects, and associated power lines. He has also provided input into the strategic environmental assessments (SEAs) for both the Renewable Energy Development Zones (REDz) and the Eskom Grid Infrastructure. Both of these SEAs have considered the area in which the proposed Impofu grid corridor is located to be of national priority for grid and renewable energy development.

7.1.1 Description of environment

7.1.1.1 Vegetation

The proposed Impofu Grid Corridor traverses a heterogenous landscape, crossing fourteen vegetation types belonging to four different biomes. Figure 23 below provides an overview of the vegetation units mapped by Mucina and Rutherford (2012 update) overlain by the proposed corridor. Important vegetation types include Gamtoos Thicket, Albany Coastal Belt, Groot Thicket and Sundays Thicket which fall within the Albany Thicket Biome; Tsitsikamma Sandstone Fynbos, Kouga Sandstone Fynbos, Kouga Grassy Sandstone Fynbos, Algoa Sandstone Fynbos and Humansdorp Shale Renosterveld which are part of the Fynbos Biome.

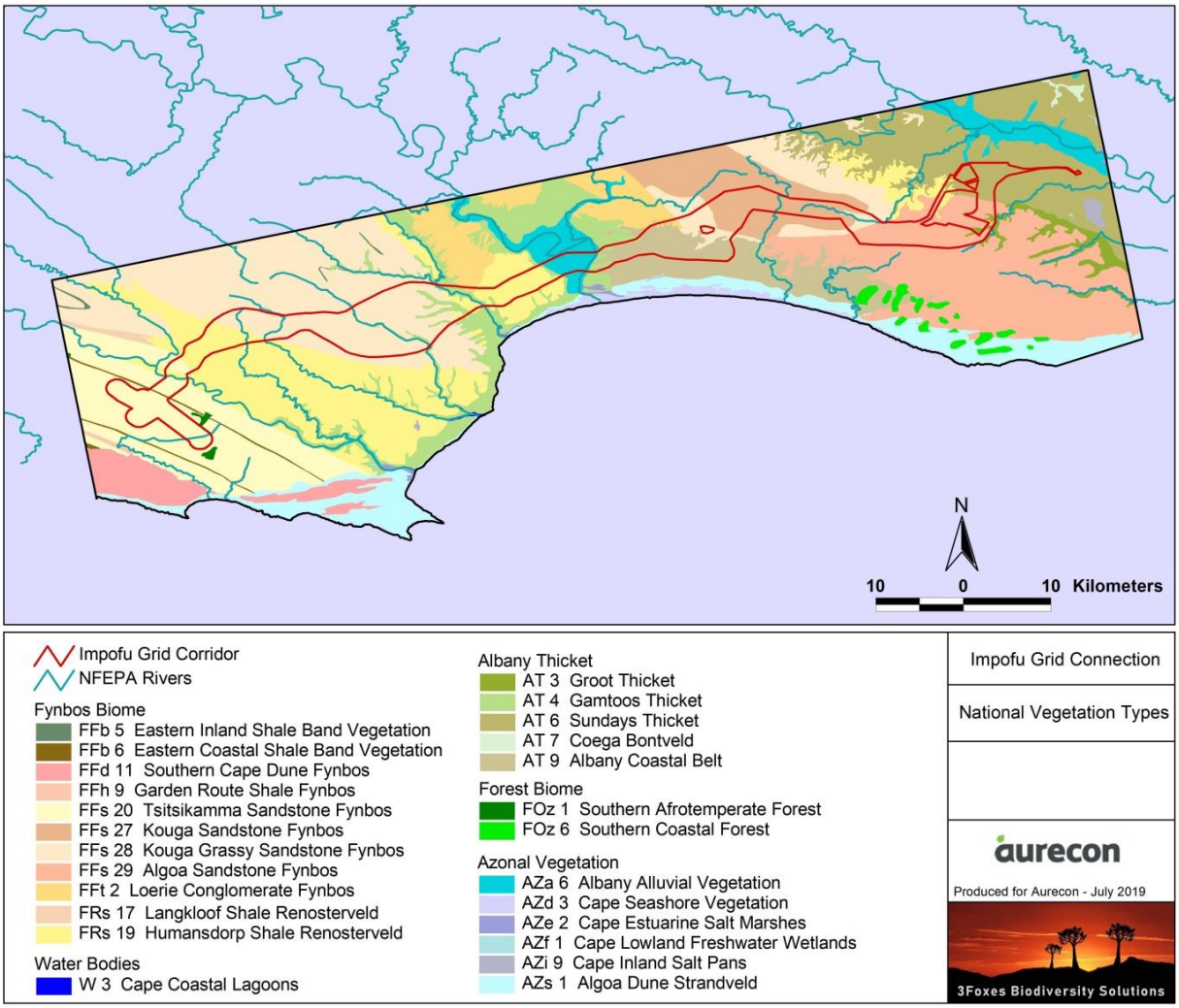

Figure 23: Vegetation map (Mucina and Rutherford 2006 and 2012 Powrie Update) of the Impofu Grid Connection Corridor and surrounds (Todd, 2019).

For the purposes of the ecological study the Grid Corridor was broken down into four relatively homogenous sections, as follows:

- Impofu onsite switching stations to Eskom Melkhout substation;
- Melkhout substation to Gamtoos River;
- Gamtoos River to Van Stadens; and
- Van Stadens to Chatty Substation.

Impofu onsite substations to Eskom Melkhout Substation

The Impofu onsite switching stations and collector switching station are located within the Tsitsikamma Sandstone Fynbos. From the Krom River the vegetation becomes Humansdorp Shale Renosterveld for approximately 7.5 km before transitioning into Kouga Grassy Sandstone Fynbos which covers an extensive area within the corridor all the way east of Melkhout substation (refer to Figure 24).

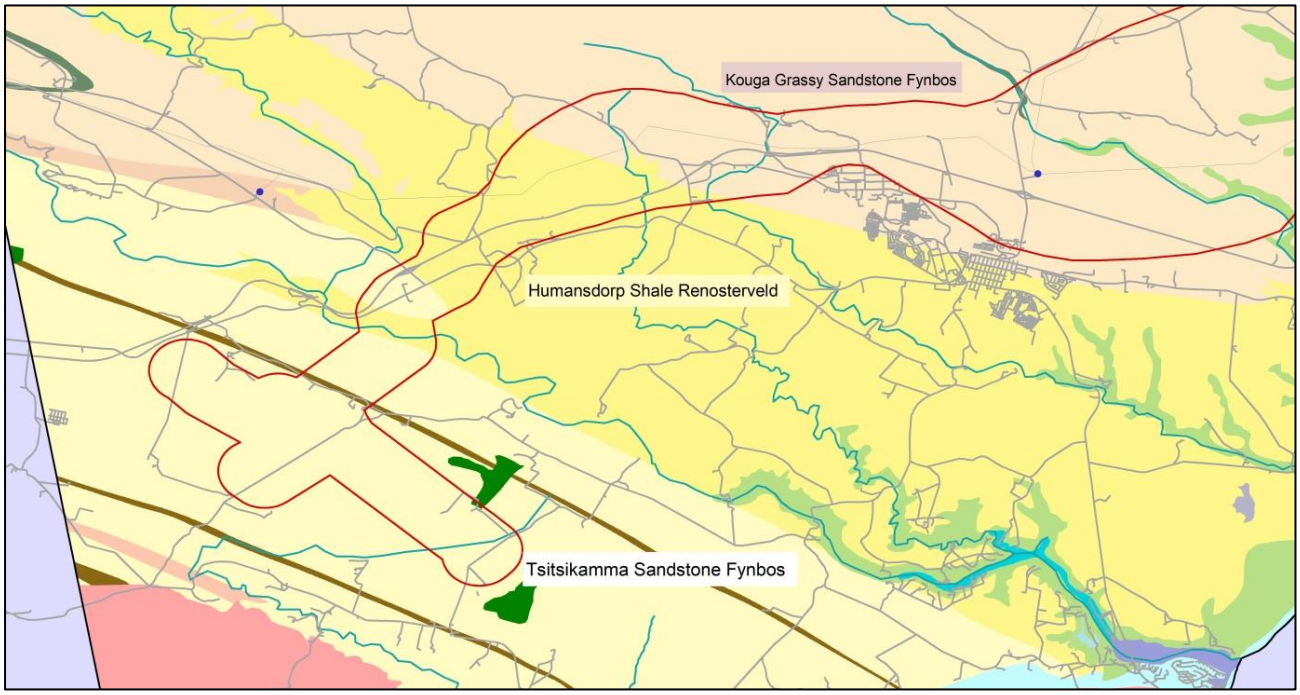

Figure 24: Overview of Grid Corridor from Impofu onsite substations to Eskom Melkhout substation (Todd, 2018)

Transformation levels within the wind farm areas are very high, with the majority of the area transformed for croplands and pastures, the onsite switching stations are within the transformed areas and no intact vegetation would be impacted by the onsite substations. The collector switching station (refer to Figure 25) is within an area of degraded Tsitsikamma Sandstone Fynbos, which is considered to be of moderate sensitivity and where no species of conservation concern were observed.

Sensitive features within this section of the grid include the crossing of the Krom River at the top end of the Impofu Dam, the remaining intact fragments of Humansdorp Shale Renosterveld west of Humansdorp (refer to Figure 26) considered to be of moderate to high sensitivity, and the various minor river crossings and relatively undisturbed Fynbos north of the N2 National Road. Kouga Grassy Sandstone Fynbos is fairly variable and the composition varies significantly depending on aspect, soil depth and structure, and is considered to be of moderate sensitivity.

Figure 25: Location of Impofu Collector substation with degraded Tsitsikamma Sandstone Fynbos (Todd, 2018)

Figure 26: Intact Humansdorp Shale Renosterveld near the N2 (Todd, 2018)

Common and dominant species observed within the areas of Tsitsikamma Sandstone Fynbos include *Leucodendron conicum, Metalasia densa, Passerina corymbosa, Protea nerifolia, Pterocelastrus tricuspidatus, Erica discolor, E.sparsa, E.rosacea, Ursinia scariosa, Agathosma ovata, Anisodontea scabrosa, Berzelia intermedia, Euryops munitus, Helichrysum teretifolium, Indigofera flabellata, Leucodendron salignum, Otholobium carneum, Phylica axillaris, Protea cynaroides, Stoebe plumosa, Commelina africana, Gazania krebsiana, Restio triticeus, Tetraria capillacea, Diheteropogon filifolius, Elegia juncea, Heteropogon contortus, Hypodiscus synchroolepis, Tetraria robusta, Themeda triandra* and *Tristachya leucothrix.*

While common species of Kouga Grassy Standstone Fynbos includes *Pteronia incana, Stoebe plumose, Tephrosia capensis, Helichrysum felinum, Disparago ericoides, Erica sparsa, Helichrysum teretifolium, Bobartia orientalis subsp orientalis, Watsonia meriana, Brachiaria serrata, Cymbopogon marginatus, Digitaria eriantha, Diheteropogon folifolius, Eragrostis curvula, Heteropogon contortus, Ischyrolepis capensis, Pentaschistis eriostoma, Pentaschistis pallida, Restio triticeus, Tetraria capillacea, Themeda triandra* and *Trischachya leucothrix*

Melkhout substation to Gamtoos River

The Melkhout substation is located north of Humansdorp in Kouga Grassy Sandstone Fynbos. From there the grid corridor goes past the Jeffreys Bay Wind Farm before traversing the Kabeljou's River which has Gamtoos Thicket in the valleys before going across the relatively flat plains of Humansdorp Shale Renosterveld before reaching the Gamtoos River (refer to Figure 27).

The plains towards the Gamtoos would once have consisted of Albany Alluvial vegetation but this area has been entirely lost to transformation (refer to Figure 28). Large tracts of the Humansdorp Shale Renosterveld have also be lost to transformation, however the Kouga Grassy Sandstone Fynbos is generally more intact. The major sensitive feature within the section of the corridor are the river crossings, but as these are all relatively minor rivers, it is likely that they can be spanned with relatively minor impact to the adjacent thicket communities. Some of the valleys along the rivers are however quite large and steep and disturbance on the steep slopes will increase erosion risk. At least 30 plant species of conservation concern are known to occur in this section of the corridor, which is a relatively high number and reflects the threat status of the Humansdorp Shale Renosterveld which dominates this section of the route and the high levels of transformation which have impacted locally endemic species.

Within the Humansdorp Shale Renosterveld common species observed include *Elytropappus rhinocerotis, Ochna serrulata, Diospyros dichrophylla, Oedera genistifolia, Berkheya heterophylla, Searsia pallens, Aloe Africana, Searsia incisa, Metalasia aurea, Metalasia densa, Leonotis leonurus, Euryops munitus, Aristida junciformis,*

Cynodon dactylon, Eragrostis curvula and *Bobartia orientalis*. Much of these areas are degraded through overgrazing or fire mismanagement.

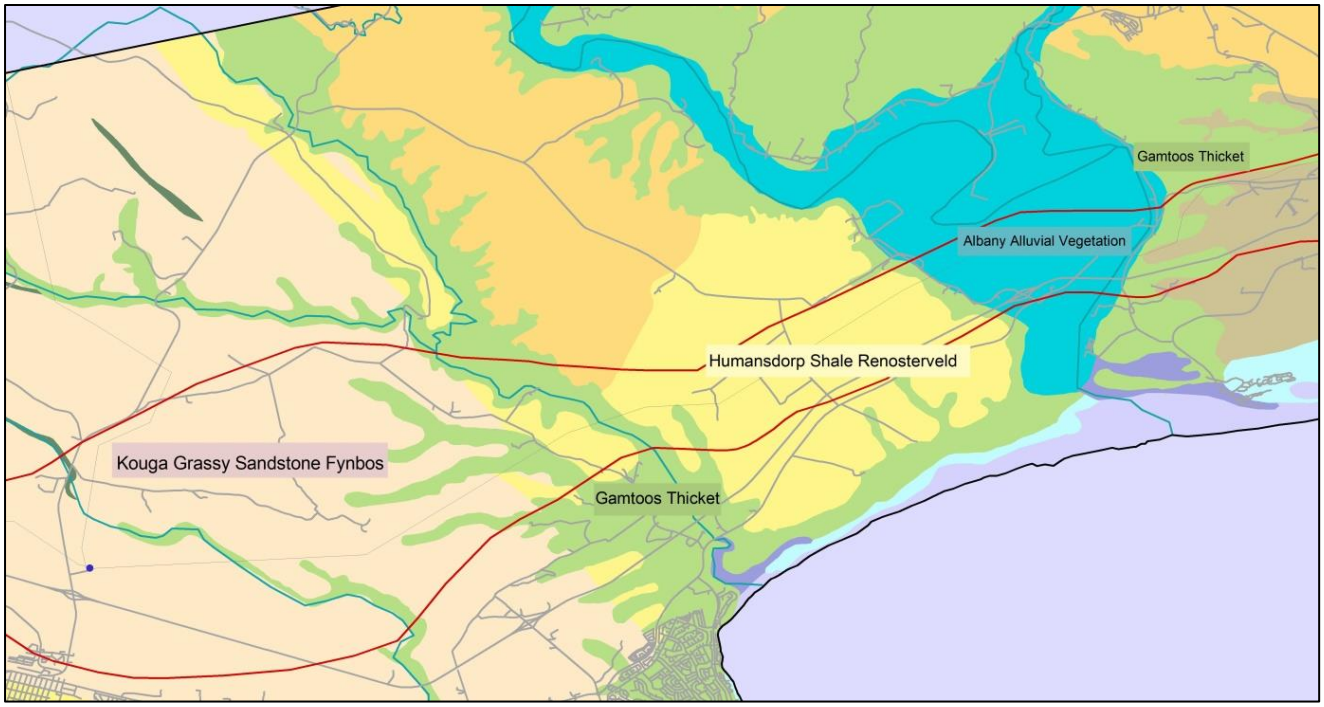

Figure 27: Overview of Grid Corridor from the Melkhout substation to the Gamtoos River (Todd, 2019)

Figure 28: The plains along the Gamtoos River (Todd, 2018)

Gamtoos River to Van Stadens

The route corridor between the Gamtoos River and Van Stadens River is dominated by Albany Coastal Belt vegetation, Kouga Grassy Sandstone Fynbos and Loerie Conglomerate Fynbos around Thornhill and Kouga Sandstone Fynbos from Thornhill east in the valley behind (north of) the Lady's Slipper mountain (Figures 29 & 31)..

The headlands along the Gamtoos River (refer to30) are considered sensitive and vulnerable to disturbance, as is the crossing of the Van Stadens River, where there are numerous forest patches. Based on the SANBI Plants

of southern Africa (POSA) database, 14 plant species of conservation concern are known from this section of the Grid Corridor, which is less than some of the other sections of the corridor, but as this section is significantly shorter, the density of such species is similar.

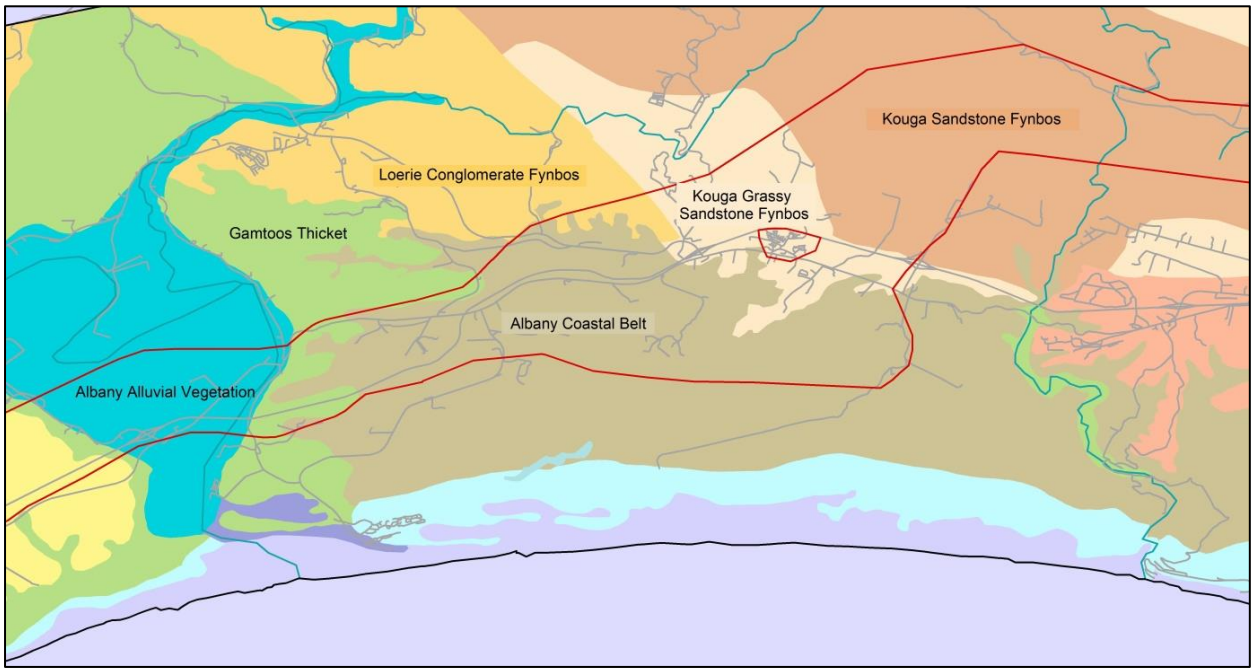

Figure 29: Overview of Grid Corridor from the Gamtoos River to Van Stadens (Todd, 2019)

The Gamtoos Thicket communities along the Gamtoos River are dominated by species such as *Euphorbia triangularis, Sideroxylon inerme, Schotia afra var. afra, Cussonia spicata, Aloe Africana, Azima tetracantha, Rhoicissus digitate, Plectranthus verticillatus, Portulacaria afra, Canthium spinosum, Olea europaea subsp. africana, Plumbago auriculata, Asparagus aethiopicus, Ehretia rigida, Grewia occidentalis* and *Oedera genistifolia*. These are dense communities where vegetation clearing should be avoided as much as possible. While this is considered to be a sensitive vegetation type, it tends to the restricted to steep slopes and valleys, where it should be possible to avoid significant impact.

Common and dominant species in the Albany Coastal Belt vegetation includes *Sideroxylon inerme, Erythrina caffra, Acacia natalita, Searsia lucida, Plumbago auriculata, Leonotis leonurus, Celtis africana, Clausena anisata, Rhoicissus tomentosa, Searsia chirindensis, Gymnosporia buxifolia, Ekebergia capensis, Grewia occidentalis, Rhoicissus tomentosa, Cynodon dactylon, Seriphium plumosum* and *Pteridium aquilinum*. The structure and composition of the Albany Coastal Belt varies a lot and ranges from dense low forest to disturbed *Acacia natalita* scrub and secondary grassland. This section of the Albany Coastal Belt is however considered to be generally less sensitive than the dense thicket and forest patches which occur along the river crossings and specific avoidance measures would need to be implemented in these areas to avoid impact to sensitive vegetation.

Figure 30: Gamtoos River (Todd, 2018)

Figure 31: Kouga Sandstone Fynbos along the MTO Longmore forestry area (Todd, 2019)

Van Stadens to Chatty substation

From the Van Stadens River, the Grid Corridor consists largely of Algoa Sandstone Fynbos until it nears Booysen Park where it quickly transitions into Motherwell Karroid Thicket and then Sundays Thicket for the final section towards Chatty Substation (refer Figure 32).

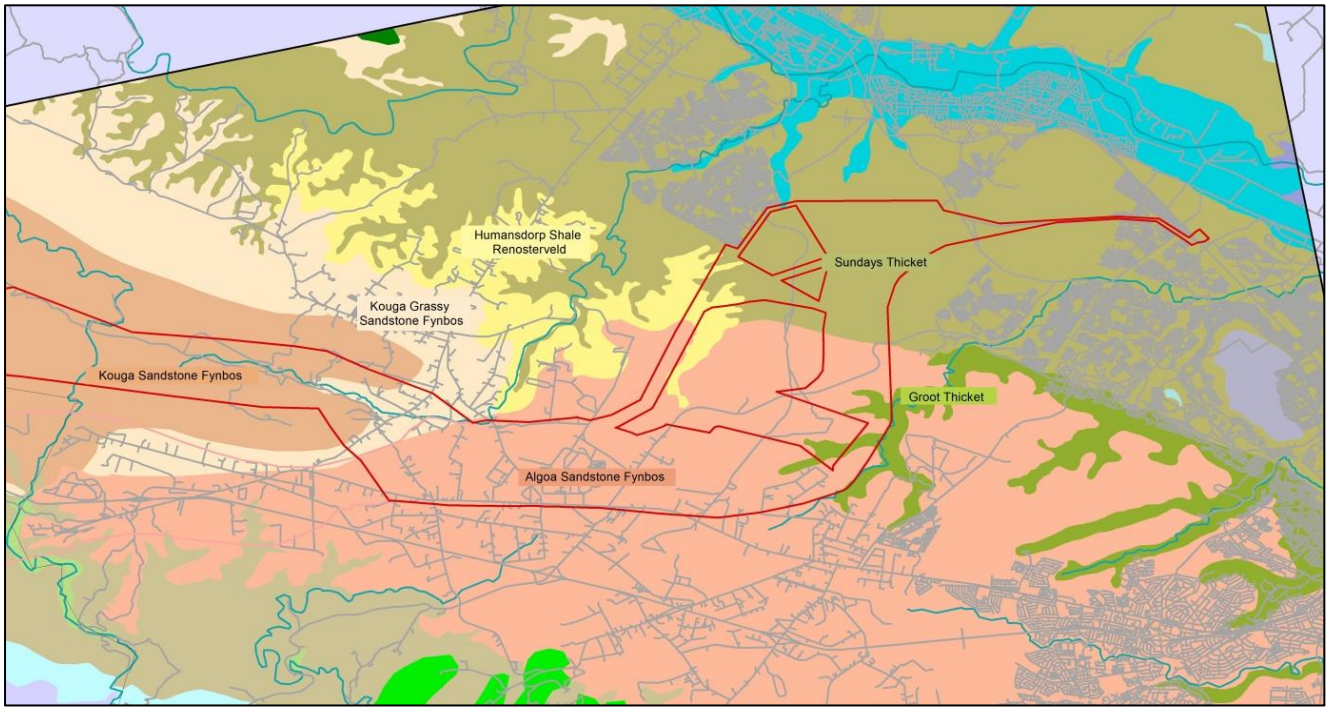

Figure 32: Overview of Grid Corridor from Van Stadens to Chatty substation (Todd, 2019)

The western portion of this section of the Grid Corridor has been heavily impacted and the majority of the area has been transformed by agricultural activities (refer to 3). From the Rietkuil Road, eastwards the vegetation is largely intact and consists of Algoa Sandstone Fynbos (refer to Figure 34) in varying communities and condition until it transitions abruptly into Motherwell Karroid Thicket near Booysen Park. From Booysen Park to Chatty substation the vegetation consists of alternating sections of Motherwell Karroid Thicket and Sundays Thicket.

The western section the Grid Corridor from Van Stadens to the Rietkuil Road is considered of low sensitivity as a result of the extensive transformation in this area, while the eastern section of the Grid Corridor is mostly fairly highly sensitive except for the final 5 km of the Grid Corridor from the R368 to the Chatty substation. More than 50 different plant species of conservation concern are known from the broader area, including many with localities from within the Grid Corridor itself.

Figure 33: Typical Agricultural Landscape (Todd, 2018)

Figure 34: Moderate condition Algoa Sandstone Fynbos (Todd, 2018)

The areas of Algoa Sandstone Fynbos are generally fairly species-poor and homogenous. There is however a clear gradient from east to west, which is related to the lower rainfall in the east as well as the change in land use from private to communal rangeland. Particularly in the east, the Algoa Sandstone Fynbos is restricted to the hilltops with Groot Thicket in the valleys. Common and dominant species include *Searsia pallens, Athanasia dentata, Metalasia aurea,* Berkheya *heterophylla, Barleria stimulans, Dicerothamnus rhinocerotis, Diospyros dichrophylla, Leucodendron salignum, Leucospermum cuneifolium, Chironia baccifera, Euphorbia stellata, Syncarpha argentea, Aloe ferox, Ischyrolepis capensis, Passerina pendula* and *Brunsvigia gregaria*. The areas of Algoa Sandstone Fynbos are considered less sensitive than the Thicket communities to the east as they have

been less impacted by transformation and also contain a lower abundance of species of concern compared to the Thicket and Bontveld areas to the south and east.

7.1.1.2 Fauna

According to the MammalMap database, more than 70 terrestrial mammals from the broad area around the site have been recorded. Species of conservation concern recorded or known to occur in the wider area include the African Striped Weasel *Poecilogale albinucha* (Near Threatened), Leopard *Panthera pardus* (Vulnerable), Cape Clawless Otter *Aonyx capensis* (Near Threatened) and Blue Duiker *Philantomba monticola* (Vulnerable). The Blue Duiker is associated with indigenous forest patches and is confirmed to be present within the well forested areas within the Grid Corridor especially in the vicinity of the Van Stadens River. Leopard would be restricted to the mountainous terrain along the northern margin of the Grid Corridor and it is not likely that it would be impacted by the development. The Cape Clawless Otter is also confirmed present and occurs along the coast as well as along the drainage systems of the area. Significant impact to the habitat of the otter is not likely as the drainage features along the Grid Corridor will be spanned and no direct impact to the riparian areas should occur.

Nearly 70 reptiles have been recorded in the broader area around the Grid Corridor. Species observed during the current study include Rhombic Night Adder, Cross-marked Snake, Cape Girdled Lizard, Cape Grass Lizard, Cape Skink, Variegated Skink and Common Ground Agama. Approximately 20 additional species have been recorded during previous EIA studies in the area and provides a reliable indication that these species would be present along the Grid Corridor as well. Listed species known from the area include the FitzSimons' Long-tailed *Seps Tetradactylus fitzsimonsi* (Vulnerable) and Albany Sandveld Lizard *Nucras taeniolata* (Near Threatened).

A total of 23 frog species have been recorded from the broader area around the Impofu grid connection corridor route. This includes two species of conservation concern, the Giant Bullfrog *Pyxicephalus adspersus* (Near Threatened) and Hewitt's Ghost Frog *Heleophryne hewitti* (Critically Endangered). Species observed to be common in the broader area include the Cape River Frog, Common Caco, Bronze Caco and Raucous Toad (refer to 5). There are numerous earth dams, wetlands and drainage lines present along the grid connection corridor which represent important habitat for frogs. However, as these features would be avoided as far as possible, direct impact on important amphibian habitats would be low and no significant impacts on any particular species or habitats would occur.

Figure 35: Frogs commonly observed in the area include from top right, Common Caco, Cape River Frog and Raucous Toad

Invertebrates, such as butterflies, moths and bees were also identified in the area, with up to 117 moth and butterfly species anticipated based on the LepiMap database of the Virtual Museum.

7.1.1.3 Conservation Biodiversity Areas

The combined Conservation Biodiversity Areas (CBA) map for the study area is depicted in 6. That part of the study area within the NMBMM is considered significantly more reliable and of greater consequence than that Eastern Cape CBA map. In addition, the NMBMM Biodiversity Plan has been gazetted and adopted by the relevant authority with the result that the activities associated with CBAs as listed in the Listing Notices come into effect. Therefore, these areas, should be avoided as far as practicable. However, in some sections, the corridor is constrained by various factors and some impact on CBAs is unavoidable. In the NMBMM, specific attention should be paid to reducing impact on intact vegetation as much as possible and aligning with existing disturbances as much as possible as novel disturbances to the larger intact CBAs is not desirable. The final alignment should be reviewed to ensure that an acceptable impact on CBAs has been achieved. The footprint of the power line in any one place is however low and as a result a significant loss of biodiversity within the CBAs is highly unlikely and the potential for disruption of ecological processes is also very low.

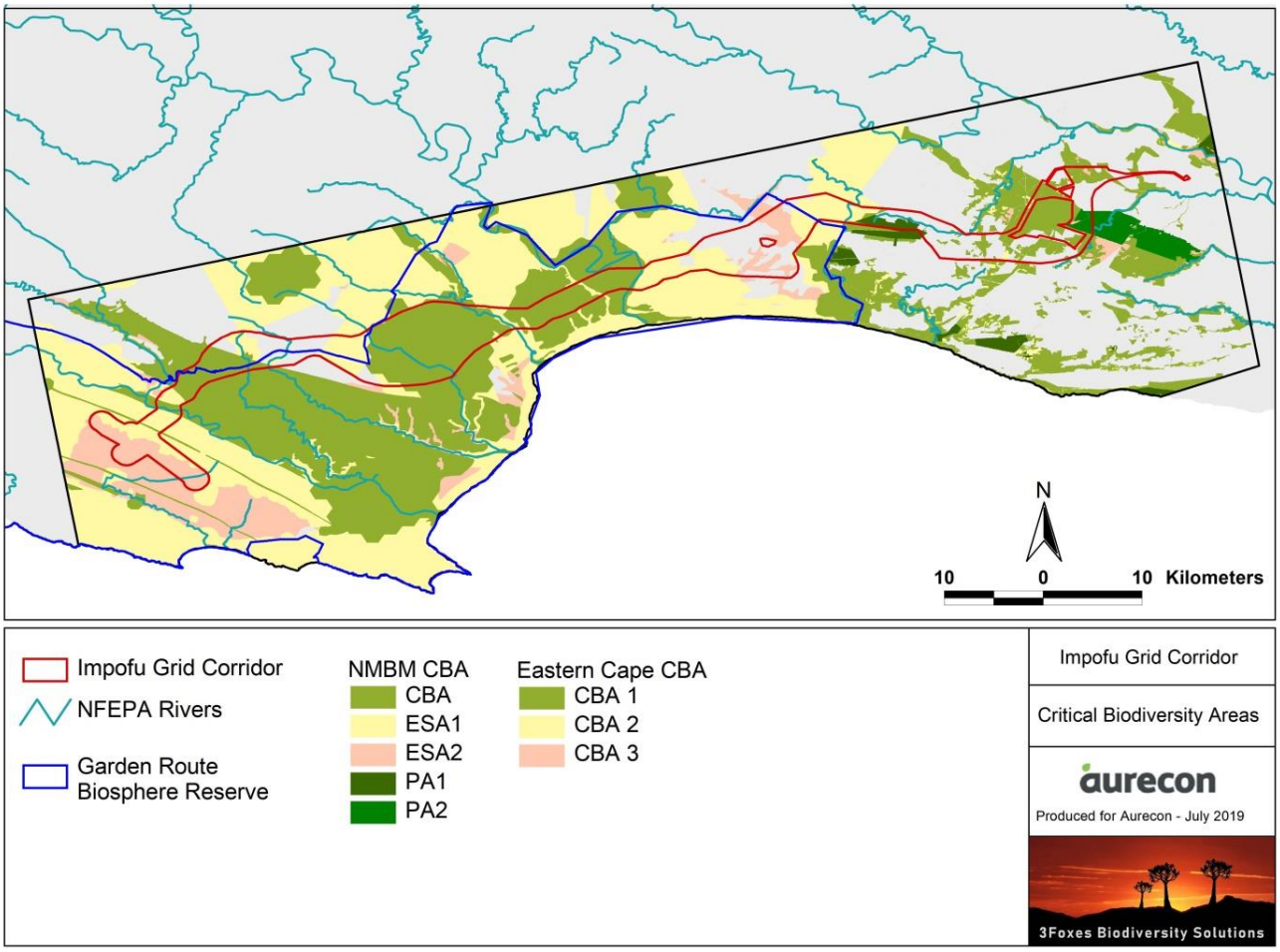

Figure 36: Critical Biodiversity Areas for the Impofu Grid Corridor

The sensitivity of the proposed powerline route varies a lot and is driven primarily by the high degree of transformation that some areas have experienced and the contrasting high conservation value of the some of the remaining intact areas. The on-site and collector substation positions are all located within areas that are transformed or highly degraded and no significant impacts from this component of the development is likely. The power line itself is relatively long and as a result traverses a wide range of habitats and ecosystems including a variety of listed or sensitive ecosystems. In many areas, impacts to these features can likely be avoided through careful route planning. There are also some constrained sections of the route, where some impact on high-value natural habitats is highly likely to occur. However, due to the linear nature of the power line, the impact in any one place is low and significant habitat loss or impact within sensitive areas can be reduced through careful placement of the pylons and reducing the development footprint as much as possible.

7.1.1.4 Protected Areas

The majority of the western portion of the Grid Corridor is within the Garden Route Biosphere Reserve. As a Biosphere Reserve, the Garden Route Biosphere Reserve is managed in line with the Lima Action Plan for UNESCO's Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves. The Impofu Grid Corridor does not impact any core areas of the biosphere reserve and due to the linear nature of the powerline it has a small impact in any one area, and it would not compromise the ecological functioning of the landscape or any of the ecosystem services currently being provided by the affected area within the biosphere reserve.

7.1.2 Impact assessment with mitigation measures

The development of the proposed Impofu grid infrastructure is likely to result in a variety of direct and indirect impacts associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hardstanding such as the switching stations, pylon foundations, and access tracks. As clearing of taller vegetation is required beneath an overhead powerline, the impact of powerlines tends to be greatest in dense taller vegetation

(e.g. forest areas) and relatively low in shorter fynbos where vegetation clearing is only required for localised disturbed areas around the pylon foundations.

During the pre-application PPP comment period, it was queried whether the overhead powerline might have an impact on bees. While high voltage lines, such as 765kV powerlines can generate fairly powerful electromagnetic fields (EMF) which are known to have some negative impact on fauna (including bees), the lower voltage lines such as the 132kV powerlines proposed, generate significantly lower EMF levels and are not known to significantly impact insects. Based on the literature included in the ecological specialist report, there is no universal negative impact anticipated on insects such as bees and butterflies from medium voltage powerlines and their associated impacts.

The following tables consider the potential impacts on the terrestrial ecology of the site and consider the major risk factors and contributing activities associated with the proposed development. These have been identified as:

- Impact on vegetation and plant species of conservation concern (-);
- Direct and indirect faunal impacts (-);
- Increased soil erosion risk (-); and
- Impact on critical biodiversity areas (-)

Table 24: Impacts on vegetation and plant species of conservation concern

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	The abundance of plant species of conservation concern is generally low although there are several sections of the corridor with the known presence of SCC or with protected species such as Milkwoods (*Sideroxylon inerme*) present. Although a preconstruction walk-through of the final power line alignment could reduce impact on such species, it is likely that there will be some unavoidable residual impact on species of conservation concern. However, as the footprint of the power line is largely linear in nature, impact in any one area is likely to be low and it is not likely that any species would be significantly compromised or reduced as a result of the powerline.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent		Permanent	
Extent	Local		Local	
Intensity	Moderate		Low	
Significance	**MODERATE (-)**		**MINOR (-)**	
Probability	Certain/ definite		Likely	
Confidence	High		High	
Reversibility	Low		Low	
Resource irreplaceability	Low		Low	
Mitigation measures				
• The final power line route should be designed so as to avoid areas of high sensitivity and CBAs as far as possible. • The final power line route should be reviewed by a terrestrial ecology specialist to ensure that impacts are acceptable and that there are no parts of the power line within no-go areas. • Existing roads and access routes should be used wherever possible. • There should be a preconstruction walk-through of the power line corridor to identify species of conservation concern that should be avoided or translocated. • Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible. • Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development. • Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.			

- Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.

Table 25: Direct and indirect faunal impacts

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	The construction of the powerline will result in some localised habitat loss, noise and disturbance along the power line route. This will lead to direct and indirect disturbance of fauna. Some slow-moving or retiring species such as many reptiles may not be able to escape the construction machinery and would be killed. There are also several species present which are vulnerable to poaching and there is a risk that these species may be targeted. This impact would be caused by the presence and operation of construction machinery and personnel during construction and this impact would be largely transient and restricted to the construction period as a result. It is not likely that any species would be disproportionately impacted or their local populations compromised as a result of the power line construction. Similar impacts would occur during the decommissioning phase, as heavy machinery would likely be required to remove the pylons which may impact the fauna present within these areas. This impact would however be localised and likely restricted to the immediate vicinity of the pylons.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term		Short term	
Extent	Local		Local	
Intensity	Moderate		Moderate	
Significance	**MINOR (-)**		**MINOR (-)**	
Probability	Almost certain		Likely	
Confidence	High		High	
Reversibility	Medium		High	
Resource irreplaceability	Low		Low	

Mitigation measures

- Preconstruction walk-through of the powerline corridor to identify areas of faunal sensitivity.
- Any fauna threatened by construction activities should be removed to safety by the ECO or other suitably qualified person.
- Any potentially dangerous fauna such as snakes should be relocated to a safe location prior to the commencement of construction and decommissioning activities.
- Existing roads and access routes should be used wherever possible.
- During construction and decommissioning, all vehicles should adhere to demarcated tracks or roads and the speed limit should not exceed 40 km/h on larger roads and should be 20-30 km/h on smaller access tracks.
- All construction staff should undergo environmental induction before construction commences in order to raise awareness and reduce potential faunal impacts.
- To avoid impacts on amphibians, all spills of hazardous material should be cleared in the appropriate manner according to the nature and identity of the spill and all contaminated soil removed from the site.
- Avoid the use of machinery within sensitive faunal habitats such as drainage lines and wetlands.
- No fires should be allowed within the site as there is a risk of runaway veld fires.
- If any parts of the site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects, and which should be directed downwards.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.

- No excavated holes or trenches should be left open for extended periods as fauna may fall in and become trapped.
- All above-ground infrastructure should be removed from the site if the line is decommissioned.

Table 26: Increased soil erosion risk

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	The disturbance created during construction/decommissioning of the power line may leave parts of the grid connection corridor vulnerable to soil erosion. Erosion has negative consequences for fauna and flora in the areas where soil is being lost and may also impact aquatic ecosystems through high silt inputs. This will need to be managed in the operational phase to ensure that vulnerable areas are stabilised. However, with mitigation, this impact can be well avoided, and erosion reduced to a low level.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term		Medium term	
Extent	Local		Local	
Intensity	Moderate		Low	
Significance	**MINOR (-)**		**MINOR (-)**	
Probability	Almost certain/ highly probable		Probable	
Confidence	High		High	
Reversibility	Medium		Low	
Resource irreplaceability	Low		Low	
Mitigation measures				
• Disturbance within or near the drainage lines should be kept to a minimum. No pylons should be located within drainage lines or the adjacent floodplains. • Any roads along slopes should have water diversion structures placed at regular intervals to ensure that they do not capture overland flow and become eroded. • Any erosion problems observed along the power line servitude should be rectified as soon as possible using the appropriate revegetation and erosion control works. • Following decommissioning, erosion should be monitored annually for at least three years after decommissioning and any erosion problems observed along the powerline servitude should be rectified as soon as possible using the appropriate revegetation and erosion control works.				

Table 27: Impacts on Critical Biodiversity Areas

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	Several parts of the power line will be located within CBAs and ESAs. This is of potential concern especially where the CBAs are related to the presence of listed ecosystems which have already experienced a high degree of transformation and which would consequently be more vulnerable to additional impact. However, in most cases, the linear nature of power line development results in low local post-mitigation impacts and it is highly unlikely that the power line would significantly compromise the biodiversity or ecological functioning of any of the CBAs present along the route.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent		On-going	
Extent	Local		Local	
Intensity	Moderate		Very low	
Significance	**MODERATE (-)**		**MINOR (-)**	

Probability	Certain/ definite	Likely
Confidence	High	High
Reversibility	Low	Medium
Resource irreplaceability	Medium	Low
Mitigation measures		
• CBAs should be avoided by the final power line alignment as much as possible, especially where these related to listed ecosystems or sensitive habitats such as forest or wetlands. • The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas as far as possible. • The taller woody vegetation should only be cleared where this is necessary for operational safety of the power line. Taller succulent species such as euphorbias should be left in place as they do not pose a fire risk as such species do not burn. • The final power line route should be checked by a terrestrial ecology specialist to ensure that impacts are acceptable and that no areas of high sensitivity would be significantly impacted by the development.		

7.1.3 Cumulative assessment

The cumulative impact of the proposed Impofu Grid Corridor together with the additional proposed linear infrastructure (introduced above in Section 4.3.1) would add to the existing baseline transformation of natural vegetation. The proposed Impofu Grid Corridor would potentially contribute to further cumulative impacts on habitat loss and fragmentation, as well as a negative impact on broad-scale ecological processes such as dispersal and climate change resilience. However, given that the footprint of the proposed overhead powerline is small, and the switching stations are proposed in a degraded environment, the cumulative impact is anticipated to be minor. Furthermore, given that the line crosses a variation of vegetation types and habitats, the local impact of each pylon is not anticipated have a significant impact, provided that the mitigation measures provided above are implemented.

7.1.4 No-Go assessment

Under the No-Go alternative, the power line would not be built and the route from the Impofu substation to the Chatty substation would not be affected. As such, the current use of these areas would continue unaffected. The power line would have little impact on land use and once built and would not affect surrounding land uses. As such, there is little difference between the construction of the power line and No-Go alternative on terrestrial ecology in the long-term, apart from the small amount of habitat loss that would occur due to the construction of the power line.

7.1.5 Terrestrial ecology impact statement

The sensitivity of the route corridor varies a lot and is driven primarily by the high degree of transformation that some areas have experienced and the contrasting high conservation value of many of the remaining intact areas. The impact within the transformed and highly degraded areas would be minimal and is not considered to be a significant concern for fauna and flora. There are also numerous high-value ecosystems along the route corridor that may be impacted. In many areas, impact to these features can likely be avoided through careful route planning. However, there are some constrained sections of the route, where some impact on high-value natural habitats is likely to occur. Areas of potential concern include those immediately east of the Gamtoos River as well as the area between Thornhill and the R334 where numerous plant species of concern occur . Due to the linear nature of the power line, the impact in any one place is low and significant habitat loss or impact within sensitive areas can be reduced through careful placement of the pylons and reducing the development footprint as much as possible.

A few fauna species of moderate concern are likely to be present within the corridor, but impact to their habitats would generally be low and a significant long-term impact on the local populations of any fauna of concern would be low. In terms of the vegetation, avoidance and careful route planning can significantly reduce the impact of the

development on vegetation. The route should align with the existing power line routes through the area as much as possible and new alignments should be avoided as far as possible as this generates a novel impact area.

Overall, there are no negative impacts associated with the development that cannot be mitigated to a low level.

7.2 Avifauna

According to the avifaunal specialist (Annexure D), due to their size and prominence, electrical infrastructure constitutes an important interface between wildlife and humans. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with powerlines. Other problems include electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, and displacement through disturbance and habitat destruction during construction and management activities.

Given the detailed avifaunal specialist assessments required for both the Impofu Grid Corridor and three Impofu Wind Farms, two different specialists were appointed to undertake the assessments. Mr Jon Smallie has focused his assessment on the wind farms, following the requirements of undertaking a 12-month pre-construction monitoring programme prior to his impact assessment. Mr Smallie was appointed for the wind farms based on his extensive experience working on the operational wind farms in the area (namely: Kouga Wind Farm, Jeffrey's Bay Wind Farm, and Gibson Bay Wind Farm).

Mr Chris van Rooyen was appointed to undertake the bird impact assessment for the Grid Corridor, given his extensive experience in the greater area towards Port Elizabeth. His experience in the area stretches from undertaking the pre-construction monitoring at many of the wind farms in the area, to undertaking strategic avifaunal research in the Kouga municipal area for the St Francis Kromme Trust in response to the various wind farm proposals. He has more than 20 years' experience in the management of wildlife interactions with electricity infrastructure and was head of the Eskom-Endangered Wildlife Trust Strategic Partnership from 1996 -2007; a co-operative management model that has received internal awards.

Mr Van Rooyen's specialist report is found in full in Annexure D.

7.2.1 Description of the environment

The avifaunal habitats over which the proposed Grid Corridor is located, ranges from low to very high sensitivity. There is a broad gradient from highly sensitive to least sensitive from west to east, with the habitat west of the Gamtoos River being significantly more sensitive than to the east of the Gamtoos River. The habitat descriptions are based largely on Van Rooyen and Froneman (2013), field observations (including a helicopter flight (see Section 4.3.1)), the Biodiversity Geographical Information Systems (BGIS) 2009 landcover database for the NMBM, and additional mapping using Google Earth satellite imagery. The identified bird habitat classes are summarised below in Table 28.

Table 28: Bird habitat classes identified in the initial assessment corridor

Bird habitat class	Description
Azonal	Inland and coastal vegetation which deviate from the typical surrounding zonal vegetation. Examples include freshwater wetlands, alluvial vegetation, saline vegetation, estuaries, sandy beaches and dunes.
Dams	Man-made impoundments, ranging in size from large state impoundments to small farm dams.
Pastures	Smutsfinger, Rhodes and witbuffel grass comprise tall pastures (30-60 cm) cultivated primarily for extensive beef production and are most prevalent in shale areas with an annual precipitation of 500–650 mm. Tall pastures are predominantly grown in areas that were cleared for wheat in the past and are kept clear through periodic removal of shrubs (every 3-4 years). These lands often take on the character of grassland with varying levels of shrubs. Rye-grass and kikuyu are defined as short pastures (5–30 cm tall) cultivated primarily for intensive dairy production in irrigated pivots, but also through dryland methods on sandy soils, particularly in areas with an average annual precipitation of around 850–950 mm. Maize pivots, which are grown as supplementary fodder, were also included under short pastures.
Forest	Includes both Afromontane and coastal forest. The tree-canopy cover in forests is continuous and mainly comprises evergreen tree species. Below the canopy,

Bird habitat class	Description
	vegetation is multi-layered. The tall dense trees result in little ground vegetation and a thick leaf litter.
Fynbos (including Renosterveld)	Dominated by low shrubs and is characterised by *restioid, ericoid* and *proteoid* vegetation components. Renosterveld is dominated by low shrubs and specifically Renosterbos (*Elytropappus rhinocerotis*) as the dominant species, with geophytes and some grasses.
Grassland	Occurs on hills and mountain slopes and may be partially derived from recent bush cutting and frequent fires combined with heavy grazing by livestock. Grassland habitat types differ from grassy fynbos in largely lacking *Restionaceae* and *Proteaceae*, also with only a few *Ericaceae* present. In its natural state the vegetation is dominated by true grasses, but a rich assembly of herbs can be present – especially soon after a fire. In the past these grasslands were probably largely retained by herbivores, with some interaction between herbivores and fires to maintain the graminoid component as the dominant plants. In many cases this process has collapsed and the graminoid component became overgrown with ericoid shrubs. The latter degraded condition creates the impression that the vegetation is a "grassy fynbos type".
Heavy alien degradation	Comprises areas where uncontrolled afforestation has taken place through the spread of invasive alien species of tree and shrub, particularly Australian *Acacia* species.
Plantation	Commercial afforestation, which is a specialised form of crop farming comprising mostly *Pinus* species.
Savanna	Comprises thorny *Acacia* trees and a grass understory, usually together with thicket elements.
Thicket	Comprises dense, closed shrubland with poorly developed grass cover. In the western section it is fragmented and depending on its location in the landscape it is mixed with other vegetation types e.g. savanna, forest or fynbos. In the eastern section it occurs in solid stands and is the dominant vegetation type around PE.
Urban and industrial	Includes towns, industrial areas, mines, dumping areas, recreational open spaces and roads.

The Impofu Grid Corridor does not overlap with any Important Bird Areas (IBAs). The closest IBA is the Swartkops Estuary - Redhouse and Chatty Saltpans IBA SA096, located at least 1.4 km east of the Chatty substation. The movement of avifauna associated with the IBA is expected to be along the Swartkops River, which runs in a north-westerly direction, away from the alternative alignments. A second IBA, the Maitland – Gamtoos Coast IBA SA097, runs parallel to the Grid Corridor approximately 2.5 -3.5 km away. Although this IBA contains up to 10% of the global population of African Black Oystercatchers *Haematopus moquini* which is significant, the movement of the birds is expected to be along the coastline, and therefore is unlikely to be impacted by the proposed Impofu Grid Corridor. Further inland, partially within the Grid Corridor the Mondplaas Ponds are located just off the N2 which is a coordinated waterbird count (CWAC) site. During the latest count[15], in January 2018, two Red Data species, African Marsh-harrier and Caspian Tern (see Figure 37), were recorded.

[15] ADU 2018. **http://cwac.adu.org.za/**

Figure 37: Red Database species, African Marsh-harrier (left)[16] and Caspian Tern (right)[17]

Red Data species which could potentially occur in the Grid Corridor are listed below in Table 29 and Table 30. For each species, the potential for occurring in a specific habitat class is indicated, as well as the type of impact (if any) that could potentially affect the species in the Grid Corridor. A comprehensive list of all birds that could potentially occur within the Grid Corridor is included in Appendix 2 of the specialist report (Annexure D).

[16] Image source: Ian Wood, IBC1089958. Accessible at hbw.com/ibc/1089958
[17] Image source: Dick Daniels/Wikimedia (CC BY-SA 3.0)

Table 29: Red Data species that could potentially occur in the Grid Corridor (Area West of Gamtoos River)

Species	Taxonomic name	Reporting rate	Global status[18] (IUCN, 2017)	Local status[19] (Taylor *et al*, 2016)	Habitat class												Impact			
					Azonal	Dams	Pastures	Forest	Fynbos	Cliffs	Grassland	Alien degradation	Plantation	Savanna	Thicket	Urban/industrial	Collisions	Disturbance	Habitat destruction	Electrocution
Crane, Blue	*Anthropoides paradiseus*	37.35	VU	NT		x	x				x						x	x	x	
Harrier, Black	*Circus maurus*	6.59	VU	EN			x		x		x						x	x	x	
Secretarybird	*Sagittarius serpentarius*	4.7	VU	VU			x		x		x			x			x	x	x	
Eagle, Martial	*Polemaetus bellicosus*	2.52	VU	EN		x	x		x			x		x			x	x	x	x
Korhaan, Southern Black	*Afrotis afra*	0.21	VU	VU					x								x	x	x	
Bustard, Denham's	*Neotis denhami*	34.69	NT	VU			x		x		x						x	x	x	
Flamingo, Lesser	*Phoenicopterus minor*	1.54	NT	NT	x	x											x	x		
Eagle, African Crowned	*Stephanoaetus coronatus*	0.98	NT	VU				x					x				x	x	x	x
Duck, Maccoa	*Oxyura maccoa*	0.49	NT	NT		x											x			
Harrier, Pallid	*Circus macrourus*	0.21	NT	NT			x				x			x			x		x	
Falcon, Red-footed	*Falco vespertinus*	0.07	NT	NT			x				x									
Marsh-harrier, African	*Circus ranivorus*	25.02	LC	EN	x		x		x		x						x	x	x	
Flamingo, Greater	*Phoenicopterus ruber*	16.26	LC	NT	x	x											x	x		
Korhaan, White-bellied	*Eupodotis senegalensis*	10.58	LC	VU			x		x		x			x			x	x	x	
Kingfisher, Half-collared	*Alcedo semitorquata*	3.43	LC	NT	x													x		
Falcon, Lanner	*Falco biarmicus*	2.8	LC	VU			x		x	X	x	x		x			x			
Eagle, Verreaux's	*Aquila verreauxii*	0.63	LC	VU					x (Mtn)	X							x			x
Rock-jumper, Cape	*Chaetops frenatus*	0.49	LC	NT					x (Mtn)	X								x		
Roller, European	*Coracias garrulus*	0.49	LC	NT										x	x					
Finfoot, African	*Podica senegalensis*	0.14	LC	VU	x													x		
Flufftail, Striped	*Sarothrura affinis*	0.14	LC	VU			x		x		x									
Painted-snipe, Greater	*Rostratula benghalensis*	0.14	LC	NT	x													x		
Grass-owl, African	*Tyto capensis*	0.07	LC	VU			x				x						x	x	x	

[18] EN – Endangered; VU – Vulnerable; NT – Near-threatened; LC – Least Concern

Table 30: Red Data species that could potentially occur in the Grid Corridor (Area East of Gamtoos River)

Species	Taxonomic name	Reporting rate	Global status[19] (IUCN, 2017)	Local status[19] (Taylor *et al*, 2016)	Habitat classes												Impact			
					Azonal	Dams	Pastures	Forest	Fynbos	Cliffs	Grassland	Alien degradation	Plantation	Savanna	Thicket	Urban/industrial	Collisions	Disturbance	Habitat destruction	Electrocution
Flamingo, Greater	*Phoenicopterus ruber*	34	LC	NT	x	x											x			
Flamingo, Lesser	*Phoenicopterus minor*	18	NT	NT	x	x											x			
Marsh-harrier, African	*Circus ranivorus*	11	LC	EN	x		x		x		x						x	x	x	
Kingfisher, Half-collared	*Alcedo semitorquata*	5.8	LC	NT	x													x		
Falcon, Lanner	*Falco biarmicus*	4.3	LC	VU			x		x	x	x	x		x			x			
Bustard, Denham's	*Neotis denhami*	3.2	NT	VU			x		x		x						x	x	x	
Harrier, Black	*Circus maurus*	2.3	VU	EN			x		x		x						x	x	x	
Eagle, African Crowned	*Stephanoaetus coronatus*	2.3	NT	VU				x					x				x	x	x	x
Duck, Maccoa	*Oxyura maccoa*	1.5	NT	NT		x											x			
Secretarybird	*Sagittarius serpentarius*	1.4	VU	VU			x		x		x			x			x	x	x	
Eagle, Martial	*Polemaetus bellicosus*	0.9	VU	EN		x	x		x		x	x		x			x	x	x	x
Grass-owl, African	*Tyto capensis*	0.6	LC	VU			x				x						x	x	x	
Crane, Blue	*Anthropoides paradiseus*	0.5	VU	NT		x	x				x						x	x	x	
Korhaan, Southern Black	*Afrotis afra*	0.4	VU	VU					x								x	x	x	
Blackcap, Bush	*Lioptilus nigricapillus*	0.1	NT	VU				x							x					
Eagle, Verreaux's	*Aquila verreauxii*	0.1	LC	VU					x (Mtn)	x							x			x
Korhaan, Karoo	*Eupodotis vigorsii*	0.1	LC	NT					x								x	x	x	
Pelican, Great White	*Pelecanus onocrotalus*	0.1	LC	VU		x											x	x		
Roller, European	*Coracias garrulus*	0.1	LC	NT										x	x					

[19] EN – Endangered; VU – Vulnerable; NT – Near-threatened; LC – Least Concern

Based on the knowledge of the area, and the understanding of how birds interact with large electrical infrastructure, the avifaunal specialist provided input into the sensitivity mapping that was undertaken during the Screening Phase to identify areas that should be avoided in the alignment of the Impofu Grid Corridor. The following inputs were provided:

Table 31: Avifaunal sensitivity classifications considered during Screening

Level of sensitivity	West of Gamtoos River	East of Gamtoos River
No-Go	Active Martial Eagle nest (2 km buffers)[20] Black Harrier communal roost (2 km buffer) Denham's Bustard display sites (1 km buffer)	Important Bird Areas (IBAs)
Very High	Artificial waterbodies (500 m buffer)	Artificial waterbodies (500 m buffer)
High	Pastures (actual area)	N/A
Moderate	Fynbos (actual area)	Pastures and Fynbos (actual area)
Low	Forest Heavy Alien Degradation Savanna Thicket Urban and industrial	Thicket Heavy Alien Degradation Urban and industrial Forest

An exception to the No-Go areas was provided where the specialist has assessed the specific area and approved it or the proposed alignment follows the alignment of an existing overhead powerline, given that this would result in a lower negative impact than across a pristine environment. (Refer to Section 10 in Avifaunal Report; Annexure D).

7.2.2 Impact assessment with mitigation measures

The proposed grid connection infrastructure is likely to have a range of direct and indirect impacts on avifauna. These are likely to include:

- Displacement of Red Data species due to disturbance associated with the construction of the powerline (-);
- Displacement of Red Data species due to habitat transformation associated with the construction of the powerline (-);
- Electrocution of Red Data species on some of the proposed pylons on the 132kV powerline (-); and
- Mortality of Red Data species due to collisions with the 132kV powerline (-).

Table 32: Displacement due to construction related disturbance

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	During the construction and decommissioning phases of the project, there will be an increase of vehicular and personnel movement which may disturb the resident avifauna. Construction activities could be a source of disturbance and could lead to a temporary or even permanent abandonment of nests. If the construction interrupts breeding cycles at a critical time, this could harm the slower reproducing species (such as large eagles) more so than faster reproducing species (e.g. passerines). Species with medium risk of disturbance within their associated habitats include the African Marsh-Harrier, Black Harrier, Secretarybird, African Grass-owl, Blue Crane, Southern Black Korhaan, and White-bellied Korhaan. Other species with a low/ negligible risk are included in Table 6 of the Avifaunal specialist report (Annexure D). Although the impact cannot be avoided through mitigation (other than avoidance which has taken place), except in the case of very specific instances, e.g. an individual Martial Eagle nest, the significance of the displacement due to the disturbance is tempered by the temporary nature of the impact.			

[20] In the case of the Martial Eagle No-Go areas, a nest was subsequently discovered by Jon Smallie, the bird specialist doing the pre-construction monitoring at the proposed wind farm site, next to the Impofu Dam. A no-go buffer zone of 1.5 km is deemed to be adequate as the nest is in a deep kloof, out of line of sight of any future construction activities

	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Short term	Brief
Extent	Very limited	Very limited
Intensity	High	Moderate
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	Probable	Probable
Confidence	Medium	Medium
Reversibility	High	High
Resource irreplaceability	Low	Low

Mitigation measures

- Construction and decommissioning activity should be restricted to the immediate footprint of the infrastructure.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of Red Listed species.
- Measures to control noise should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned.
- The final powerline alignment must be inspected on foot by the avifaunal specialist prior to construction to ascertain if any Red Listed species nests are present. All relevant detail must be recorded i.e. species, coordinates and nest status. Should any nests be recorded, it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain when and where such breeding Red Data species could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle, once it has been established that a particular nest is active. During decommissioning, all above-ground infrastructure such as pylons should be removed from site. Below-ground infrastructure such as pylon foundations can be left in place if it does not pose a risk, as removal of such infrastructure may generate additional disturbance and impact. This should be in accordance with the facilities' decommissioning and recycling plan, and as per the agreements with the landowners concerned.

Table 33: Displacement due to habitat transformation

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	During the construction phase of the grid connection infrastructure, some habitat destruction and transformation inevitably takes place through the necessary removal of vegetation and levelling of substation yards. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude and/or switching stations through transformation of habitat, which could result in temporary or permanent displacement. Whilst the footprint required for this sort of infrastructure can be small (in absolute terms), the more significant consequence of this impact is the permanent nature of the fragmentation caused by its linear nature. The displacement effect associated with the fragmentation of the habitat cannot be mitigated. The impact of the proposed switching stations and collector switching station by contrast are predicted to be low given the small footprint located within either short pastures or fynbos. Species with medium risk of displacement due to habitat transformation within their associated habitats include Denham's Bustard, Black Harrier, Secretarybird and White-			

	bellied Korhaan. Other species with a low/ negligible risk are included in Table 5 of the Avifaunal specialist report (Annexure D).	
	Without mitigation	**With mitigation**
Nature	Negative	Negative
Duration	Permanent	Permanent
Extent	Regional	Regional
Intensity	High	High
Significance	**MINOR (-)**	**MINOR (-)**
Probability	Probable	Probable
Confidence	High	High
Reversibility	Low	Low
Resource irreplaceability	Medium	Medium
Mitigation measures		
• Construction activity should be restricted to the immediate footprint of the infrastructure. • Access to the remainder of the site should be strictly controlled to prevent unnecessary destruction of habitat. • Measures to control noise should be applied according to current best practice in the industry. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. • The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned		

Table 34: Mortality due to electrocution

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. The electrocution risk is largely determined by the pylon/ tower design and the size of the bird. The avifaunal specialist has highlighted that the species at highest risk to electrocution are Martial Eagle, African Crowned Eagle, African Fish Eagle and Verreaux's Eagle and has detailed the type of electrocution risk with each of the six pylon types considered for the Impofu overhead powerline. **Option 1** (Monopole intermediate, double circuit with twin tern conductors) and **Option 2** (Monopole strain (0º- 30º angle) double circuit with twin tern conductor): the risk of phase to earth electrocution is present in the scenario where the bird chooses to perch on one of the horizontal stand-off insulators. It is unlikely to be a regular occurrence, and mitigation is not required. **Option 3** (Monopole strain (30º- 90º angle) double circuit with twin tern conductor): the pole configuration is such that it is unlikely that a bird will bridge the air gap between live components and/ or live and earthed components and therefore no species are at risk and mitigation is not required. **Option 4** (Monopole strain (30º- 90º angle) 2 x single circuit with twin tern conductor) and **Option 5** (triple pole structure with twin tern conductor): the risk of phase to earth electrocution is limited to a scenario where the bird chooses to perch on one of the horizontal stand-off insulators. This may happen more regularly than with the intermediate poles, as there is unrestricted access to the insulators, which may be viewed as "branches". With the input of the grid engineer, mitigation is provided below and should be included in the design of the pylon for construction. **Option 6** (245A self-supporting tower): there is no electrocution risk associated with this tower and therefore no mitigation is required.			
	Without mitigation		**With mitigation**	

Nature	Negative	Negative
Duration	On-going	On-going
Extent	Very limited	Very limited
Intensity	Low	Negligible
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	Probable	Rare/ improbable
Confidence	High	High
Reversibility	High	High
Resource irreplaceability	Medium	Low
Mitigation measures		
The following measures are required only for **monopole option 4 and 5** (Section 4.4.2). No mitigation is required for the other monopole types. • Bird perch to be added to the pole top. • Bird discouragers to be fitted above the stand-off insulators to prevent a large bird from attempting to perch on the insulators. This measure is subject to the electrical engineers confirming that the basic insulation level of the pole will not be compromised.		

Table 35: Mortality due to collisions

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Collisions are probably the bigger threat posed by powerlines to birds in southern Africa. Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with powerlines. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because such a huge number of variables play a role in determining the risk, for example weather, rainfall, wind, age, flocking behaviour, power line height, light conditions, topography, population density and so forth. The most likely candidates for collision mortality on the proposed Impofu 132Kv overhead powerline are Denham's Bustard, Maccoa Duck, Secretarybird and Blue Crane with a high magnitude of risk. The following species are of medium magnitude of risk: Greater Flamingo, Lesser Flamingo, African Marsh-Harrier, Black Harrier, African Crowned Eagle, Martial Eagle, African Grass-owl, Southern Black Korhaan, White-bellied Korhaan and Verreaux's Eagle. The risk associated with Flamingos and Blue Crane is aggravated due to their habit of flying in low light conditions, e.g. night and dusk and dawn, respectively. Collision mortality of Red Data species is likely to be the most significant impact of the proposed power line, especially in the section west of the Gamtoos River. Mitigation in the form of Bird Flappers could reduce the impact (by up to 57 %) for most avifauna, but it will have limited effectiveness for Denham's Bustard.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going		On-going	
Extent	Local		Local	
Intensity	Very high		High	
Significance	**MODERATE (-)**		**MINOR (-)**	
Probability	Almost certain/ Highly probable		Probable	
Confidence	High		High	
Reversibility	Medium		Medium	

Resource irreplaceability	Medium	Medium
Mitigation measures		
• High risk sections of power line must be identified by a qualified avifaunal specialist during the walk-through phase of the project, once the alignment has been finalised. If power line marking is required, bird flight diverters (BFD) must be installed on the full span length on each of the conductors according to the Eskom Guidelines (see Appendix 4 of the avifaunal report). Light and dark colour devices must be alternated so as to provide contrast against both dark and light backgrounds respectively (see Appendix 5 of the avifaunal report). These devices must be installed as soon as the conductors are strung. In specific instances, i.e. high-risk waterbodies (to be identified during the walk-through phase), the new experimental PLP LED (light emitting diode) BFD is recommended to increase the efficacy of the device during low light conditions for waterbirds and cranes.		

7.2.3 Cumulative assessment

The planned powerlines (listed in Table 12 in the avifaunal specialist report and Section 4.3.1 above), together with the proposed Impofu Grid Connection will constitute around 186km of new HV lines, in addition to the approximately 600km of existing HV lines in the initial assessment area. (The broader area here is important to consider given the mobility of avifauna). This constitutes an increase of approximately 30% to the existing HV grid in the broader area. However, many of the existing lines run in parallel, and it is planned to also locate the new Impofu Grid Connection next to existing lines as far as possible. This materially reduces the impacts on avifauna because lines running parallel effectively constitute a single impact as far as birds are concerned. It is therefore important not to view the 30% increase in the HV network as a similar-sized increase in the collision or displacement risk to avifauna. The mitigation planned for the new lines will further reduce the impact of the lines on avifauna, building on the mitigation required for the cumulative projects (see Table 12 in avifaunal specialist report, Annexure D).

It is possible that while the cumulative impact on disturbance and habitat loss will be increased with the proposed Impofu overhead powerline, the impacts associated with collision might be lessened in areas where the proposed Impofu Grid Connection overhead line runs adjacent to the existing powerline as the increase in infrastructure will make it more visible.

7.2.4 No-Go alternative

Should the proposed Grid Connection not be constructed, the ecological integrity of the area as it currently exists will be maintained as far as avifauna is concerned. No additional negative impacts on avifauna are foreseen as a result of the development not taking place.

7.2.5 Avifauna impact statement

The proposed Impofu Grid Connection infrastructure will have several impacts on avifauna, ranging from moderate to minor negative which, in most instances could be reduced to minor or negligible negative impact through appropriate mitigation. There will however be a limited number of residual impacts which will remain minor negative despite the implementation of mitigation measures. It is important to note that this assessment was considered on the 2 km Grid Corridor which already takes cognisance of the avoidance of highly sensitive and No-Go areas identified in the Screening Phase.

Assuming that the proposed Impofu Grid Connection will be routed mostly along existing lines, and assuming that all the other mitigation measures will be implemented on all the planned powerlines as recommended by the avifaunal specialists, it is concluded that the construction of these lines will not materially increase the impact of the existing powerline network on the avifauna in the area.

It is concluded that the construction and operation of the proposed 132kV powerline should result in manageable impacts on Red Data avifauna, provided the recommended mitigation measures are diligently implemented, including the monitoring requirements that will be detailed in the EMPr in the Draft BAR.

7.3 Aquatic Ecology

As highlighted above in Section 6.5.2, the area in which the proposed Impofu Grid Corridor is located is currently facing severe drought. It is predicted in the Eastern Cape Climate Change Response Strategy that the province will experience more hot days and heat waves, leading to more drought and the increased frequency of fire danger (such as the 2017 fire near Woodridge High School). Increased storm severity and extreme weather events will lead to an increased inundation and loss of coastal land, estuaries and wetlands; as well as intense rain and flooding. Higher temperatures will also see an increase in evaporation and therefore reduced soil moisture, reduced runoff and river base flow. These changes would impact the water availability of the area, as well as future drainage patterns. It is therefore important that existing natural wetland systems be protected.

Given his specialisation in ecology and conservation importance rating of inland habitats, wetlands, rivers and estuaries, as well as his extensive experience of the affected area (as evidenced by the projects included in his CV (Appendix 2 of his report)), Dr Brian Colloty was appointed to undertake a specialist aquatic assessment for the proposed Impofu Grid Connection. The assessment was based on initial information collected during site visits in September, November and December 2017, as well as more detailed investigations in March, May 2018 and July 2019, while adhering to the assessment criteria contained in the DWAF 2005 / 2007 delineation manuals and the Wetland Classification System (see Appendix 1 in the aquatic report- Annexure D). Several national spatial databases and project specific wetland / waterbody spatial database layers were also used in this phase of the assessment.

The timing of his assessments coincided after a period of spring and early summer rainfall. However, given the specialists understanding of the landscape, and site visits to the area during other years and seasons, the confidence in this assessment is not impacted by the season.

7.3.1 Description of environment

The proposed Impofu Grid Corridor occurs within the following catchments within the South Eastern Coastal Belt Ecoregion located within the Mzimvubu-Tsitsikamma Water Management Area (refer to Figure 38):

1. K80F – Klipdrift River
2. K90D – Krom / Diep rivers
3. K90E – Geelhoutboom River
4. K90F – Seekoei / Swart rivers
5. K90G - Kabeljous River
6. L90C – Gamtoos River
7. O99S – Van Stadens
8. M20B – Van Stadens / Maitlands rivers
9. M10C - Brak River
10. M10D – Swartkops / Chatty rivers

These catchments are characterised by perennial, non-perennial watercourses, drainage lines and estuary (Gamtoos) associated with these mainstem systems listed above.

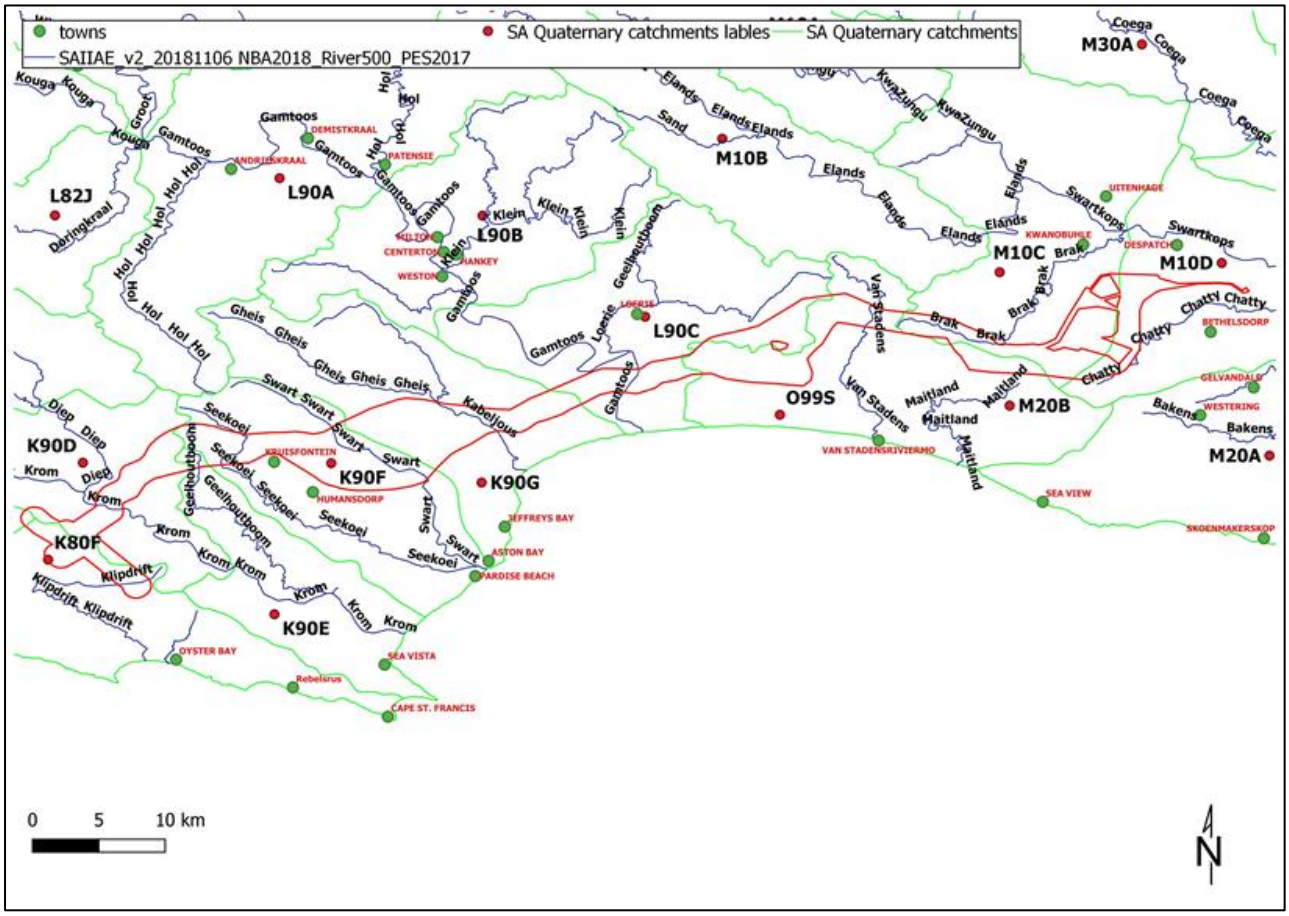

Figure 38: Quaternary catchments and mainstem rivers in the region (NFEPA and DWS, in Colloty 2019)

In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all of the watercourses within the Grid Corridor have been assigned a condition score ranging from C to E/F (Nel *et al*, 2011), indicating that they are mostly moderately to largely modified but with some biological significance. This is largely due to the high degree of transformation that has taken place within the catchments of these systems through conversion of the natural fynbos to pasture.

The only remaining riparian zones are located within the steep river valleys associated with the study area, most of which have been lost to alien tree invasion, while several wetlands remain as these areas are too wet for agricultural production or grazing. The only exceptions being the Brak, Swartkops and Chatty river reaches that were rated as E/F, i.e. no longer have any natural function. This is due to the industrial development, large scale transformation for housing and the associated illegal dumping and leaking sewers that have affected these systems.

According to the NFEPA wetland database, and the National Wetland Inventory database being updated by Council for Scientific and Industrial Research (CSIR) / South African National Biodiversity Institute (SANBI) (currently version 5.2) several wetlands could occur within the study area (refer to figure 2a-e in the Aquatic report). These were classified as follows, and have been confirmed during this assessment[21]:

1. Valley bottom wetlands – unchannelled;
2. Valley bottom wetlands – channelled;
3. Endorheic pan / depressions;
4. Artificial or man-made systems such as dams, reservoirs / irrigation balancing dams; and
5. Gamtoos Estuary.

[21] The water body delineation and classification was conducted using the standards and guidelines produced by the Department of Water Affairs and Forestry (DWAF, 2005 and 2007) and SANBI (SANBI, 2009 and Ollis *et al*, 2013). Where necessary due to changes over time, the wetlands will be re-digitised at a finer scale and / or reclassified, once the final alignment has been confirmed.

Figure 39 to Figure 42 below indicate the typical watercourses observed within the site, separated into sections for scale. Any activities within these areas or the 32 m buffer (or the 1:100 floodline, whichever is the greatest) of the rivers and drainage lines or 500 m from the boundary of the wetlands will require a Section 21 c and i Water Use License (mostly likely a General Authorisation (GA) if all other Section 21 uses are below the GA thresholds). In this regard it is recommended that existing tracks and roads as far as possible are used to minimise any new impacts on these systems, while all pylons are placed 32 m from a watercourse and 50 m from a wetland.

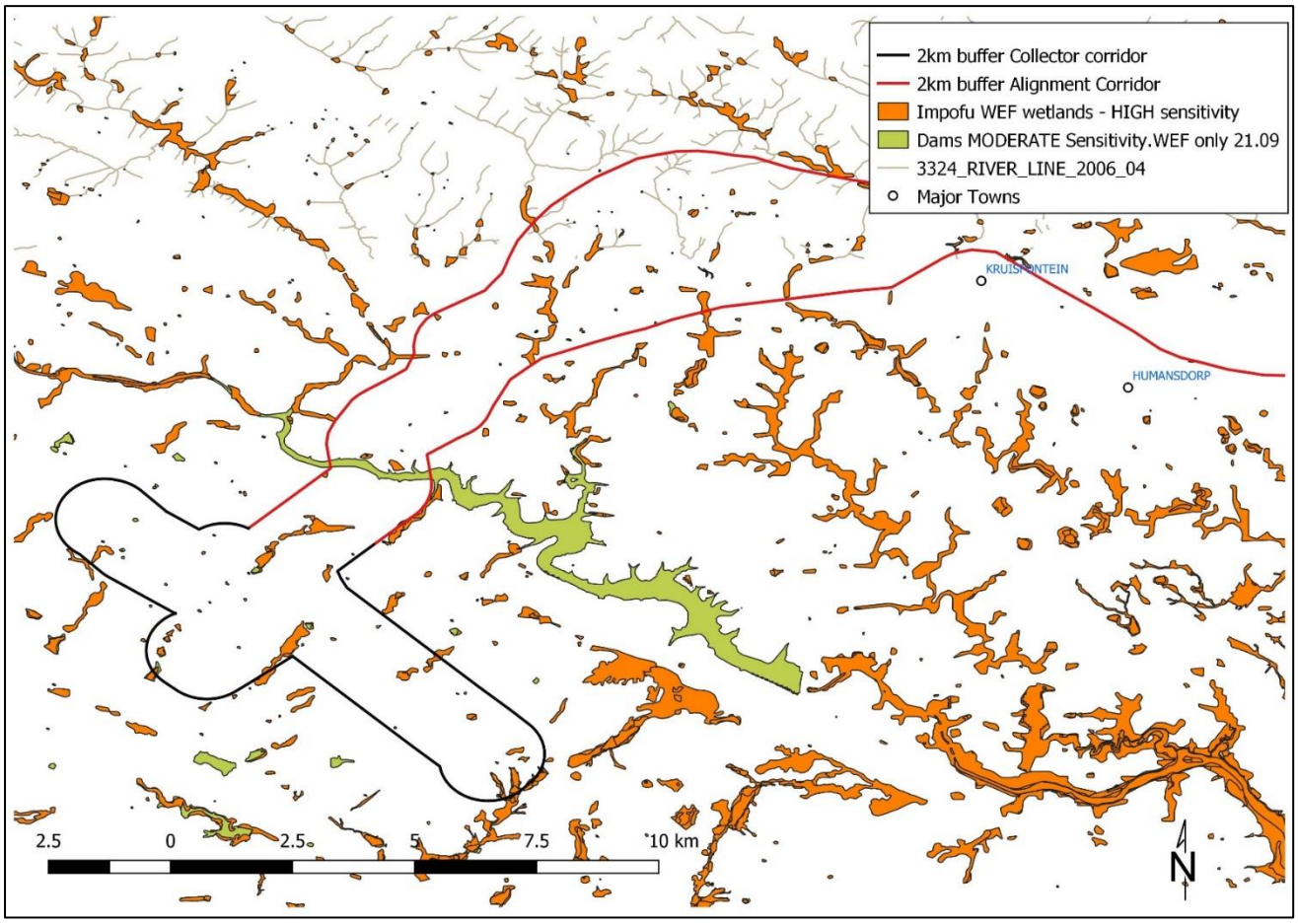

Figure 39: Confirmed aquatic waterbodies observed during the assessment (Colloty, 2019)

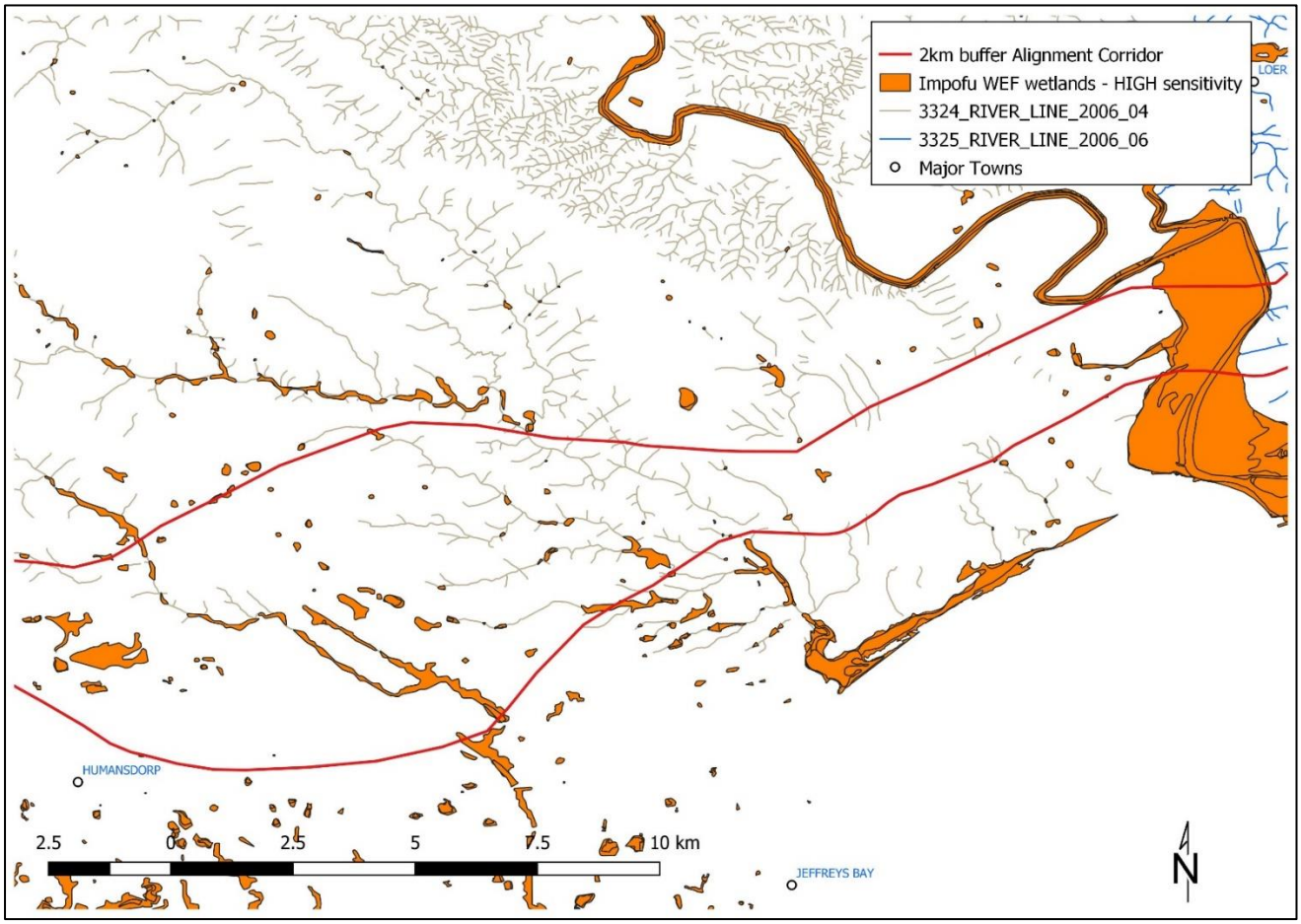

Figure 40: Confirmed aquatic waterbodies observed during the assessment (Colloty, 2019)

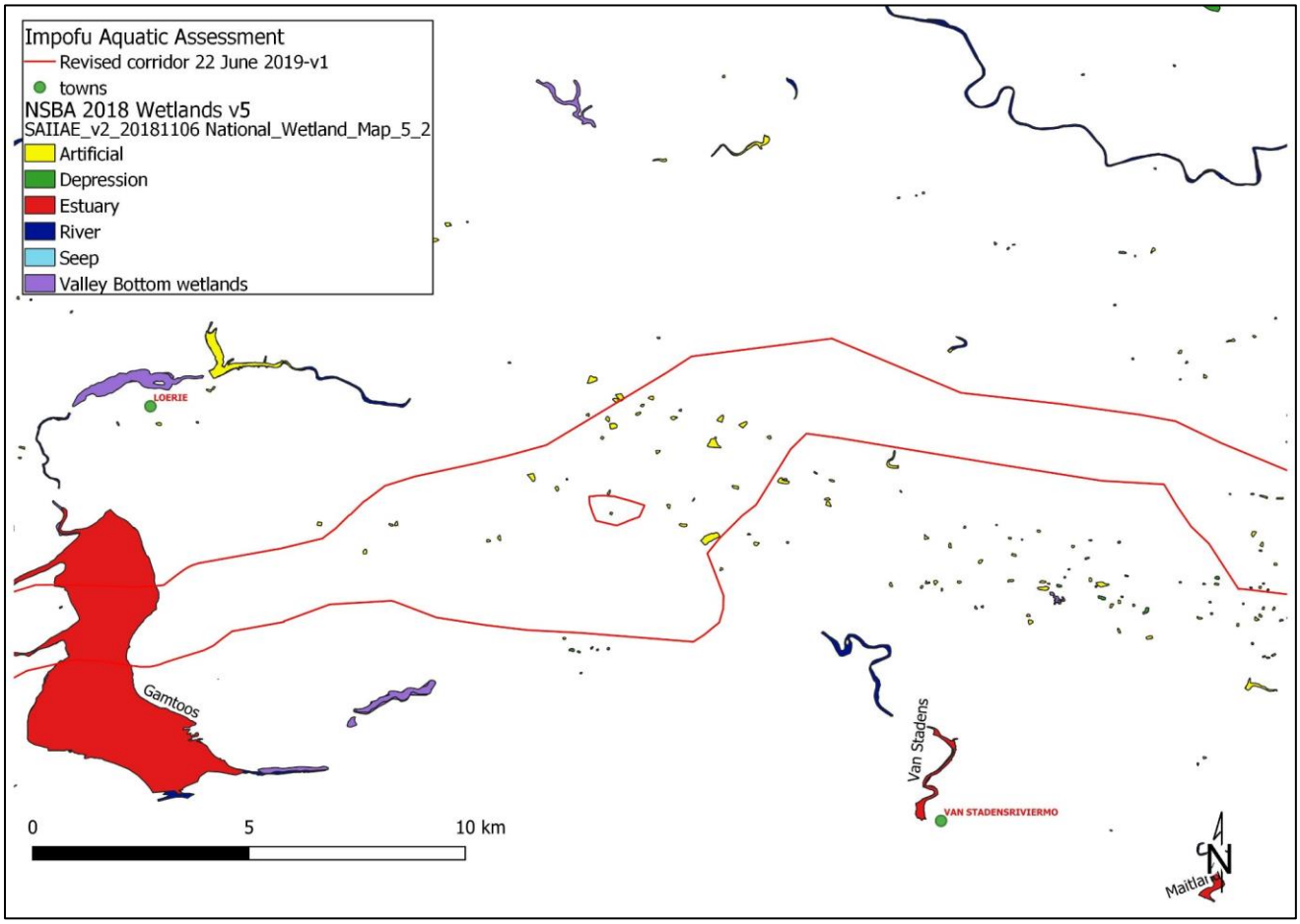

Figure 41: Confirmed aquatic waterbodies observed during the assessment. The Gamtoos Estuary and remaining intertidal saltmarshes indicated by the red arrows (Colloty, 2019)

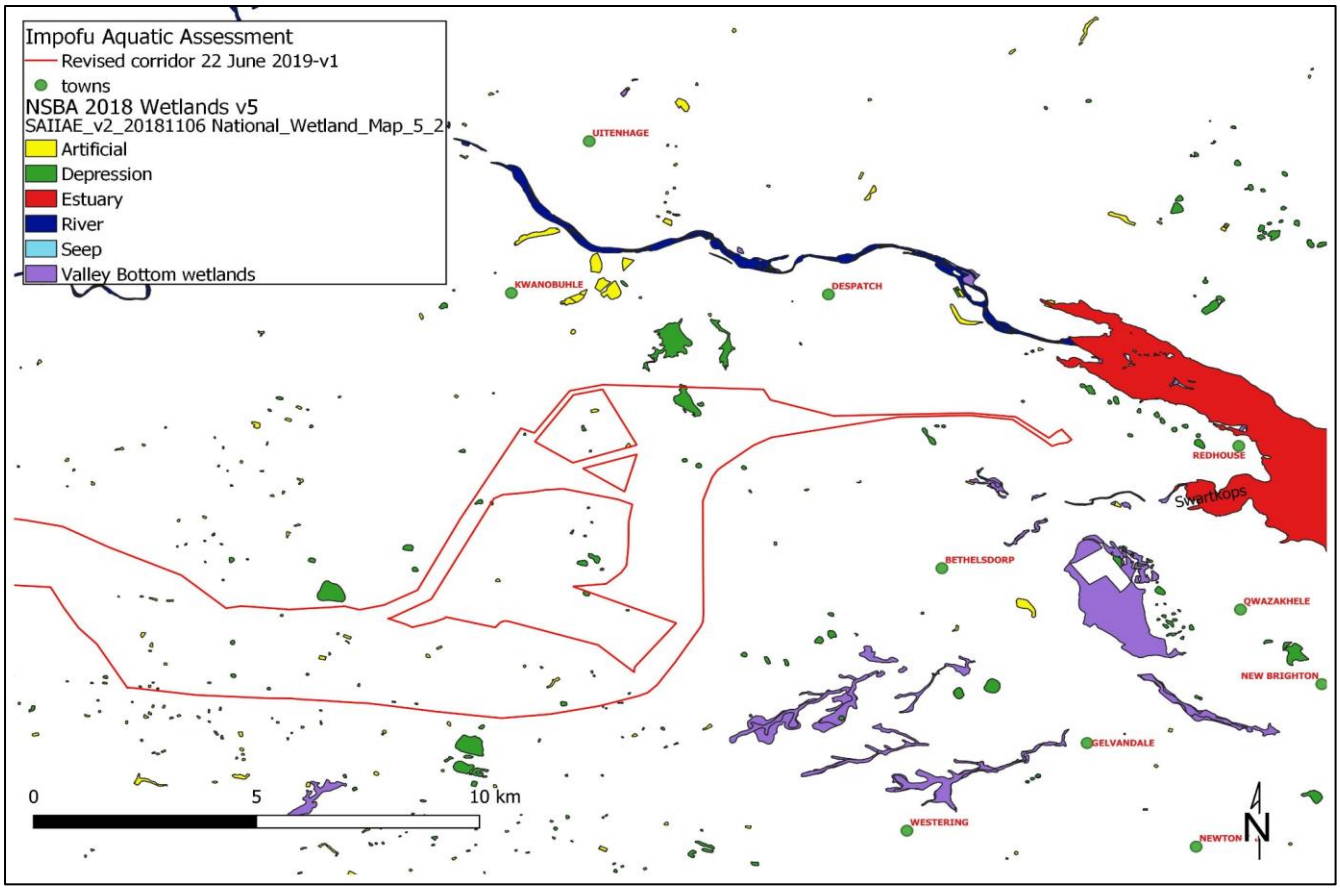

Figure 42: Confirmed aquatic waterbodies observed during the assessment (Colloty, 2019)

The proposed Grid Corridor would have limited impact on the aquatic environment if any of the proposed structures regardless of type, avoid the delineated wetlands (with 50 m buffer applied to each), and water courses by making use of existing tracks or roads as far as possible and where new access roads are required, sensitive aquatic areas must be avoided. During the screening phase of this assessment, the aquatic specialist therefore provided the following No-Go requirements for the proposed grid infrastructure.

- Watercourses with 50 m buffer;
- Wetlands with 50 m buffer; and
- Artificial dams.

No-Go areas do not permit any pylons within wetlands or waterbodies (watercourses and dams) and their associated buffers (but the power line can cross overhead). Similarly, no new tracks / roads through watercourses / dams are allowed and only existing access tracks may be used.

The only exception being for small drainage lines and only after micro-siting / walkdown has taken place and found acceptable by the aquatic specialist, together with compliance and a rehabilitation / monitoring plan (with any rehabilitation / monitoring conditions proposed by the specialist).

7.3.2 Impact assessment with mitigation measures

Impacts on aquatic ecology can be expected where a component of the project (new roads or access tracks and pylon footings) is constructed in a waterbody (watercourse or wetland). Such infrastructure would require the clearance of vegetation with an associated risk of erosion and sedimentation, altering catchment areas, as well as potential impacts to regional hydrology.

During screening, some potential mitigation measures were already identified in the form of avoidance, some of these can also be applied when more detailed design is undertaken:

- A strong preference to follow existing alignments or servitudes, with established access tracks or roads. This would then avoid the cumulative impact of clearing additional vegetation for access roads / tracks and the required servitude.
- Avoid upper catchments or important catchment divides that pose a risk with regard to erosion and sedimentation. Based on previous experience conducted within the study area for Eskom, new tracks with steep grades pose a risk to the aquatic environment and have resulted in a greater of degree of erosion. These then required the contractors to provide additional protection and rehabilitation were required.
- Avoid, rather than span any natural wetlands, particularly pans / depressions where possible. Pans have a high sensitivity with regard to power lines, i.e. pylon footings and tracks alter a significant portion of the wetland's catchment.
- Avoid steep river valleys, with intact riparian vegetation, that would require new tracks which presents a risk with regard to erosion and sedimentation even in the absence of any direct aquatic environments.

The proposed grid infrastructure may have the following direct and indirect impacts on aquatic ecology:

- Loss of aquatic species of special concern (-)
- Wetland loss as natural wetlands were observed (-)
- Loss of riparian systems and water courses (-)
- Impact on aquatic systems through the possible increase in surface water runoff on form and function - Increase in sedimentation and erosion (-)
- Potential impact on localised surface water quality (-)

However, given that the placement of pylons will already be influenced by the above-mentioned No-Go areas (avoidance), it is anticipated that the overall impacts with mitigation would be low to none. The specialist has indicated that this must be confirmed during a post approval walkdown or inspection of the final pylon positions and access routes. Therefore, only the last two impacts listed above are assessed by the specialist here.

Table 36: Potential impacts on localised water quality

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	During construction and decommissioning, and to a negligible degree the operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) associated with site-clearing machinery and construction and operational activities could be washed downstream via the ephemeral systems. This has the potential to affect the surrounding biota. However, mitigation measures listed below will considerably reduce the significance of the impacts.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term		Brief	
Extent	Limited		Very limited	
Intensity	High		Very low	
Significance	**MINOR (-)**		**NEGLIGIBLE (-)**	
Probability	Likely		Probable	
Confidence	High		High	
Reversibility	Medium		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
• All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be more than 32 m from any demarcated water courses and 50 m from a wetland. • Chemicals used for construction must be stored safely on site and surrounded by bunds. Chemical storage containers must be regularly inspected so that any leaks are detected early. • Littering and contamination of water sources during construction must be prevented by effective construction camp management. • Emergency plans must be in place in case of spillages onto road surfaces and water courses. • No stockpiling should take place within a water course. • All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. • Stockpiles must be located away from river channels. • The construction camp and necessary ablution facilities meant for construction workers must be beyond the 32 m or 50 m buffers described previously, as applicable.				

Table 37: Increase in sedimentation and erosion

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	Clearing of vegetation and an increase in hard surface areas such as the switching stations, or new roads, will result in the concentration of surface water flows. These higher volume flows, with increased velocity may result in downstream erosion and sedimentation and stormwater management should therefore be considered.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term		Medium term	
Extent	Local		Limited	
Intensity	Moderate		Very low	

Significance	MINOR (-)	NEGLIGIBLE (-)
Probability	Probable	Unlikely
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Low	Low
Mitigation measures		
Switching stations • A stormwater management plan must be developed post EA, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. This should then be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and reno mattresses) and the re-vegetation of any disturbed areas.		

7.3.3 Cumulative assessment

It is unlikely that the proposed Impofu grid infrastructure would add more than a minor negative impact on the aquatic ecology in addition to the proposed additional infrastructure (Section 4.3.1) in the region, given that existing access routes will be used where possible, and other impacts such as erosion or sedimentation would be small scale and localised when considering the overall state of the aquatic environments.

The confidence in this assessment is high considering Dr Colloty was also the aquatic specialist appointed on all three of these existing projects (see Section 4.3.1), which included the delineation of all the waterbodies and their respective buffers, locating the towers and any new access routes away from these. This was also then confirmed during a walk down process of each individual tower for each of these lines.

7.3.4 No-Go assessment

Should the proposed development not be constructed, it is assumed that the current land use (agriculture and urbanisation) would continue to increase in intensity. As seen on several occasions during the site visits, this could lead to an increase in the number of irrigation pivots, or land being cleared or converted to grazing, or for urbanisation.

Thus, continued clearing as well as other impacts such as water abstraction and changes to water quality (agricultural return flow or urban effluent), would be seen as a High negative impact significance in the region, as the number of wetlands lost, and changes to streams / rivers noted over time has resulted in a deterioration of these systems.

7.3.5 Aquatic impact statement

According to the aquatic specialist, if no pylons are located within the waterbodies and watercourses shown (Figures 39-42) the overall impacts with mitigation would likely be low to none, based on the assumption that existing tracks, cattle pathways and roads are used as access routes as far as possible and where new access roads are required they must avoid sensitive aquatic areas and all erosion mitigation measures recommended in the aquatic report (Annexure D) (and included in this BAR and EMPr) must be effectively implemented.

It is further recommended that a comprehensive rehabilitation plan be implemented from the project onset within areas of disturbance (inclusion of buffers) to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMPr preparation. The walkdown is required as the final pylon positions (and thus associated access routes) could not be provided at this point, thus it would be important to evaluate in terms of the aquatic environment and evaluate the need for a Water Use License / GA for these areas as well as populate the required DWS Risk Assessment matrix.

Furthermore, should this project be authorised and proceed, areas impacted by necessary access tracks may present an opportunity. As identified in the assessment of the No-Go alternative (Section 7.3.4), the natural watercourses on site are likely to degrade in the future, based on the historical and current land uses, even if this development does not go forward. A positive contribution to the local area could be made if rehabilitation is initiated in areas that have been impacted upon by the proposed infrastructure. This was effectively shown in the post construction follow-up of the Melkhout-Dieprivier line, where steep access tracks were created, which then resulted

in eroded areas. The contractor returned to reshape these areas, and ensure revegetation takes place (reseeding was required in certain areas).

7.4 Socio-economic

The socio-economic context of the project includes both the environment within the proposed corridor as well as the policy and planning framework, which was described above in Section 2 and Section 6.6. Locally based, Urban-Econ Development Economists were appointed to undertake a specialist Socio-Economic Impact Assessment as part of the BA process (included in Annexure D).

7.4.1 Description of environment

The proposed Impofu Grid Corridor begins in the Koukamma Local Municipality[22] and runs through the Kouga Local Municipality, both local municipalities fall within the larger Sarah Baartman (formally Cacadu) District Municipality, and then into the Nelson Mandela Bay Metropolitan Municipality (NMBM).

The Kouga Local Municipality covers an area of roughly 2,670 km^2, making it the second smallest municipality in the district, accounting for only 4.5 % of the total surface area of the Sarah Baartman District Municipality. Although, with an estimated population of 95,270 in 2016, it is the most populous municipality in the district. The municipality is bordered by the Dr Beyers Naudé and Sundays River Valley Local Municipalities to the north, the NMBM to the east, and the Koukamma Local Municipality to the west. The largest towns within the Kouga Local Municipality are Humansdorp and Jeffreys Bay, while smaller settlements include: Hankey, Patensie and St Francis Bay. The administrative centre of the municipality is Jeffreys Bay which lies approximately 75 km southwest of Port Elizabeth in the NMBM. The urban areas are typical of the spatial patterns of towns throughout South Africa, namely that they are segregated by economic classes and reside in clusters.

The largest sectors within the Kouga Local Municipality in terms of GDP contribution in 2016 were finance and business services (26.4%), trade (21.3%), general government (16.6%) and manufacturing (11.2%). While only contributing a small proportion of GDP, the agricultural sector in the municipality is an important employer, employing 22.1% of the working age population. In 2016, the unemployment rate within the Kouga Local Municipality was estimated at 13.7%, which was below the district figure (19.0%), while 30.1% of the population is considered to be not economically active. The latter is made of scholars/students, pensioners, and those who could not find work. Educational attainment levels in the Kouga Local Municipality are particularly poor with almost two thirds of the population in 2011 (65.6%) not having completed matric. Another contributor to the municipal economy is the tourist attractions of the coastal towns of Jeffreys Bay (known internationally for surfing), St Francis Bay, Cape St Francis and Oyster Bay. The inland urban areas of Hankey and Patensie, situated in the Gamtoos River Valley, provide important services to the surrounding high-density agriculture industry.

In comparison, the NMBM had a total population of 1.1 million people in 2016, making it the sixth biggest metropolitan municipality in South Africa. Within NMBM, the largest sectors in terms of GDP contribution during 2016 were finance and business services (23.3%), manufacturing (21.3%), trade (18.9%) and general government (15.4%). Unemployment within the NMBM was estimated at 28.7%, which was just below the Eastern Cape average of 33.1%. A further 34.9% of the working age population was considered to be not economically active. Despite these figures, the NMBM had a labour force participation rate of 65.1% in 2016, well above that of the Eastern Cape (47.0%).

The NMBM has a very dynamic industrial sector with two ports, namely the Port of Port Elizabeth and the Port of Ngqura (adjacent to the Coega Industrial Development Zone), making it a transport focal point. Port Elizabeth is also a major tourist destination with an attractive coastline and beaches, known affectionately as the ‘Friendly City’. Despatch and Uitenhage form the other urban areas of NMBM and are located near to where the proposed Impofu grid would terminate at the Chatty substation.

Both the Kouga Municipality and NMBM boast significantly higher disposable income averages per household than the other municipalities in the province, with approximately R10,598 and R12,280 per month (2016 prices) for the Kouga Local Municipality and NMBM respectively. Despite this, the area is still challenged by poverty, with

[22] Given the small size of the Koukamma Local Municipality traversed by the proposed grid connection, the length of the section (+/- 8 km) relative to the rest of the grid route +/- 120 km, and the limited number of people that are likely to be affected by this section of the grid, the following report does not consider the policy planning environment, nor the socio-economic context for the municipality.

a poverty headcount of 5.7% and 3%, meaning that approximately 5,600 and 35,000 people are estimated to live below the poverty line within the respective municipalities.

Agriculture plays a large role in terms of employment, providing almost 5,000 jobs between 2011 and 2016, despite having had low levels of financial growth. The construction sector also experienced positive employment growth over the same period, contributing an additional 5,000 jobs. It is possible that the increase in the construction sector was partially attributed to the construction of the recently built wind farms. Furthermore, as detailed further in the assessments of the proposed Impofu Wind Farms, it is possible that the farmers' benefiting from turbines on their land, may be able to use the additional form of income to improve their farming practices, thereby contributing positively to the agricultural sector.

The farms that occur within the Impofu Grid Corridor vary by type. A large proportion of the properties along the route are engaged in cattle and sheep farming, but there are also three farms dedicated to chicken/ egg production. Dairy production is also found in the project area of the proposed Impofu Wind Farms, as well as the area around the Gamtoos River. Other types of land use activities along the corridor include natural game and wildlife as well as a seedling/ plant nursery.

7.4.2 Impact assessment with mitigation measures

The impacts included within this section have been identified through a combination of the findings of the socio-economic specialists as set out in the specialist BA report, and the professional judgement of the EAP. Where impacts have differed between the specialists and the EAP, these have been highlighted.

The impact on sense of place was assessed by the socio-economic specialist, as well as the heritage specialist and visual specialist. Given that this impact is largely connected to the potential visual impacts of the infrastructure, the EAP has considered sense of place holistically (considering the inputs from each specialist) in the visual impact section below (Section 7.7).

The potential socio-economic impacts associated with the proposed Impofu Grid Connection are a mix of positive and negative, direct and indirect impacts. The positive impacts assessed below include:

- Direct impacts:
  - Creation of local job creation and business opportunities (+) (assessed in section 6.2.1.1a, b and c of the socio-economic report (Annexure D)); and
  - Strengthening of grid and supply of local renewable electricity (+) (assessed by the specialist in section 6.2.2.1e in socio-economic report);
- Indirect impacts:
  - Sustainable increase in national and local government revenue (+); (assessed in section 6.2.1.1d, 6.2.2.1a and 6.2.2.1d of the socio-economic report (Annexure D));

However, negative socio-economic impacts are also anticipated to occur with the development, and these may include:

- Direct impacts:
  - Harm to social networks with presence of external construction workers (-); (assessed by EAP with input provided by specialist report section 6.2.1.2b in Annexure D); and
  - Nuisance impacts such as dust, noise and traffic (-); (assessed by EAP).
- Indirect impacts:
  - Impact on farm property prices (-) (assessed by specialist in section 6.2.1.2c in Annexure D); and
  - Negative impact of Electro-Magnetic Field (-) (assessed by specialist in section 6.2.2.2b in Annexure D); and
  - Impact on local tourism industry in the affected area (-) (assessed by specialist in Annexure D).

Table 38: Creation of employment and business opportunities

Phase	Pre-Construction	**Construction**	Operational	**Decommissioning**
Impact description	It is estimated that the construction phase associated with the proposed grid connection infrastructure will extend over a period of approximately 18-24 months, as work moves along the corridor, creating approximately 230 temporary job opportunities. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the access roads (where necessary), switching stations and the powerline itself. It is anticipated that approximately 100 of the employment opportunities will be available to unskilled workers (construction labourers, security staff etc.), 60 to semi-skilled workers (drivers, equipment operators etc.) and 70 to skilled personnel (engineers, land surveyors, project managers etc.). Members from the local communities in the area are likely to qualify for most of the low skilled and semi-skilled employment opportunities, especially given the development of other similar infrastructure in the area recently. The creation of potential employment opportunities, even temporary employment, will represent a significant, if localised, social benefit. The direct impact of earning a salary will contribute towards indirect benefits such as local spending, and improved livelihoods at a household scale. Employment opportunities may also be created for SMMEs, provided that local and Broad Based Black Economic Empowerment (BBBEE) compliant enterprises are favoured. As the grid connection infrastructure will be owned and maintained by Eskom, no additional job creation will be created during the operational phase but it may help reduce the risk of Eskom having to retrench employees as this power line will result in more assets for Eskom to manage. Should the infrastructure be decommissioned at a later stage, it is likely that similar impacts to the construction period would occur.			
	Without mitigation		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term		Short term	
Extent	Regional		Regional	
Intensity	Very high		Very high	
Significance	**MODERATE (+)**		**MODERATE (+)**	
Probability	Almost certain/ highly probable		Almost certain/ highly probable	
Confidence	High		High	
Reversibility	High		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
Employment • Where reasonable and practical the proponent should appoint local contractors, and implement a 'locals first' policy, especially for semi and low-skilled job categories. • Labour-intensive methods should be favoured in construction and decommissioning, where feasible. • Where feasible, efforts should be made to employ suitably qualified and experienced local contactors that are compliant with BBBEE criteria. • The local authorities and relevant community representatives should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. • The need to implement a training and skills development programme for local workers should be investigated prior to the initiation of the construction phase. The aim of the programme would be to maximise local employment opportunities. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.				

Business • Local service providers should be favoured to provide transport and other services to the construction teams. • The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible.

Table 39: Harm to social networks with presence of external construction workers

Phase	Pre-Construction	**Construction**	Operational	**Decommissioning**
Impact description	Despite the two municipalities being sufficiently diversified to supply the required workforce for the construction of the proposed grid connection, it is highly unlikely that this workforce will be drawn exclusively from the surrounding area. Workers involved in the construction of the proposed grid connection will therefore be traveling to the site on a daily basis. The influx of construction workers into the area could result in social conflicts between the local population, existing construction workers currently operating in the area and this new workforce. Likewise, the influx of people into the area, could potentially lead to a temporary increase in the level of petty crime, illicit activity, litter and possibly a deterioration of the health of the local community through the spread of communicable diseases (e.g. flu, TB). In addition, this movement of temporary visitors to the area could present a higher risk to safety of farmers and farm workers, livestock and damage to farm infrastructure. For example, fences and gates may be damaged and stock losses may also result from gates being left open and/ or fences being damaged or stock theft. It's likely that these potential risks could be effectively mitigated by careful planning and managing of the movement of construction workers during the construction phase. Addressing the challenges related to potential social impacts is best done in partnership with all stakeholders in the area, specifically the affected and adjacent property owners, ward councillor and municipality. This would promote transparency, information sharing and help build good relationships between all affected parties.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term		Short term	
Extent	Local		Local	
Intensity	Low		Low	
Significance	**MINOR (-)**		**NEGLIGIBLE (-)**	
Probability	Likely[23]		Unlikely	
Confidence	Medium		Medium	
Reversibility	High		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
• Control the movement of workers between the site and areas of residence to minimise loitering around the facilty. This should be achieved through the provision of scheduled transportation services between the construction site and area of residence. • Employ locals as far as feasible through the creation of a local skills database. • Set up a recruitment office in the nearby towns and adhere to strict labour recruitment practices that would reduce the desire of potential job seekers to loiter around the properties in the hope of finding temporary employment. • Establish a management forum comprising key stakeholders to monitor and identify potential problems that may arise due to the influx of job seekers to the area. • Ensure that any damages or losses to nearby affected farms that can be linked to the conduct of construction workers are adequately reimbursed.				

[23] Whilst the socio-economic specialist assessed the probability of this impact to be almost certain/ highly probable, the EAP considers the probability to be only likely, given the level of assumption made.

- Assign a dedicated person to deal with complaints and concerns of affected parties.
- Litter collection bins should be provided and appropriately placed within the contractor's site camp and on site, and should be regularly cleared.

Table 40: Nuisance impacts such as dust, noise and traffic

Phase	Pre-Construction	**Construction**	Operational	**Decommissioning**
Impact description	Impacts such as an increase in dust, noise, reduction in safety and increase in traffic can be associated with the construction period and present a nuisance to residents in the area. It is possible that the clearing of vegetation, possible excavation, and vehicles traveling on dirt roads may increase dust in the area. During the construction period, it is likely that the movement of people and construction materials to and from the site will result in an increase in traffic. It is also likely that the construction teams and activities will add noise to the existing landscape, especially in areas where there is currently limited activity. Along the Grid Corridor, there are also a number of farmhouses and other potentially sensitive receptors. However, it is reasonable to assume that the construction teams would have limited time at each portion of the corridor, and mitigation measures are available.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief		Brief	
Extent	Local		Limited	
Intensity	Moderate		Very low	
Significance	**MINOR (-)**		**NEGLIGIBLE (-)**	
Probability	Almost certain/ highly probable		Likely	
Confidence	High		High	
Reversibility	High		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
• Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis. Should dust be found to be a significant issue in some areas, vehicles used to transport sand and dust-generating building materials must be fitted with tarpaulins or covers. • Construction related activities should be undertaken in terms of the relevant best practice standards relating to noise. • The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from site. Workers who throw waste out of windows should be fined. • Should waste be reported as an issue by an affected landowner, the Contractor should be prepared to collect waste along the farm roads regularly. • Waste generated during the construction and decommissioning phase should be disposed of as per the waste management plan in the EMPr.				

Table 41: Strengthening of grid and supply of local renewable electricity

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Strengthening of the electricity network within the two municipalities will benefit both residents and business owners, in that the reliability of the current supply will be increased and residences and businesses who do not currently have access to electricity may obtain access. In addition, the proposed 132 kV powerline will help to unlock further development in the both Humansdorp, Jeffreys Bay (Kouga), Thornhill, and KwaDwesi (NMBM) and be of strategic importance in the long-term westward expansion of Port Elizabeth.			

	Construction of the powerlines is not anticipated to limit the expansion potential of the residential or commercial areas.	
	Without mitigation	**With mitigation**
Nature	Positive	Positive
Duration	On-going	On-going
Extent	National	National
Intensity	Moderate	Moderate
Significance	**MODERATE (+)**	**MODERATE (+)**
Probability	Almost certain/ highly probable	Almost certain/ highly probable
Confidence	High	High
Reversibility	High	High
Resource irreplaceability	Low	Low
Mitigation measures		
None suggested		

Table 42: Sustainable increase in national and local government revenue

Phase	Pre-Construction	**Construction**	**Operational**	**Decommissioning**
Impact description	The construction of the proposed grid connection will generate revenue for the government during the construction period through a combination of personal income tax, value added tax (VAT), companies tax, etc. During the operational phase, this impact will be indirectly expanded upon, by the benefits associated with the strengthening of the electricity grid. Providing more electricity to the area is of strategic importance in the long-term westward expansion of Port Elizabeth. Government earnings will be distributed by national government to cover public spending which includes amongst others the provision and maintenance of transport infrastructure, health and education services as well as other public goods.			
	Without mitigation		**With mitigation**	
Nature	Positive		Positive	
Duration	On-going		On-going	
Extent	National		National	
Intensity	Moderate		Moderate	
Significance	**MODERATE (+)**		**MODERATE (+)**	
Probability	Almost certain/ highly probable		Almost certain/ highly probable	
Confidence	High		High	
Reversibility	High		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
• The operator responsible for the maintenance of the powerline and servitude should be encouraged to, as far as possible, procure materials, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy.				

Table 43: Impact on farm property prices

Phase	Pre-Construction	**Construction**	**Operational**	Decommissioning
Impact description	According to the socio-economic specialists, many international studies have investigated the potential impact of high-voltage overhead powerlines on property prices in rural areas (see Annexure D for more detail). The research concludes that impacts, if found, are			

	varied and difficult to measure and rely on a range of other negative externalities, such as market condition, location and personal preference. It is likely that the reason for the impact is due to visual impacts. It was found that it is highly probable that should a reduction in property prices occur, it would be marginal and only persist for a limited period. It is also likely that, should a reduction occur, it would be confined to areas where the proposed grid connection route passes through or in close proximity to urban areas. In conclusion, the available evidence is inconclusive of the impact of powerlines on property and land values. Several studies have shown no impact, while others have found a small negative impact. In the event that there is an impact on property prices it will arise in the construction phase and persist into the operational phase.

	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Long term	Long term
Extent	Local	Local
Intensity	Moderate	Moderate
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	Almost certain/ highly probable	Almost certain/ highly probable
Confidence	High	High
Reversibility	High	High
Resource irreplaceability	Low	Low
Mitigation measures		
• Mitigation measures to reduce the impact on the sense of place as considered by the visual impact assessment should also be implemented.		

Table 44: Impacts on local tourism industry

Phase	Pre-Construction	**Construction**	**Operational**	Decommissioning
Impact description	According to the socio-economic specialist, the construction and operation of the proposed grid connection has the potential to indirectly impact the local tourism industry through changes in the visual environment. The proposed power line is also likely to alter the visual character and ambience of the of the immediate areas adjacent to the grid corridor. The impact of this is detailed in the Visual Impact Assessment. Altering the visual character of these areas could adversely reduce the number of ecotourists that could potentially visit the area.			

	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Permanent	Permanent
Extent	Limited	Limited
Intensity	Negligible	Negligible
Significance	**NEGLIGIBLE (-)**	**NEGLIGIBLE (-)**
Probability	Rare / improbable	Rare / improbable
Confidence	High	High
Reversibility	Medium	Medium
Resource irreplaceability	Low	Low
Mitigation measures		
• None. • Little or no potential for screening or visual mitigation of powerlines during construction.		

Table 45: Health impacts associated with exposure to electromagnetic field

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	According to the socio-economic specialist, research has been undertaken since the 1970s to investigate the risks of health from exposure to extremely low frequency electric and magnetic fields. Despite the large number of studies published, several endpoints have not been rigorously examined and it is uncertain whether exposure could be associated with negative health consequences such as cancer. However, the specialist has included the impact in the case that this risk may still occur. Eskom has likewise published a study that sets minimum servitude boundaries for powerlines to limit adverse exposure.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going		Ongoing	
Extent	Regional		Regional	
Intensity	Moderate		Moderate	
Significance	**MINOR (-)**		**MINOR (-)**	
Probability	Unlikely		Unlikely	
Confidence	Medium		Medium	
Reversibility	Medium		Medium	
Resource irreplaceability	Low		Low	
Mitigation measures				
• No buildings should be constructed within the powerline servitude. • During maintenance activities, personnel should ensure that no vagrants stay within the powerline servitude.				

7.4.3 Cumulative assessment

The cumulative impact of the proposed Impofu Grid Connection and additional powerlines introduced above in Section 4.3.1 is anticipated to be similar to those assessed individually above in Section 7.4.2. However, it is likely that the positive impacts will be greater due to the increased investment, while the negative impacts will be lower.

7.4.4 No-Go assessment

The establishment of the proposed grid infrastructure linking the Impofu Wind Farms to the national electricity grid is an integral component of the three proposed Impofu Wind Farms. The No-Go option would represent a lost opportunity for South Africa to supplement its current high energy needs with clean, renewable energy and the associated lost opportunity for local socio-economic growth. Given South Africa's position as one of the highest per capita producers of carbon emissions in the world, this would represent a negative social cost. However, at a provincial and national level, it should be noted that the proposed renewable energy development is not unique. In this regard, a significant number of other renewable energy developments are currently operational, under construction or proposed in the Eastern Cape and other parts of South Africa. Therefore, whilst foregoing the construction of the proposed Impofu Wind Farms would not necessarily compromise the development of renewable energy facilities at a larger scale, the significant socio-economic benefits for the local communities in the area would be forfeited. This would include direct and indirect employment opportunities during all phases of the project, and investment in local economic development initiatives via the Community Trust.

If the local socio-economic benefits are not realised, the population growth of the surrounding towns is likely to increase and with it competition for the limited job opportunities and resources is likely to grow. This will put further pressure on the basic services required by the local municipality.

7.4.5 Socio-economic impact statement

The establishment of the grid infrastructure is supported at a national and provincial level as evident in policy and planning documents (see Section 6.6). The project will facilitate the connection of the Impofu Wind Farms to the national grid thereby contributing to outcomes of the Renewable Energy Independent Power Producer Procurement Programme (REI4P); and is more locally compatible with the economic development vision of the Sarah Baartman District Municipality, Kouga Local Municipality and the NMBM.

The potential positive impacts associated with the proposed grid connection project relate to GDP growth, local and preferential procurement (BBBEE, women-owned vendors, etc.), enterprise development and the creation of employment opportunities. The potential negative impacts are linked to the presence of migrant construction workers on the site and in the area. In addition, because of visual impacts, there may be a resultant impact on surrounding property values. An increase in crime levels is also possible without mitigation measures in place and the perceived adverse health effects of powerlines. From a socio-economic perspective, the potential positive impacts of the proposed development will far outweigh the potential negligible negative impacts.

7.5 Agriculture

The proposed Impofu Grid Corridor is mostly covered by land zoned and used for agriculture, spanning more than 500 farm portions, many of which are working farms. Although South Africa covers a surface area of approximately 122 million hectares, it has very limited arable land and it is therefore critical to ensure that development does not lead to a loss of agricultural production from such land.

To assess the impact of the proposed grid infrastructure on this land, an agricultural and soil specialist was appointed to investigate the impact on agricultural potential, including soils. Mr Johann Lanz with expertise on impact assessments and rehabilitation of agricultural land, rehabilitation and re-vegetation of mining and industrially disturbed and contaminated soils, as well as more general aspects of soil resource management was appointed to investigate the agricultural potential of the land within the Grid Corridor. He has also provided input into the strategic environmental assessments (SEAs) for both the Renewable Energy Development Zones (REDz) and the Eskom Grid Infrastructure. Both of these SEAs have considered the area in which the proposed Impofu grid corridor is located to be of national priority with regards to grid and renewable energy development. The full agricultural specialist report can be found in Annexure D.

7.5.1 Description of the environment

The corridor is predominantly on coastal plains at an altitude of around 200 m, but it extends into the foothills of the first mountain ranges inland of the coast. It also drops altitude across the flood plains of the Gamtoos River. Slopes across the site vary from the predominantly flat coastal plains to steep mountainous terrain and gorges.

The proposed Grid Corridor crosses 25 different land types, which are in 11 different land type groups. Information about the soil conditions of the different groups is given in Table 46 and illustrated in Figure 43.

Table 46: Details of the soils within the different land type groups along the corridor

Land type group	Generalised soil description	Dominant soil forms
Ae	Red-yellow apedal, freely drained soils; red, high base status > 300 mm deep (no dunes)	Hutton, Oakleaf, Mispah
Ah	Red-yellow apedal, freely drained soils; red and yellow, high base status, usually < 15% clay	Hutton, Clovelly
Bb	Plinthic catena – dystrophic and/or mesotrophic yellow soils	Constantia, Fernwood, Longlands, Wasbank, Cartref
Ca	Plinthic catena: upland duplex and/or margalitic soils common; undifferentiated	Kroonstad, Longlands, Westleigh, Wasbank, Cartref
Db	Prismacutanic and/or pedocutanic diagnostic horizons dominant; b horizons not red	Kroonstad

Land type group	Generalised soil description	Dominant soil forms
Fa	Soils with minimal development, usually shallow, on hard or weathering rock. Glenrosa and/or mispah forms (other soils may occur); lime rare or absent in the entire landscape.	Cartref
Fc	Soils with minimal development, usually shallow, on hard or weathering rock. Glenrosa and/or mispah forms (other soils may occur); lime generally present in the entire landscape.	Cartref
Ha	Grey regic sands; regic sands dominant	Fernwood, Constantia
Hb	Grey regic sands; regic sands and other soils	Vilafontes, Clovelly
Ia	Soils with negligible to weak profile development, usually occurring on deep alluvial deposits	Oakleaf
Ib	Miscellaneous land classes, rocky areas with miscellaneous soils	Cartref, Glenrosa, Mispah

Although the Grid Corridor traverses a diverse range of soil types, most are considered non-arable according to the land capability scale detailed in the specialist report. Areas of marginal arable potential occur in the western portion where the Impofu Wind Farms are proposed, and Chatty Ravine matching the polygon mapped as Db on the map on the following page (Figure 43).

It is therefore unsurprising that the corridor is predominantly used as grazing land with small isolated patches of cultivation. The extreme western end of the corridor supports intensive, high production dairy farms with cultivated, kikuyu based pasture plus additional fodder crops, both under irrigation, as well as non-irrigated. There is another area of intensive irrigation land on the flood plain of the Gamtoos River.

Pylons cannot be located in centre pivots and therefore they are considered to be No-Go areas. However, overhead powerlines can cross centre pivot areas, but are then required to be higher than normal to prevent electrical discharge between the irrigation infrastructure and the powerlines. Centre pivot lands are therefore designated as No-Go areas for structures and will be avoided by the planned infrastructure. All other areas within the corridor have low agricultural sensitivity. The locations of the proposed switching stations were deemed acceptable by the specialist, and no significant impact is anticipated on agriculture should the existing substations be expanded for connection.

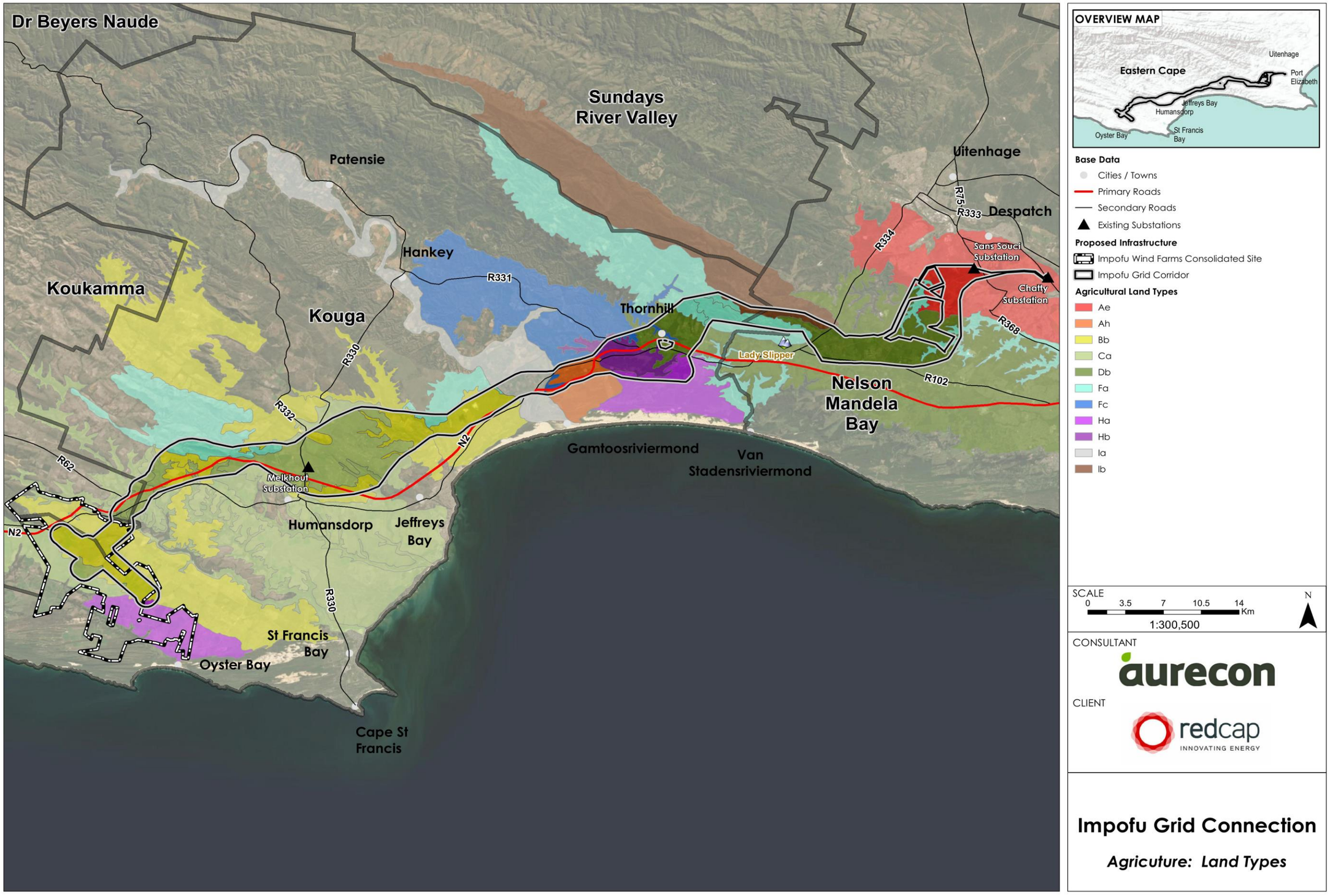

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Figure 43: Satellite map image showing the distribution of different land types along the corridor

7.5.2 Impact assessment with mitigation measures

The single identified impact of the proposed Impofu Grid Connection is a loss of agricultural potential on the impacted land. This can result by way of the following different mechanisms during construction:

- Construction disturbance of agricultural activities;
- Loss of excavated topsoil; and
- Soil compaction due to heavy vehicle traffic.

The following additional mechanisms contribute to loss of agricultural potential during all phases of the development:

- Occupation of very small portions of land by the ground-based footprint (pylon bases and switching stations), and therefore exclusion of agricultural activities on them; and
- Erosion resulting from surface disturbance due to excavations, hardened surfaces and vehicle traffic across lands.

Table 47: Loss of agricultural potential on the impacted land

Phase	Pre-Construction	**Construction**	**Operational**	**Decommissioning**
Impact description	The loss of agricultural production and potential results from the following mechanisms: • Loss of agricultural land use caused by direct occupation of land by the facilities' footprint; • Soil erosion caused by alteration of the surface characteristics; • Generation of dust caused by alteration of the surface characteristics; • Loss of topsoil in disturbed areas, causing a decline in soil fertility; and • Degradation of surrounding grazing land due to vehicle trampling.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium term		Brief	
Extent	Limited		Very limited	
Intensity	High		Very low	
Significance	**MINOR (-)**		**NEGLIGIBLE (-)**	
Probability	Likely		Probable	
Confidence	High		High	
Reversibility	Medium		High	
Resource irreplaceability	Low		Low	
Mitigation measures				
Construction phase: • Agricultural sensitive areas must be avoided. • Effective communication with farmers about the timing and location of construction activities must be undertaken. • Return topsoil to the surface of all backfilled excavations. • Ensure run-off control where surface disturbance could cause erosion. • Loosen compact soils under vehicle tracks on cultivated lands by ripping. **Operational phase:** • Implement erosion control if any erosion occurs. **Decommissioning phase:** • Effective communication with farmers about the timing and location of decommissioning activities must be undertaken. • Return topsoil to the surface of all backfilled excavations. • Ensure run-off control where surface disturbance could cause erosion. • Loosen compact soils under vehicle tracks on cultivated lands by ripping.				

7.5.3 Cumulative assessment

The cumulative impact on agriculture, taking the proposed future overhead powerlines that have a valid EA into account, is also negligible. Because of the negligible impacts, the agricultural environment can accommodate much more electricity grid infrastructure before acceptable levels of change are exceeded.

7.5.4 No-Go assessment

The No-Go alternative anticipates changes to the agricultural environment that would occur in the absence of the proposed development. No significant changes are anticipated in the No-Go scenario, compared to the negligible negative impacts anticipated for the development. The No-Go alternative is therefore assessed as negligible.

7.5.5 Agriculture impact statement

This assessment has found that the proposed development has negligible agricultural impact. This is because, after construction, all agricultural activities can continue, undisturbed below powerlines. It is only the ground-based footprint (pylon bases and substations) that have any impact, and these cover an extremely small surface area and therefore have negligible impact on agricultural production. Centre pivot irrigation lands have been designated as No-Go areas of very high sensitivity and must be avoided by the footprint of the development.

7.6 Heritage

Heritage resources include paleontological material (e.g. fossilised materials), archaeological material (e.g. rock paintings, stone tools), and cultural heritage material (e.g. old graveyards, fences, ruins of buildings, or sense of place). As discussed above in Section 3.1, ECPHRA, as the relevant provincial heritage agency has indicated that a full HIA is not required, however a palaeontological and archaeological study is to be submitted for approval.

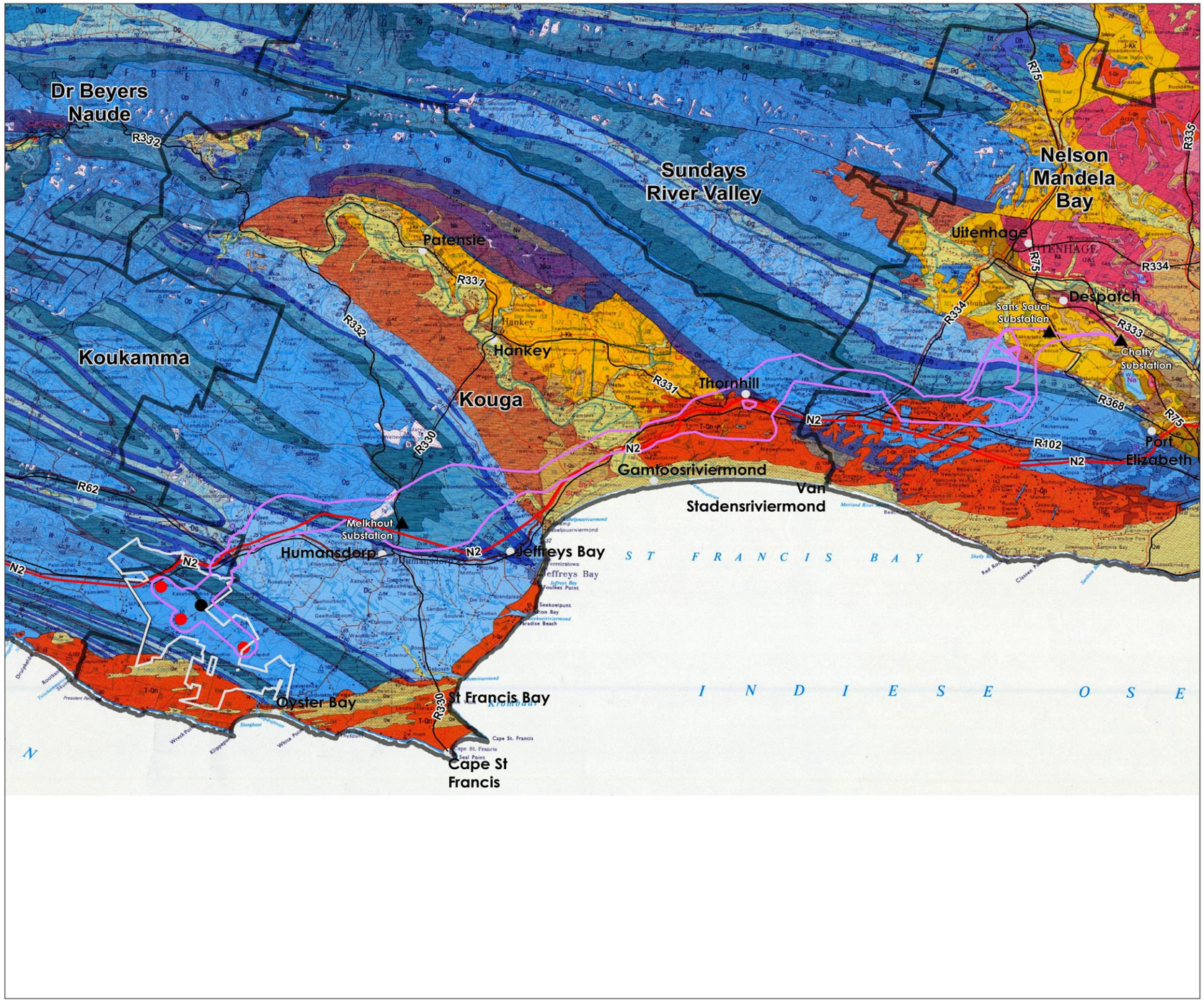
An archaeologist and palaeontologist were therefore commissioned to undertake the requisite investigations. Dr Peter Nilssen was appointed to undertake the archaeology impact assessment (which also speaks to cultural heritage), and Dr John Almond of Natura Viva was appointed to undertake the palaeontological investigation. The locally based Gamtkwa Khoisan Council (GKC) have been identified as a key stakeholder regarding heritage resources, as they have actively undertaken research and contributed towards the protection of heritage resources in the area for many years. Input from the GKC, as well as desktop based research and site visits to the area in September 2017 have contributed to the sections below.

7.6.1 Description of environment

7.6.1.1 Palaeontology

The proposed Impofu Grid Corridor traverses several geomorphic provinces on the southern coastal platform and Cape Fold Belt of southern Africa, as defined by Partridge *et al.* (2010), *viz*: the Southern Coastal Platform, Southern Coastal Lowlands as well as the Central and Eastern Cape Fold Mountains. This large region shows a considerable degree of topographic variety, due in large part to the varied underlying geology (illustrated in Figure 44). This includes gently rolling hills and seawards-sloping plateau along the wave-cut coastal platform inland from St. Francis Bay and Algoa Bay, rugged upland ridges of the NW-SE trending Cape Fold Mountains, as well as highly-dissected terrain along the margins of the Gamtoos River Valley. In addition to the ancient, deeply-incised Gamtoos River the study area is traversed by several smaller and younger drainage systems such as the Krom River, Swart River, Kabeljous River and Swartkops River. Exposures in lowland areas where bedrocks are covered by superficial sediments (alluvium, colluvium, soils, etc.) are largely limited to river and stream banks, erosion gullies, borrow pits and quarries, road and railway cuttings and farm dams.

The map on the following page highlights four sections of relative homogeneity which are further detailed in the specialist report .



Base Data

- Cities / Towns
- Primary Roads
- Secondary Roads
- Existing Substations

Proposed Infrastructure

- Impofu Wind Farms Consolidated Site
- Impofu Grid Corridor
- Collector Switching Station
- Collector Switching/Substations

SCALE
0 4.5 9 13.5 18 Km
1:350,000

N

CONSULTANT
aurecon

CLIENT
redcap
INNOVATING ENERGY

Impofu Grid Connection

Geology Map

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Figure 44: Extract form 1:25,000 geology sheet 324 Port Elizabeth (Council for Geocience, Toerien and Hill, 1989)

The Impofu Grid Corridor is underlain by several formations of potentially fossiliferous sediments of the Gamtoos Group, Cape Supergroup, Uitenhage Group and Algoa Group. The four sectors illustrated above in Figure 44, and summarised below, are detailed further (with illustrative photographs) in the specialist report (Annexure D).

- Sector 1 (approximately 35% of the grid corridor length) is underlain by Cape Supergroup bedrocks (Table Mountain / TMG and Bokkeveld Groups) and is considered to be of low palaeosensitivity.
- Sector 2 (approximately 30% of the grid corridor length) is centred on the Gamtoos River Valley which is underlain by Mesozoic continental sediments of the Uitenhage Group in the NW/SE trending Gamtoos Basin (Shone 2006) and has the potential for plant, mammalian and other fossil remains. Therefore, the palaeosensitivity of Sector 2 is considered to be moderate.
- Sector 3 (approximately 20% of the grid corridor length) is underlain by folded, WNW-ESE trending Cape Supergroup sediments and is generally considered to be of low sensitivity.
- Sector 4 (approximately 15% of the grid corridor length) is underlain by Late Jurassic – Early Cretaceous continental and marine sediments of the Uitenhage Group and a wide range of fossil material is expected, therefore the palaeosensitivity of this sector is considered to be moderate.

Within Section 1 and 4, two small areas of high palaeontological sensitivity have been identified within the grid connection study area: (1) steep cliff exposures of the Early Cretaceous Kirkwood Formation along the eastern banks of the Gamtoos River that are rich in fossil plant material (illustrated in Figure 45), and (2) low fossiliferous scarp exposures of the Late Jurassic Bethelsdorp Member (lower Kirkwood Formation) along a pan margin, 1.8 km west of Sans Souci Substation. It is recommended that any excavations within the first area is carefully monitored for fossils by the Environmental Control Officer (ECO) while the latter should be treated as a No-Go area for development.

Figure 45: Riverine cliff sections through thick channel sandstone followed by overbank mudrocks and thin tabular sandstones of the Kirkwood Formation, eastern bank of the Gamtoos River (source: Almond, 2019)

7.6.1.2 Archaeology

Similar to the approach taken by other specialists above, the larger study area is divided by the archaeologist into three subsections, namely: West Grid, Central Grid and East Grid. These areas coincide with the geographical sections illustrated in Figure 14 in Section 6.3 (where together the Collector Section and Section A form West Grid).

The West Grid section comprises coastal plain and the south-eastern slopes, foothills and hills of the more mountainous terrain to the north. Located more than 5 km from the present-day shoreline, the corridor lies outside

of the archaeologically sensitive coastal zone and the areas of pre-colonial cultural landscape mapped and described by Binneman (2010a) and Binneman and Reichert (2017). Ancient aeolian sediments on the coastal plain are deeply incised in places by rivers and their associated tributaries revealing the underlying hard rock geological formations described in greater detail by Dr Almond in the palaeontological study. Numerous drainage lines and water sources occur in this area as do man-made dams. Apart from the town of Humansdorp, the bulk of the area is under rural and agricultural (including forestry) development. Large parts of the landscape, particularly along the coastal plain and areas adjacent to water sources are transformed by farming activities. Further human-related impacts of the more recent past include roads, bridges, railway lines, quarries, dams, variety of farming activities, variety of structures and infrastructure, fencing, overhead powerlines, transmission/receiver masts, wind turbines and so on.

Archaeological resources that may occur in this area include historic period infrastructure, structures, cemeteries, graves and cultural materials, Stone Age artefacts in open air and disturbed contexts of mostly Early Stone Age and Middle Stone Age origin, Stone Age artefacts in sub-surface sediments, and unmarked burials. If present along river valleys, rock shelters may include archaeological remains of Stone Age and pastoralist origin as well as rock art.

The Central Grid section also includes the coastal plain and the south-eastern slopes, foothills and hills of the more mountainous terrain to the north, but in addition includes a coastal strip about 25 km in length. Along the 25 km coastal strip, the 2 km corridor lies 3 km from the present day shoreline at the nearest point. Although the 2 km corridor falls within the archaeologically sensitive 5 km coastal zone, it straddles previously disturbed areas and lies outside the archaeological No-Go zone indicated by the polygon IG2 in Figure 48. The No-Go zone is especially relevant to previously undisturbed areas.

As in the West Grid section, soft sediments along the Central Grid stretch are eroded and cut by the Kabeljous, Gamtoos and Van Stadens rivers and their associated tributaries. Drainage lines, water sources and dams are common. Overall, this section appears topographically more varied than the West and East Grid sections and a major natural feature is the broad floodplain of the Gamtoos River roughly in the middle of the Central Grid section and labelled IG3 in Figure 48. Apart from a portion of the coastal town of Jeffreys Bay and the smaller villages of Loerieheuwel and Thornhill, the bulk of this area is under rural and agricultural settlement. As in the west, large parts of the natural landscape are transformed by agricultural activities. Other human-related impacts of the more recent past include roads, bridges, railway lines, quarries, dams, a variety of farming activities, a variety of structures and infrastructure, fencing, transmission/receiver masts, overhead powerlines, wind turbines and so on.

Apart from the high density of shell middens, pastoralist and other heritage resources in the archaeologically sensitive coastal zone referred to above, the archaeological record in this section of the grid corridor is known and expected to include Stone Age and pastoralist materials and possible rock art in rock shelters, Stone Age and pastoralist artefacts in open and often disturbed contexts, artefacts in sub-surface sediments, unmarked prehistoric graves, historic period infrastructure, structures, cemeteries, graves and cultural materials associated with the historic period.

The East Grid section consists of a combination of coastal plain, undulating low lying hills with slopes and foothills of the more mountainous interior in the north-west; with the Elands and Swartkops as the main rivers in the area. As would be expected nearing the urban edge of the NMBM, this part of the grid assessment corridor is notably more transformed by human related activities, specifically those associated with modern urban developments. The main urban centres include Uitenhage, Despatch and Port Elizabeth. Outside of the urban centres, the most common land use is rural and agricultural (numerous small holdings and numerous chicken farms), and with the exclusion of wind farms, recent human-related impacts are the same as those described above for the other grid sections.

Very few heritage related studies have been done in this area and while some historic period remains have been recorded, no significant archaeological resources are known or expected to occur within this section of the Grid Corridor. The most likely heritage resources present in this area are historic period infrastructure, structures, cemeteries, graves and cultural materials associated with the historic period, and to a lesser extent, Stone Age and pastoralist artefacts in open and disturbed contexts. If rock shelters are present, they may contain Stone Age or pastoralist remains as well as rock art.

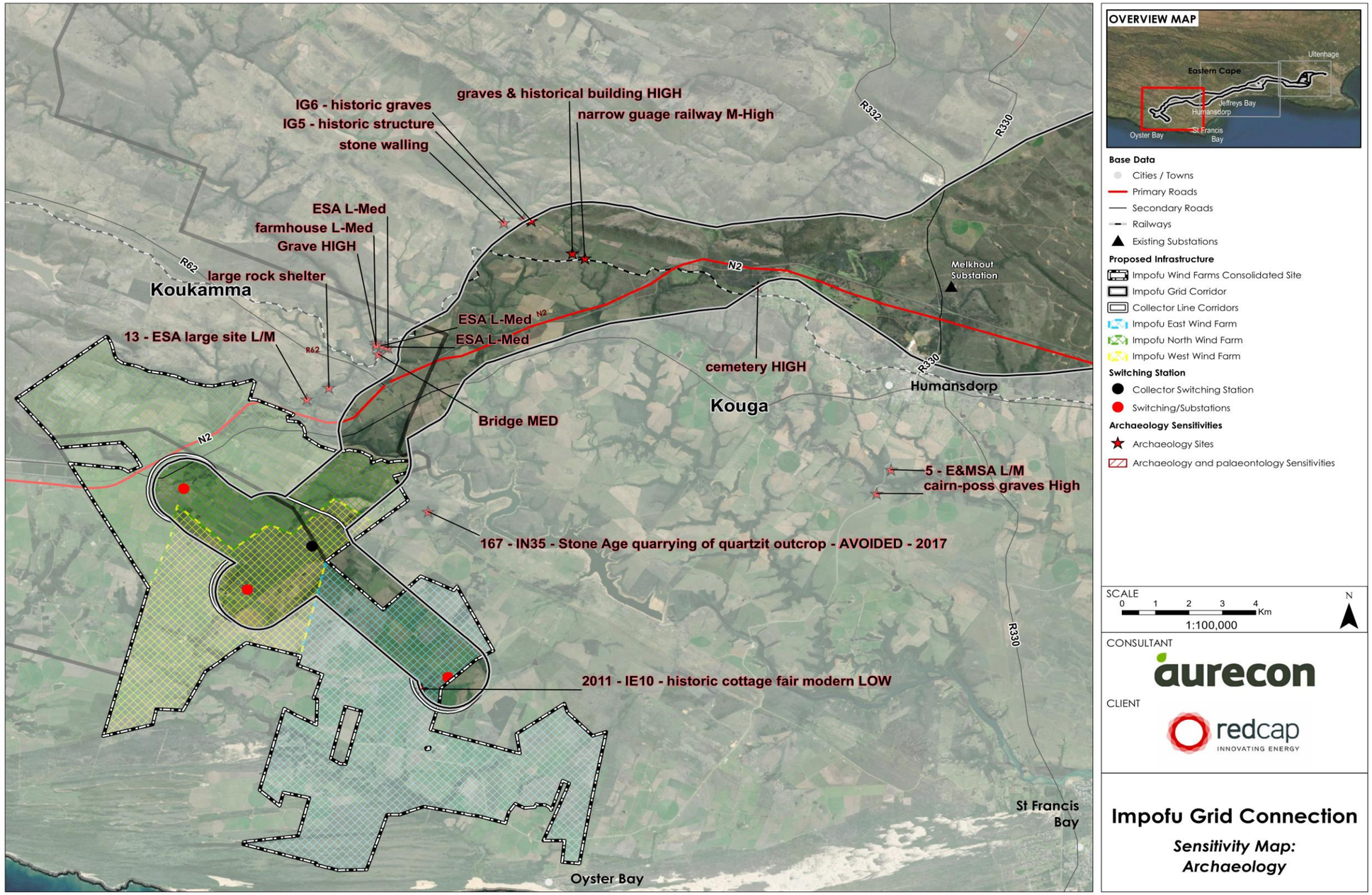
A narrow-gauge railway which was built between Port Elizabeth and Avontuur between 1899 and 1903 also runs through sections of the grid corridor. This, and other examples of heritage resources in the grid corridor, namely graves, old buildings, and stone walling, are provided in Figure 46.

Figure 46: Examples of historic heritage resources in the initial grid assessment corridor (Nilssen, 2017)

Given that the locations of the highly sensitive areas are relatively well known, several No-Go features were identified in the screening phase to be avoided by the development. These are highlighted below in Table 48 and are illustrated on the following page in Figure 47 and Figure 48. A map of Section C has not been included given the lack of archaeological sensitive sites.

Table 48: Archaeological sensitivity classifications considered during Screening

Level of sensitivity	Feature
No-Go	• Archaeologically sensitive coastal zone • Historic narrow-gauge railway line (the line itself, sidings and structures only) • Sites listed as medium or high significance by Binneman and Reichert (2017) • Stone walling
High	• Aesthetic areas including the northern, relatively undeveloped portions of the broader grid corridor where more hilly and mountainous landscapes are less disturbed • Broad flood plain and adjacent banks of the Gamtoos River • Area surrounding the R102 where it runs through a pass alongside the Van Staden's Bridge • Coastal zone in the south



Base Data
- Cities / Towns
- Primary Roads
- Secondary Roads
- Railways
- Existing Substations

Proposed Infrastructure
- Impofu Wind Farms Consolidated Site
- Impofu Grid Corridor
- Collector Line Corridors
- Impofu East Wind Farm
- Impofu North Wind Farm
- Impofu West Wind Farm

Switching Station
- Collector Switching Station
- Switching/Substations

Archaeology Sensitivities
- Archaeology Sites
- Archaeology and palaeontology Sensitivities

SCALE 0 1 2 3 4 Km
1:100,000
N

CONSULTANT
aurecon

CLIENT
redcap
INNOVATING ENERGY

Impofu Grid Connection

Sensitivity Map: Archaeology

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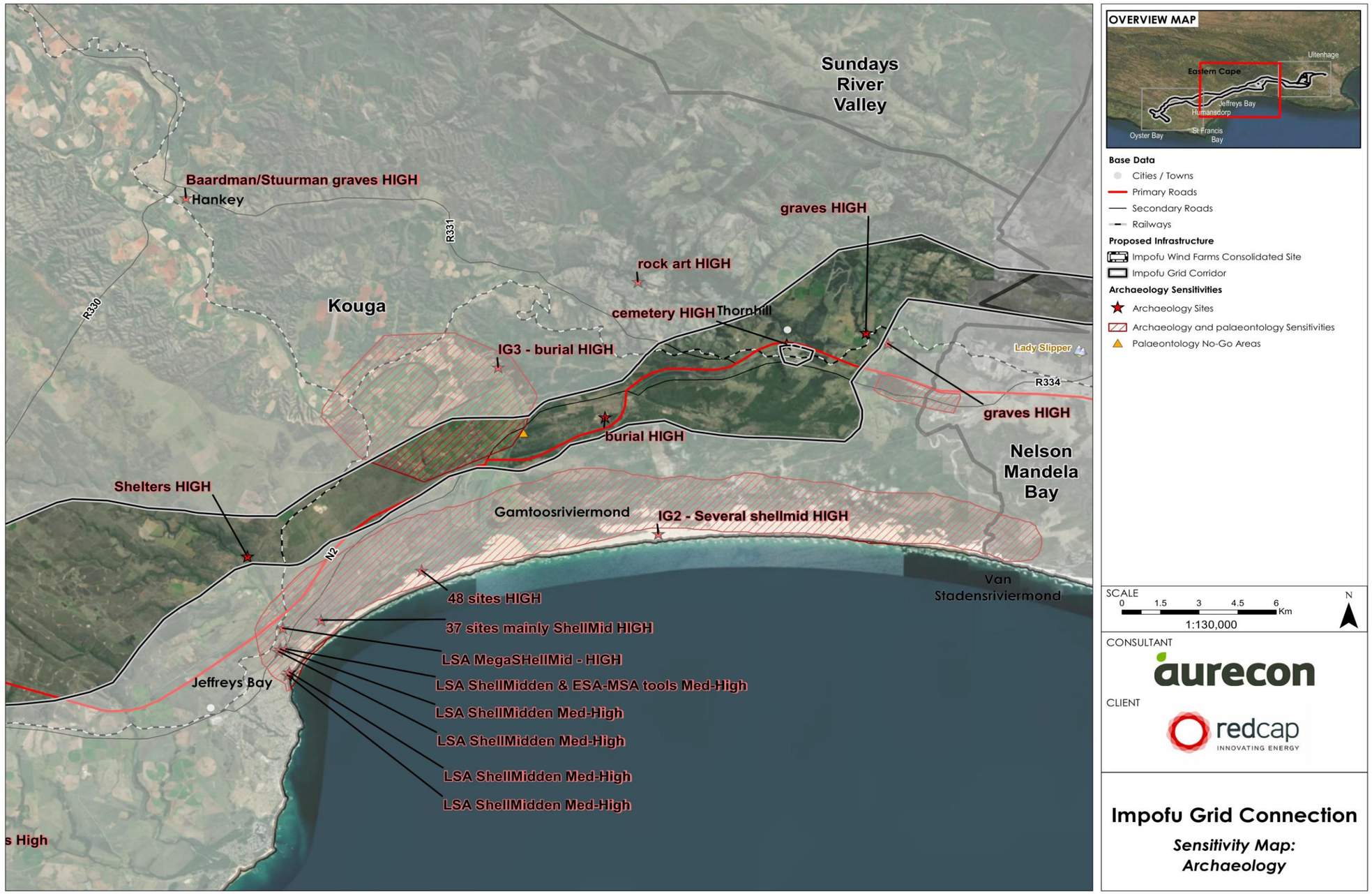
Figure 47: No-Go and sensitive heritage areas: section A



Base Data
- Cities / Towns
- Primary Roads
- Secondary Roads
- Railways

Proposed Infrastructure
- Impofu Wind Farms Consolidated Site
- Impofu Grid Corridor

Archaeology Sensitivities
- Archaeology Sites
- Archaeology and palaeontology Sensitivities
- Palaeontology No-Go Areas

SCALE 0 1.5 3 4.5 6 Km
1:130,000
N

CONSULTANT
aurecon

CLIENT
redcap
INNOVATING ENERGY

Impofu Grid Connection

Sensitivity Map: Archaeology

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Figure 48: No-Go and sensitive heritage areas: section B

7.6.2 Impact assessment with mitigation measures

It is anticipated that the construction activities related to the proposed Impofu Grid Connection may cause damage or destruction to the archaeological artefacts identified by the archaeologist, or to potential unknown artefacts buried underground. Similarly, although the risk of impact is lower, construction related activities may lead to the disturbance, damage or destruction of fossils preserved at surface or below ground.

Since archaeological resources occur on ground surfaces or in sub-surface sediments, only those aspects of the grid development that will impact on surface or sub-surface sediments are considered relevant. Therefore, within this section, the following impacts are assessed:

- Disturbance, damage or destruction of fossils preserved at surface or below ground (-);
- Damage or destruction of graves, graveyards and cemeteries (-);
- Damage or destruction to historic narrow-gauge railway line (and associated structures) (-); and
- Damage or destruction of Kabeljous River Rock Shelters (-).

NB: In Section 7.3 above, the aquatic specialist indicated that if the No-Go areas were adhered to by the development, then no impact would occur on the sensitive feature, and therefore the impact assessment was not presented. A similar approach has been taken by the EAP for archaeology. As a condition of the EA, the No-Go areas presented by the archaeologist must be avoided, and therefore the negligible impact on the resource will not occur. With this in mind, the following impacts were assessed in the specialist report, but are not presented here as they will be avoided:

- Destruction of historic period structure/ cottage and dipping kraal (IE10) (-);
- Damage or destruction of historic period stone walling (IG1) (-); and
- Damage or destruction of historic period structures (IG5, 31b) (-).

Furthermore, given that the sense of place has been assessed by the heritage specialist, as well as the socio-economic and visual specialist, the EAP has considered this impact holistically below in Section 7.7 with the input of each specialist considered.

Table 49: Disturbance, damage or destruction of fossils preserved at surface or below ground

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	It is possible that the construction phase of the proposed switching stations and pylons for the overhead power line may lead to the damage or destruction of buried palaeontological resources. However, given the sensitivity of the geological landscape, and natural weathering occurring within sector 1 and 3, it is unlikely that this impact would occur with the construction of the proposed switching stations and pylons. It is recommended that the area of high-sensitivity within the Kirkwood Formation, be investigated by a registered palaeontologist during the micro-siting process.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent		Permanent	
Extent	Very limited		Very limited	
Intensity	Very low		Negligible	
Significance	**NEGLIGIBLE (-)**		**NEGLIGIBLE (-)**	
Probability	Rare/ improbable		Rare/ improbable	
Confidence	High		High	
Reversibility	Low		Low	
Resource irreplaceability	Medium		Medium	
Mitigation measures				
• The suitably qualified and experienced ECO responsible for the developments should be made aware of the potential occurrence of scientifically-important fossil remains within the development footprint.				

- Any bedrock excavations within the sector spanning the Kirkwood Formation cliffs on the eastern bank of the Gamtoos River should be carefully monitored by the ECO for chance fossil finds such as wood and other plant material (refer to Appendix 1 of the specialist report for the Chance Fossil Finds Procedure).
- Should substantial fossil remains be encountered at surface or exposed during construction, the ECO should safeguard these, preferably *in situ* (see Appendix 1: Chance Fossil Finds Procedure). They should then alert the Eastern Cape Provincial Heritage Resources Agency, ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za) as soon as possible. This is to ensure that appropriate action (i.e. recording, sampling or collection of fossils, recording of relevant geological data) can be taken by a professional palaeontologist at the proponent's expense.
- The palaeontologist concerned with any mitigation work will need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological specialist work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by SAHRA (2013).

Table 50: Damage to graves, grave yards and cemeteries (site reference: IG6, IG4, 31a, 28, 70 and 80)

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	It is possible that the construction of the overhead powerline may damage existing graves and graveyards in the corridor if not correctly mitigated. The archaeologist has identified that according to the impact methodology used, the anticipated impact was calculated to be minor negative. But due to the legal protection of burials, the impact of the loss of graves and graveyards would be high. However, with mitigation, the structure will not be impacted. The EAP considers that this impact without mitigation should therefore be moderate negative, but with the implementation of avoidance, fencing and following the requisite legal procedures where necessary, the impact can be mitigation to negligible.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent		Permanent	
Extent	Limited		Limited	
Intensity	High		Very low	
Significance	**MODERATE (-)**		**NEGLIGIBLE (-)**	
Probability	Unlikely		Unlikely	
Confidence	Medium		Medium	
Reversibility	Medium		Medium	
Resource irreplaceability	High		High	
Mitigation measures				
• If the proposed powerline comes within 100 m of any graves, sites should be fenced where they are not already enclosed and protected by fencing. • The overhead powerline may not straddle graves or graveyards, and pylons must be positioned at least 50 m from graveyard fences.				

Table 51: Damage to historic narrow-gauge railway line and associated structures

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	It is possible that the construction of the overhead powerline may damage the historic narrow-gauge railway line (and associated structures). As per the mitigation measures provided below, no pylons are to be located near to the railway line. However, there remains a risk that construction related activities and movement of people in the area could still harm the structures. The EAP has therefore included an assessment of this			

	impact with mitigation (the specialist provided mitigation but did not present the impact in a table).	
	Without mitigation	**With mitigation**
Nature	Negative	Negative
Duration	Permanent	Permanent
Extent	Local	Local
Intensity	Moderate	Very low
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	Probable	Unlikely
Confidence	Medium	High
Reversibility	Low	Low
Resource irreplaceability	Medium	Medium
Mitigation measures		
• While it is acceptable for the powerline to straddle or cross over the railway line, it is recommended that, as far as possible, such crossings should not occur at old railway sidings or stations where associated railway buildings are still intact. • If the overhead powerline runs alongside the historic railway line, it should be kept at least 20 m from the line to ensure that the line is not damaged during construction. • No structures (buildings, bridges etc.) associated with the railway line may be damaged or destroyed without a permit from the heritage authorities, and therefore it is recommended that they are avoided with a buffer of 50 m. • Any grid connection development activities that encroach upon these buffers must be micro-sited prior to the construction phase. • Construction teams must be informed of the importance of this railway line during their pre-construction training.		

Table 52: Damage to Kabeljous River Rock Shelters (site reference 68)

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Kabeljous River Rock Shelters, with Stone Age materials spanning the last 6000 years are located at site reference 68 (ref to Figure 47). Since these are roughly south facing rock shelters, near the southern boundary of the proposed Impofu Grid Corridor, it is recommended that the overhead powerline should be routed to the north of the rock shelters.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent		Permanent	
Extent	Regional		Regional	
Intensity	High		Very low	
Significance	**MODERATE (-)**		**MINOR (-)**	
Probability	Likely		Likely	
Confidence	High		Medium	
Reversibility	Low		Low	
Resource irreplaceability	High		High	
Mitigation measures				
• Alignment should be routed to the north of the rock shelters if possible. • The powerline may not straddle or cross over the rock shelters. • A buffer of 500 m should be observed, regardless of whether the line runs to the north or the south of the structures.				

- Should the alignment come within the 500 m buffer, the placement of pylons must be micro-sited with the archaeologist prior to construction.

7.6.3 Cumulative assessment

Cumulative palaeontological impacts are influenced by any substantial development in the region, and not just by power lines or wind farms.

All the relevant power line PIA studies listed concur in that, with few exceptions, the palaeontological sensitivity of the Humansdorp - NMBM region is generally low as far as the bedrocks are concerned, especially because of the high levels of chemical weathering and tectonic deformation observed here in conjunction with low levels of bedrock exposure. The most significant fossil sites recorded so far are (1) marine trace fossils in the Peninsula Formation near Rosenhof (Almond 2012, 2017) in the Impofu West Wind Farm project area, (2) the Late Pleistocene hyaena den bone, tooth and coprolite assemblages within Nanaga Formation aeolianites in the Gibson Bay WEF project area and near Oyster Bay (Carrion *et al.* 2000, Nilssen & Smith 2015, Brink 2015), (3) rich fossil plant assemblages and fossil resin on the eastern bank of the Gamtoos River (McLachlan & McMillan 1976, p. 207, Section 2.7 above) as well as (4) estuarine to marine shelly invertebrates and trace fossils within the Kirkwood Formation near Uitenhage (Section 7.4 above). Cumulative impacts on fossil heritage of the proposed Impofu Grid Connection in the context of other powerline developments in the region as well as the three Impofu Wind Farm projects are inferred to be *minor* as far as the Palaeozoic bedrocks are concerned (Almond 2017). This would also apply to impacts on sparse but locally-rich fossil heritage preserved within the coastal aeolianites and Kirkwood Formation *provided that* adequate monitoring of major excavations here (*e.g.* pylon footings, access roads) is carried out during the construction phase.

Given the risk of archaeological finds in the area, the proposed and future development could have a significance negative cumulative impact on archaeological resources if detailed studies are not undertaken. Where detailed studies are undertaken, the impacts can be avoided, or at least minimised, where the finds are documented, mitigated or conserved according to their significance. Furthermore, where appropriate, representative samples of the archaeological record should be conserved for interested and affected parties, future generations and scientists. The positive cumulative impact on heritage resources is that the impact assessments required for these developments have greatly improved our record and understanding of archaeological material in the area and have provided an opportunity to conserve them for present and future generations. This is not possible if uncontrolled piecemeal developments as well as natural processes were to take place.

7.6.4 No-Go assessment

When considering the No-Go Alternative (i.e. no grid connection development), impacts on local fossil heritage and archaeological finds would essentially be neutral. Without development, natural weathering processes and erosion will continue to steadily destroy fossils preserved near or at the ground surface (negative), but at the same time new fossils will be continually exposed (positive). A similar opinion could be shared with archaeological finds. This No-Go alternative would therefore forgo potential improvements in the paleontological and archaeological understanding of the study region through any mitigated new fossil finds made during construction.

Since the no-go option will involve continued and unknown impacts of natural processes and agricultural activities on archaeological resources, and because the proposed development impacts can be controlled and monitored, then the wind farms and grid connection developments may actually be preferred over the No-Go option. At this stage, however, there is no preference of one over the other.

7.6.5 Heritage impact statement

Combined desktop and field studies of the broader Impofu project area (inclusive of proposed wind farms) show that in practice the bedrocks and superficial sediments here are generally of low palaeontological sensitivity due to high levels of bedrock deformation, fossil-poor sedimentary facies, as well as chemical weathering (Almond 2012, 2017, this study). As a consequence of (1) the paucity of irreplaceable, unique or rare fossil remains within the development footprint, (2) the high levels of chemical weathering in the study area, as well as (3) the extensive superficial sediment cover overlying most potentially-fossiliferous bedrocks within the grid connection study area,

the overall impact significance of the construction phase of the proposed electrical infrastructure project without mitigation is assessed as minor / negligible (negative).

Pending the potential discovery of significant new fossil remains during the construction phase of the proposed Impofu Grid Connection, no further specialist palaeontological studies or mitigation are recommended for this project in the construction phase. There are no fatal flaws to the proposed electrical infrastructure project as far as fossil heritage is concerned. Provided that the Chance Fossil Finds Procedure (Appendix 1 of palaeontology report) and mitigation measures recommended are implemented, there are no objections on palaeontological heritage grounds to the construction of the proposed Impofu grid infrastructure.

Most of the area covered by the Impofu Grid Corridor is well researched and documented, and therefore areas of known archaeological sensitivity can be avoided where possible in the alignment of the overhead powerline. The nature of the archaeological resources in the corridor (outside any defined No-Go areas) is one where the resources will mostly consist of localised and spatially confined areas that can easily be avoided by micro-siting the final grid alignment and individual pylon placements. Because of the confidence around the locations of the proposed switching stations, possible extension to existing substations, and the limited linear and narrow footprint of the overhead powerline within the corridor, the line can easily be micro-sited where necessary during a final pre-construction walkthrough, undertaken by a suitably qualified archaeologist, to avoid any sensitive heritage resources identified at the final locations of the pylons.

7.7 Visual

The proposed pylons selected for the 132 kV overhead powerline are anticipated to stand at about 26 m tall but where longer spans are required or to cross over other powerlines, they could be up to 32 m tall. Although in some places the proposed Impofu powerline will run adjacent to the existing Eskom 132 kV powerline, in others the lines may diverge and the Impofu line may run alone across open, potentially undisturbed, areas. As described in more detail above, the corridor traverses a variety of vegetation types and urban establishments, coupled with the topographic variation, contributes towards a diverse landscape. Therefore, along the corridor there will be some areas with higher visual absorption capacity[24] and landscape integrity[25] than others. Other visual determinants include visibility and the presence of visually sensitive resources. It is therefore important to discuss both what the landscape looks like, as well as what receptors might be sensitive to a changing landscape.

A visual impact assessment was therefore undertaken by visual specialists, Mr Bernard Oberholzer and Mr Quinton Lawson (included in Annexure D). Mr Oberholzer has more than 20 years' experience in undertaking visual impact assessments and is the author of the Guideline for Involving Visual and Aesthetic Specialists in the EIA Processes[26], while Mr Lawson has more than 10 years' experience in visual assessments and has specialist in 3D modelling and visual simulations. Together the authors have used their complementary skills to undertake numerous assessments including contributing to the national SEAs for REDz and Eskom Grid Infrastructure in association with the CSIR. The study makes use of literature, spatial mapping, and analysis of photo montages supported by a visit to the study area on 27 and 28 September 2017 and on the 24th July 2019.

7.7.1 Description of environment

Starting in the west, with the proposed switching stations which may be seen from the R102 Main Road (see Figure 49 for an example of what this could look like), the proposed Grid Corridor runs adjacent to the N2 National Road and R102 Main Road over most of the distance, crossing the N2 at four different points. The N2 is an extension of the Garden Route and is an important transport corridor running between Durban and Cape Town, carrying both tourists and commuters, etc. It is likely that road users will see the overhead powerline in areas between the proposed Impofu Wind Farms and the Melkhout substation just past Humansdorp, along the Gamtoos River Valley, and again at the intersection of the N2 and the R102, where the line then runs north into the NMBM (see Figure 50 to Figure 52 illustrating the visual impact of the existing electricity infrastructure from the N2). The western portion of this corridor has already been notably altered by the construction of the existing wind farms and there are already two existing 132kV powerlines that run almost the entire length of the proposed corridor.

[24] Visual absorption capacity is the ability of the landscape to screen the proposed overhead powerline from view. For example, areas that are generally open and visually exposed have a low visual absorption capacity.
[25] Landscape integrity is based on the scenic or rural quality and intactness of the landscape. For example, areas with existing infrastructure would have lower levels of landscape integrity than areas of pristine vegetation.
[26] DEA&DP. 2005. *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes.*

Figure 49: Photograph of existing 66kV overhead powerline and telephone line, with Melkhout substation in the background approximately 500 m away (source: Jones, 2017)

Figure 50: Existing Eskom 132kV overhead powerline visible from the N2

Figure 51: Existing Eskom 132kV overhead powerline running up the steep climb across the Gamtoos River visible from R102

Figure 52: Existing Eskom 132kV overhead powerline crossing the N2 near Lady's Slipper

Other areas where more static receptors may be located include visitors to the Hopewell Private Nature Reserve, as well as Krom River ravine and Impofu Dam which are significant water features in the area. Dotted along the corridor are a number of farmsteads, settlements and other buildings/ establishments such as at Thornhill. Within the NMBM, the corridor runs along the Chatty River for a short distance before it enters the urban edge and associated housing developments (see Figure 53). These sensitive receptors, and areas of sensitivity are illustrated in maps 5, and 5a-d in the visual specialist report in Annexure D.

Figure 53: Aerial photograph of Sans souci substation on the outskirts of the urban edge (source: Palmer, 2017)

Figure 54: Aerial image of land cleared for the construction of housing developments next to Kwanobuhle (source: Palmer, 2017)

Figure 55: Existing impact on land illustrated by road crossings and electrical infrastructure around urban settlement (source: Palmer, 2017)

As indicated by the photographs above, the corridor traverses a wide variety of landscapes as it moves from west to east. In some places, the landscape is rural and natural, in others, it is cultivated or transformed in other ways. These have been further described in the terrestrial ecology, aquatic ecology, agricultural and heritage sections above.

During the spatial analysis undertaken by the visual specialist in the screening phase, the features (and in some cases, buffers) listed below in Table 53 were provided for consideration in alignment of the proposed corridor.

Table 53: Visual sensitivity classifications considered during Screening

Level of sensitivity	Feature
No-Go	• Protected park area • Protected reserve area • Protected private reserve • Farmsteads / residences • Settlements / resorts
High	• Landscapes of national scenic value • Water features of national scenic value • Prominent coastal features in the coastal zone • Cultural landscapes of national significance • National Parks / RAMSAR sites - within 500 m • Nature / Biosphere Reserves - within 500 m • Private reserves / game farms - within 500 m • Settlements / towns / resorts - within 250 m • Farmsteads / residences - within 250 m • Scenic routes - within 500 m • National route N2 -within 250 m
Moderate	• Landscapes of regional scenic value • Water features of regional scenic value • 500 m coastal zone • Cultural landscapes of regional significance • National Parks / RAMSAR sites - within 1 km • Nature / Biosphere Reserves - within 1 km • Private reserves / game farms - within 1 km • Settlements / towns / resorts - within 500 m • Farmsteads / residences - within 500 m • Scenic routes - within 1 km • National route N2 -within 500 m • Arterial route R102 -within 250 m
Low	• Landscapes of local scenic value • Water features of local scenic value • 1 km coastal zone • Cultural landscapes of local significance • National Parks / RAMSAR sites - within 1.5 km • Nature / Biosphere Reserves - within 1.5 km • Private reserves / game farms - within 1.5 km • Settlements / towns / resorts - within 1 km • Farmsteads / residences - within 1 km • Scenic routes - within 1.5 km • National route N2 - within 1 km • Arterial route R102 - within 500 m

7.7.2 Impact assessment with mitigation measures

Due to the height and nature of the proposed infrastructure for the Grid Connection, mitigation of visual impacts will either not exist, or only slightly reduce the significance of the impacts. The following criteria were therefore provided during the screening phase to reduce potential visual impacts through avoidance where possible:

- Avoid intact/ pristine natural landscapes – mainly scenic mountainous areas/ ridge skylines;
- Avoid steep slopes, i.e. steeper than 1:4 – the least steep slopes encountered being the preferred alignment;
- Avoid human settlements – the furthest away being the preferred alignment;
- Avoid nature reserves – the furthest away being the preferred alignment;
- Avoid crossing major arterial / scenic routes (e.g. N2) – fewest crossings being preferred; and
- Use existing disturbed/ industrialised areas, and existing powerline corridors as far as possible.

The proposed Grid Connection would potentially add to the visual effect of multiple powerlines in the existing landscape. However, to minimise visual clutter in the landscape, new powerlines should generally be combined with existing power line corridors to minimise further intrusion or fragmentation of pristine or rural landscapes. An exception could be where existing powerlines have been located in a visually sensitive area, so that additional powerlines would exacerbate the visual impact, i.e. lead to high cumulative visual impact.

The following impacts were assessed:

- Visual intrusion related to construction and decommissioning activities on the rural landscape and scenic resources (-);
- Visual obstruction of landscape by operational overhead powerline (-);
- Visual obstruction of landscape by operational switching substations (-); and
- Loss of sense of place (-) (assessed by the EAP with input provided by the socio-economic and heritage specialists).

Table 54: Potential visual intrusion of construction activities on rural landscape and scenic resources

Phase	Pre-Construction	**Construction**	Operational	**Decommissioning**
Impact description	The visual impacts associated with the proposed development include the use and movement of large vehicles and a crane to raise the power line structures. Small maintenance access routes would be created along the proposed powerline route which could result in soil erosion if not adequately managed. Due to the small footprint of the monopole and small track, windblown dust is likely to be limited. Although the construction phase is anticipated to be up to 18-24 months long, the construction impact will move along the alignment, and therefore the full area will not be affected for the full duration. Over and above the potential mitigation of avoidance through the planned layout, the EAP recommends additional mitigation measures in the form of erosion management in the EMPr that can be used to reduce the impacts of the construction phase.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term		Short term	
Extent	Municipal area		Municipal area	
Intensity	Moderate		Moderate	
Significance	**MODERATE (-)**		**MODERATE (-)**	
Probability	Certain/ definite		Certain/ definite	
Confidence	High		Medium	
Reversibility	Medium		Medium	
Resource irreplaceability	Low		Low	
Mitigation measures				

Pre-construction phase:

- Avoidance of high visual impact areas where possible.
- Avoidance of steep slopes (steeper than 1:5 gradient) where possible.
- Use of monopoles, where possible, to minimise visual clutter.
- Switching stations to be located in unobtrusive positions, avoiding ridgelines or hillcrests where possible and to be screened by earth berms and tree planting if required.
- Existing roads/ tracks to be used as far as possible and new access/ maintenance roads kept as narrow as possible.

Construction phase:

- Construction camps and storage to be located in unobtrusive positions in the landscape, away from main roads, farmsteads and scenic areas.
- Construction camps to be clearly delineated and limited in size to only that which is essential.
- Construction activities to be restricted to normal working hours where possible.
- Adherence to an EMPr, monitored by an ECO.

Additional measures added by EAP:

- Soil erosion measures need to be adequately implemented and routinely monitored by the ECO during construction and by the owner of the infrastructure during operation. This should occur monthly during construction, bi-annually during operation, and bi-annually for a year following decommissioning.
- Should the infrastructure be decommissioned, all structures should be removed and recycled where possible.
- The rubble should be managed according to the NEM:WA and deposited at a suitable landfill site if it cannot be recycled or reused.
- All compacted areas should be ripped and then rehabilitated according to a rehabilitation plan.

Table 55: Visual obtrusion of powerline within the Grid Corridor

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Once the 132 kV overhead powerline is operational, it will remain on the landscape for at least 20 years. It will therefore remain visible to sensitive receptors, including the crossing of the N2 and R102 a few times. The moderate significance assessed by the specialist below, considers the residual visual impacts of pylons in the rural landscape. With no mitigation available, the impact remains moderate negative.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going		On-going	
Extent	Municipal area		Municipal area	
Intensity	Moderate		Moderate	
Significance	**MODERATE (-)**		**MODERATE (-)**	
Probability	Certain/ definite		Certain/ definite	
Confidence	High		High	
Reversibility	Medium		Medium	
Resource irreplaceability	Low		Low	
Mitigation measures				
None.				

Table 56: Visual obtrusion of switching stations and collector switching station

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	The proposed Impofu North switching station is located approximately 1 km to the southeast of the R102 and N2, on private farm land, and therefore may be visible from			

	the road. The proposed Impofu West and Impofu Collector switching stations are located a further 4 km away, with the Impofu East switching station approximately 8 km. It is therefore likely that only the Impofu North switching station would have a visual impact on main road users during operation, given that the others are located too far away, and are on private farm land. The visual specialists recommend in their assessment of the construction impacts, that a potential mitigation measure include planting of trees and an earthen berm to screen the proposed switching station.	
	Without mitigation	**With mitigation**
Nature	Negative	Negative
Duration	On-going	On-going
Extent	Local	Local
Intensity	Moderate	Low
Significance	**MODERATE (-)**	**MINOR (-)**
Probability	Certain/ definite	Almost certain/ highly probable
Confidence	High	Medium
Reversibility	Medium	Medium
Resource irreplaceability	Low	Low
Mitigation measures		
• Lighting at switching stations to be minimised through use of reflectors, low-level bollard lights and movement sensors so that lights only come on when required. • Signage to be minimised as far as practical. • Switching station structures and fencing to be regularly maintained to prevent eyesores.		

Table 57: Loss of sense of place

Phase	Pre-Construction	**Construction**	**Operational**	Decommissioning
Impact description	According to the socio-economic specialist, a community's 'sense of place' is developed over time as it embraces the surrounding environment, becoming familiar with its physical properties and creates its own history. This can be impacted upon by a range of factors such as aesthetics, climate, culture and heritage, as well as lifestyle of individuals and as such is a largely subjective matter. The contribution of electrical infrastructure to a landscape that is largely rural will alter the landscape, resulting in a loss of sense of place. Due to the variation in topography, land use and visibility from visual receptors, it is anticipated that this impact will occur at different significance levels across the corridor, with the highest impact occurring around the Gamtoos River flood plain. It is also likely that static sensitive receptors will be impacted if the overhead powerline is constructed within a radius of approximately 500 m of them. In most cases, it is anticipated that the impact will be lessened by aligning the proposed overhead powerline with the existing linear infrastructure to avoid creating a new corridor of impact.			
	Without mitigation		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going		On-going	
Extent	Local		Limited	
Intensity	Moderate		Low	
Significance	**MODERATE (-)**		**MINOR (-)**	
Probability	Certain/ definite		Likely	

Confidence	High	High
Reversibility	Medium	Medium
Resource irreplaceability	Low	Low
Mitigation measures		
• Impofu Grid Connection should be kept as close as possible to existing developments and impacts, especially in the Gamtoos Valley. Examples of linear infrastructure includes roads (R102 and N2), bridges (including pipeline bridge), overhead powerlines, etc. • No new corridor of impact may be created in the Gamtoos valley area, and areas north of the R102 bridge and south of the N2 bridge should be avoided. • . • Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction. • Activities that may disrupt neighbours must be preceded by notice being given to the affected neighbour at least 24 hours in advance.		

7.7.3 Cumulative assessment

The combined potential visual impact of several existing and proposed powerlines in the area could result in increased visual clutter on the skyline, particularly when viewed from the N2 and R102 Routes, and surrounding farmsteads and settlements.

Additional proposed grid connections, currently approved, include the Dieprivier-Kareedouw power line to the north of the proposed Impofu Wind Farms site, which because of its distance from the proposed Impofu Grid Connection, will have no bearing on cumulative visual impacts. The Melkhout-Kromrivier grid connection is existing and only the minor additional Oyster Bay connection, although already approved, is still to be erected.

7.7.4 No-Go assessment

In the No-Go alternative, the absence of a new power line would mean that there would be no additional visual intrusion on the rural landscape and on settlements in the area. Landscape features and skylines would therefore remain intact where other powerlines do not already exist.

7.7.5 Visual impact statement

The fact that the precedent has been set for the area in the west to be developed as a renewable energy node, and that the proposed Impofu Grid Corridor runs along the existing Eskom 132 kV powerline must be taken into consideration. Furthermore, there are several existing Eskom powerlines that converge at the Sans Souci substation in the east, and this is in the vicinity of outlying townships; specifically, a landscape that has already been transformed.

For these reasons, the overall visual impact significance is considered to be moderate to minor in the western and eastern sections of the power line corridor, and moderate in the more rural central sections of the corridor.

8 CONCLUSIONS AND WAY FORWARD

8.1 Summary of findings

The potential impacts associated with the proposed Impofu Grid Connection for the proposed Impofu Wind Farms are summarised below in Table 58. With mitigation measures in place as set out in Chapter 7, post-mitigation impacts are anticipated to be moderate negative to negligible negative significance, and up to moderately positive. These mitigation measures will also be included in the EMPr that will accompany this BAR in the Revised Draft BAR phase.

Anticipated impacts to terrestrial ecology of the site will be largely associated with disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure. The majority of the potential impacts are expected to occur during the construction and decommissioning phases, while operational impacts also include risk of soil erosion and invasion of alien plant species. Significance of impacts on terrestrial ecology with mitigation measures in place was rated as minor negative.

The main negative impact on avifauna includes electrocution of bids and birds colliding with powerlines. Other impacts include electrical faults caused by bird's excreta when roosting or breeding on the powerlines, and displacement through disturbance and habitat destruction. Loss of habitat and disturbance would occur during the construction and decommissioning phases, while the other anticipated impacts are anticipated to occur during the operational phase. Significance of impacts on avifauna with mitigation measures in place was rated between minor negative and negligible.

In terms of aquatic ecology considerations, the proposed Grid Corridor covers nine quaternary catchments that are characterised by perennial, non-perennial watercourses and drainage lines associated with the mainstem systems within each quaternary catchment. During the Screening Phase, the aquatic ecologist provided the project team with a comprehensive digitisation of the watercourses (including wetlands) in the area. Provided the pylons are placed with the consideration of the No-Go condition of staying 50 m outside of a watercourse and wetland, which will be confirmed during a micro-siting walkthrough with a suitable aquatic specialist, then only two impacts are anticipated. These include the potential impacts on localised water quality, and a possible increase in sedimentation and soil erosion. However, with mitigation, both of these are anticipated to be negligible.

Heritage resources include archaeological, paleontological and cultural heritage material. The palaeontologist assessed the area in four sections, finding that two of the sections potentially were more sensitive than the others. One No-Go area and one area that would require assistance in micro-siting were identified, and the impact on palaeontology was considered negligible. The archaeologist considered a desktop archaeological assessment undertaken by Eastern Cape Heritage Consultants in 2017 in addition to his own assessment. A number of sensitive areas along the corridor have been identified, and with buffers provided should not be impacted by the construction of the overhead powerline. Grave yards, a historic narrow-gauge railway line and the Kabeljous River Rock shelters are some of the heritage receptors that were of major concern, however the final impacts after mitigation were considered to be minor negative to negligible. Given the highly localised nature of the impact, the archaeologist has indicated that a micro-siting walkthrough must be undertaken prior to construction as this can ensure that any unforeseen impacts are easily mitigated by moving the pylon location if required.

It is anticipated that impacts on the socio-economic environment will be of a local to regional extent, with some national. During the construction and decommissioning phase potential negative impacts include harm to social networks with the presence of external construction workers, impacts to the local tourism industry through changes in the visual environment, nuisance impacts such as an increase in dust and traffic and noise. However, these are all anticipated to be negligible with mitigation. Potentially positive impacts include job creation and contribution to local livelihoods, and the indirect impacts of government revenue from capital spend. These are assessed as moderate positive with and without mitigation implemented.

The components of the project that can impact on soils, agricultural resources and productivity include the area transformed by the footprint of the facility, and the associated construction activities that disturb the soil profile and vegetation. The agricultural impacts of an overhead power line in this kind of an environment are considered negligible by the agricultural specialist, as long as the pylons avoid centre pivots. However, given that some areas along the corridor contain arable land, of which South Africa only has 10 % this impact was considered minor negative.

Given that the Grid Corridor covers a large distance, up to 70 % of which will be aligned with the N2 or R102, the overhead powerline will be visible to road users. Furthermore, a number of other sensitive receptors were also identified. With little mitigation available for a linear structure standing up to 32 m tall, it is important that consideration be taken into account during alignment design. The potential visual obtrusion of the construction and operational phases of the overhead powerline is considered to remain moderate negative with mitigation. The loss of sense of place is a visual impact that relates to both the assessment of the cultural landscape, and impact on people in the area. It was therefore combined by the EAP, with input provided by the visual, socio-economic and heritage specialists. It is important to note that although assessed as a full Grid Corridor, it is anticipated that these impacts will be more significant in certain sensitive areas, like the Gamtoos River valley.

Table 58: Summary of impacts

Aspect	Impact	Without mitigation	With mitigation
Construction			
Terrestrial Ecology	Impacts on vegetation and plant species of conservation concern	Moderate (-)	Minor (-)
	Direct and indirect faunal impacts	Minor (-)	Minor (-)
	Increased soil erosion risk	Minor (-)	Minor (-)
Avifauna (Birds)	Displacement due to construction-related disturbance	Minor (-)	Negligible (-)
	Displacement due to habitat transformation	Minor (-)	Minor (-)
Aquatic Ecology	Potential impacts on localised water quality	Minor (-)	Negligible (-)
	Increase in sedimentation and erosion	Minor (-)	Negligible (-)
Heritage	Disturbance, damage or destruction of fossils preserved at surface or below ground	Negligible (-)	Negligible (-)
	Damage to graves and graveyards	Moderate (-)	Negligible (-)
	Damage to historic narrow gauge railway line and associated structures	Minor (-)	Negligible (-)
	Damage to Kabeljous River Rock Shelters	Moderate (-)	Minor (-)
Socio-economic	Creation of employment and business opportunities	Moderate (+)	Moderate (+)
	Harm to social networks with presence of external construction workers	Minor (-)	Negligible (-)
	Nuisance impacts such as dust, noise and traffic	Minor (-)	Negligible (-)
	Sustainable increase in national and local government revenue	Moderate (+)	Moderate (+)
	Impact on Local tourism industry	Negligible (-)	Negligible (-)
Agriculture	Loss of agricultural potential on the impacted land	Minor (-)	Negligible (-)
Visual	Potential visual intrusion of construction activities on rural landscape and scenic resources	Moderate (-)	Moderate (-)
	Loss of sense of place	Moderate (-)	Minor (-)
Operation			
Terrestrial Ecology	Increased soil erosion risk	Minor (-)	Minor (-)
	Impacts on Critical Biodiversity Areas	Moderate (-)	Minor (-)
Avifauna (Birds)	Mortality due to electrocution	Minor (-)	Negligible (-)
	Mortality due to collisions	Moderate (-)	Minor (-)
Socio-economic	Strengthening of grid and supply of local renewable electricity	Moderate (+)	Moderate (+)
	Sustainable increase in national and local government revenue	Moderate (+)	Moderate (+)
	Impact on farm property prices	Minor (-)	Negligible (-)
	Health impacts associated with exposure to electromagnetic field	Minor (-)	Minor (-)
	Impact on Local tourism industry	Negligible (-)	Negligible (-)
Agriculture	Loss of agricultural potential on the impacted land	Minor (-)	Negligible (-)

Aspect	Impact	Without mitigation	With mitigation
Visual	Visual obtrusion of powerline within the grid corridor	Moderate (-)	Moderate (-)
	Visual obtrusion of switching stations and collector switching station	Moderate (-)	Minor (-)
	Loss of sense of place	Moderate (-)	Minor (-)
Decommissioning			
Terrestrial Ecology	Direct and indirect faunal impacts	Minor (-)	Minor (-)
	Increased soil erosion risk	Minor (-)	Minor (-)
Avifauna	Displacement of priority species due to disturbance	Minor (-)	Minor (-)
Aquatic Ecology	Potential impacts on localised water quality	Minor (-)	Negligible (-)
Socio-economic	Creation of employment and business opportunities	Moderate (+)	Moderate (+)
	Harm to social networks with presence of external construction workers	Minor (-)	Negligible (-)
	Nuisance impacts such as dust, noise and traffic	Minor (-)	Negligible (-)
	Sustainable increase in national and local government revenue	Moderate (+)	Moderate (+)
Agriculture	Loss of agricultural potential on the impacted land	Minor (-)	Negligible (-)
Visual	Potential visual intrusion of construction activities on rural landscape and scenic resources	Moderate (-)	Moderate (-)

8.2 Recommendations and opinion of the EAP

The EAP recommended that this project undergo an additional comment period prior to the application being submitted to DEA (pre-application process). By adopting this precautionary approach, it ensures that more accurate, detailed and relevant information is available to all stakeholders (Proponent, engineers, specialists, authorities, I&APs etc.) early in the process. Therefore, it is more likely that once a project is subject to the detailed and time restricted legislated BAR process, potential significant impacts have already been identified and avoided (where possible) which reduces the likelihood of significant issues needing to be dealt with during the legislated BAR process. This allows for more confidence in the project with a greatly reduced risk for the environment. This precautionary approach leads to a far more robust and relevant assessment which allows for the DEA to make a more informed decision.

As highlighted in Section 4.2 and Annexure C, the addition of this extra pre-application process provided an opportunity for up to five weeks of engagement with the findings of this assessment by reviewing the reports and engaging with the project team at three public meeting meetings (both open house and presentation style). The pre-application process was made accessible by offering a range of information sources for the project such as non-technical summaries which summarise the contents of this report in a non-technical format, a background information document which provides a high-level explanation of the proposed Impofu Wind Farms development (inclusive of this proposed Grid Corridor) as well as a one-page pamphlet that was designed for low levels of literacy. Relationships have also been established with affected landowners within the corridor via telephone, and farmers' associations have been engaged with, which will be built upon in the PPP of the Draft BAR. All of this should result in the levels of uncertainty being reduced.

It is the opinion of the EAP that no fatal flaws have been identified and No-Go areas have been identified by the relevant specialists and these will be avoided by the proposed alignment. The mitigation measures proposed by the EAP and relevant specialists (Section 7) are recommended to manage the identified impacts associated with the proposed Grid Connection infrastructure (including access and service roads and temporary construction footprint). We request that these be considered by the I&APs and competent and commenting authorities, and should the project be authorised in the future, that the following conditions be included in the EA.

Condition 1: The holder of the EA shall appoint and Environmental Control Officer (ECO) for the construction phase of the development to monitor the implementation of the specified mitigation measures. The operator should appoint an environmental officer or other suitably qualified individual during the operational phase, to oversee and

monitor the implementation of the specified management and mitigation measures. The holder of the EA remains ultimately responsible for ensuring the mitigation/ rehabilitation measures are implemented.

Condition 2: Any work that falls within 32 m of a drainage line, and 500 m of a wetland will require the relevant authorisations form the Department of Water and Sanitation, prior to construction.

Condition 3: A final walk-through or desktop assessment of the alignment must be conducted by ecological, freshwater/ aquatic, archaeological and avifaunal specialists.

8.3 Level of confidence in assessment

Assessment of potential environmental impacts requires prediction of the impacts of a defined activity against the collected baseline data, through application of professional judgement. It therefore depends on the level of information available describing the activity; the quality of the baseline data collected; and the skills and expertise of the specialists involved. The BA project team has been listed in Table 2 and CVs of the EAP are included in Annexure A, with CVs of the specialists included in Annexure D.

Given the experience across South Africa with the construction and operation of overhead powerlines, the limited footprint of the proposed pylons, and the specialist findings (included in Annexure D) it is considered that the findings of this BAR will provide the developer with enough conditions to align the 31 m servitude appropriately within the 2 km corridor. Furthermore, where the micro-siting of each pylon is critical towards the impact on an environmental aspect (such as archaeological finds, or watercourses), the specialist has indicated that a micro-siting walk down must be undertaken post authorisation.

Each specialist study with the exception of socio-economic included at least one site visit to the area (in some cases more) and the time spent on site occurred in an appropriate season. Furthermore, many of the specialists have been involved in many other projects in the area. It is also assumed that the additional PPP provided for in this BA (see Sections 4.1, 4.2 and Annexure C) will encourage I&APs to provide input into the assessment with local social-ecological knowledge.

8.4 Way forward

This revised Draft BAR considered the comments that were raised during the Pre-Application BAR process, the first draft BAR, ongoing landowner consultation, changes in corridor alignment as well as further specialist input and has been updated accordingly. The updated report has now been made available again for a 30-day public comment period in September 2019, as a revised draft BAR. All comments received on the revised Draft BAR will be collated, responded to and included in the updated Public Participation Report (Annexure C).

Following the closure of the 30-day public comment period in October 2019, the report will be updated to final and will be submitted to DEA for review and decision making (for 107 days) whereby an Environmental Authorisation would be granted or refused. All registered I&APs will be notified of the outcome of the decision-making process.

ANNEXURES

Annexure A: EAP declaration and CVs

Annexure B: Landowner identification

Annexure C: Public participation report

Annexure D: Specialist reports

Annexure E: Environmental Management Programme (EMPr)