Msenge Emoyeni Powerline Deviation

BASIC ASSESSMENT:
AQUATIC BIODIVERSITY IMPACT ASSESSMENT REPORT

Prepared for:
Nala Environmental (Pty) Ltd.

Prepared by:
Scherman Environmental cc.
8 Jacobus Uys Street, Hill60
Makhanda
6139

June 2022

SCHERMAN ENVIRONMENTAL
Aquatic & Environmental Management Consulting

EXECUTIVE SUMMARY

The Msenge Emoyeni WEF is located approximately 20km south of the town of Bedford in the Eastern Cape Province; in the Great Fish River catchment of Water Management Area (WMA) 7, i.e. the Mzimvubu to Tsitsikamma WMA. The study area straddles quaternary catchment Q91A draining south into the Oliewenboskloof and Riet rivers; and Q92F, draining north into the Biesiesleegte and eNyara rivers.

Project activities considered in this specialist report are as follows:

- 66kV overhead single circuit powerline approximately 22.7km long in a 300m wide assessment corridor (150m on either side), from the proposed Msenge Emoyeni Wind Energy Facility (WEF) onsite substation to the Poseidon MTS.
- Access tracks of up to 7m in width following the powerline route from the proposed onsite substation to the Poseidon MTS to enable construction and maintenance activities.
- Water course crossings along the powerline route from the proposed onsite substation to the Poseidon Main Transmission Substation.
- 33kV/132kV on-site substation with a footprint occupying an area of 250m x 200m, within a 300m radius to allow movement where possible.

Due to the extensive spread of hydrological features in the landscape, the purpose of the aquatic assessment was to cover as much of the study area as possible and evaluate drainage features through ground-truthing, as compared to mapped features. A field survey in March and April 2022 verified the Moderately Modified (C category) aquatic features across the study site. The freshwater (aquatic) landscape in the footprint of the proposed infrastructure predominantly falls within ESA 1. Two of the water course crossings are classified as CBA 1 areas and several CBA 2 areas occur within close proximity to the buffer zone of the OHL.

The impact assessment showed that most impacts were Medium and can be mitigated to Low. The following impacts are anticipated and were assessed.

- Changes to the hydrological regimes of streams.
- Loss of riparian vegetation along streams and drainage channels.
- Sedimentation and increasing turbidity levels of instream habitats, loss of instream habitat and aquatic biota.
- Dumping of rubble in riparian zones and dry river channels.
- Chemical pollution of the streams.
- Impacts on wetlands.

Due to the extensive number of instream farm dams across all the properties assessed during the site survey of March and April 2022, resulting in highly fragmented drainage systems, it is recommended that 100m buffers be applied across the area. Implementation of a 100m buffer along drainage lines, many often include large instream artificial dams, may provide some protection for severely impacted drainage systems in the study area. Should infrastructure be required within this buffer, a site-specific assessment should be conducted to consider whether the 100m “protection” buffer can be downgraded to a 32m regulatory/planning buffer.

Note that water use licensing will be required for the development.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

BA(R)	Basic Assessment (Report)
BCP	Biodiversity Conservation Plan
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
CSIR	Council for Scientific and Industrial Research
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EC	Ecological Category
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECBSAP	Eastern Cape Biodiversity Strategy and Action Plan
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
ESA	Ecological Support Area
ETS	Ecosystem Threat Status
GA	General Authorisation
GE	Google Earth
MTS	Main Transmission Substation
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act
NWM5	National Wetlands Map 5
PES/EI/ES	Present Ecological State/Ecological Importance/Ecological Sensitivity
REDZ	Renewable Energy Development Zone
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SPLUMA	Spatial Planning and Land Use Management Act
SQR	sub-quaternary reach
SWSA	Strategic Water Source Area
TBC	The Biodiversity Company
WEF	Wind Energy Facility
WMA	Water Management Area
WULA	Water Use License Application

1 INTRODUCTION AND CONTEXT

1.1 Background

Msenge Emoyeni Wind Farm (Pty) Ltd. is proposing the deviation of the authorised 132kV overhead powerline for the Msenge Emoyeni Wind Energy Facility (WEF) from the onsite substation to the Poseidon Main Transmission Substation (MTS), (DFFE Ref: 12/12/20/1754/2).

The project has been selected as a preferred bidder via private offtake. Following liaison with Eskom it was determined that in order to provide suitable setbacks to the existing and operational Amakhala and Nojoli WEFs turbines, and to follow the existing Albany-Poseidon 132kV powerline as closely as possible while reducing/optimizing crossing points, the 132kV powerline routing has to deviate from its authorised routing. The new routing falls outside of the previously assessed 20-30m wide servitude.

A 66kV powerline route with a corridor of approximately 300m (150m on either side of the centre line) with associated access tracks and watercourse crossings is proposed to evacuate power from the proposed 33/132kV onsite substation for Msenge Emoyeni WEF. The assessment of the 300m grid connection corridor provides an opportunity for the consolidation of linear electrical infrastructure within the area (Nala Environmental, 2022).

This report has been prepared as per Section 17 of GNR 543 – Environmental Impact Assessment Regulations and the National Environmental Management Act (No. 107 of 1998) which specifies the General Requirements for a person compiling a specialist report or undertaking a specialised process. All specialists' work has been conducted independently of influence or prejudice by any parties.

This study has been commissioned to meet the requirements of a BA process in the form of a single assessment, as set out by the National Environmental Management Act (1998). Furthermore, this study should and has been done in accordance with the Gazetted Protocols 3(a),(c) and (d) in terms of Section 24(5)(a) and 24(5)(h) of NEMA (Published on the 20th of March 2020); and meet the requirements as set out within the Aquatic Biodiversity Protocol published in GN NO. 1105 of 30 October 2020.

1.2 Study Area

The Msenge Emoyeni WEF is located approximately 20km south of the town of Bedford in the Eastern Cape Province **(Figure 1.1)**; in the Great Fish River catchment of Water Management Area (WMA) 7, i.e. the Mzimvubu to Tsitsikamma WMA. The study area straddles quaternary catchment Q91A draining south into the Oliewenboskloof and Riet rivers; and Q92F, draining north into the Biesiesleegte and eNyara rivers.

The grid connection infrastructure related to the WEF is located within the Cookhouse Renewable Energy Development Zone (REDZ) and Eastern Power Corridor. The following properties were identified for the development of the proposed 66kV powerline, the on-site substation and associated access tracks and water course crossings (Nala Environmental, 2022):

- Remainder of Farm Leeuw Fontein No. 221
- Portion 1 of Farm Normandale No. 206
- Portion 3 of Farm Plat House No. 203

- Remaining Extent of Farm Kop Leegte No. 205
- Remainder of Farm 260 No. 260
- Remainder of Farm 242 No. 242
- Remainder of Farm 148 No. 148
- Portion 3 of Farm 148 No. 148
- Portion 5 of the Farm Van Wyks Kraal No.73

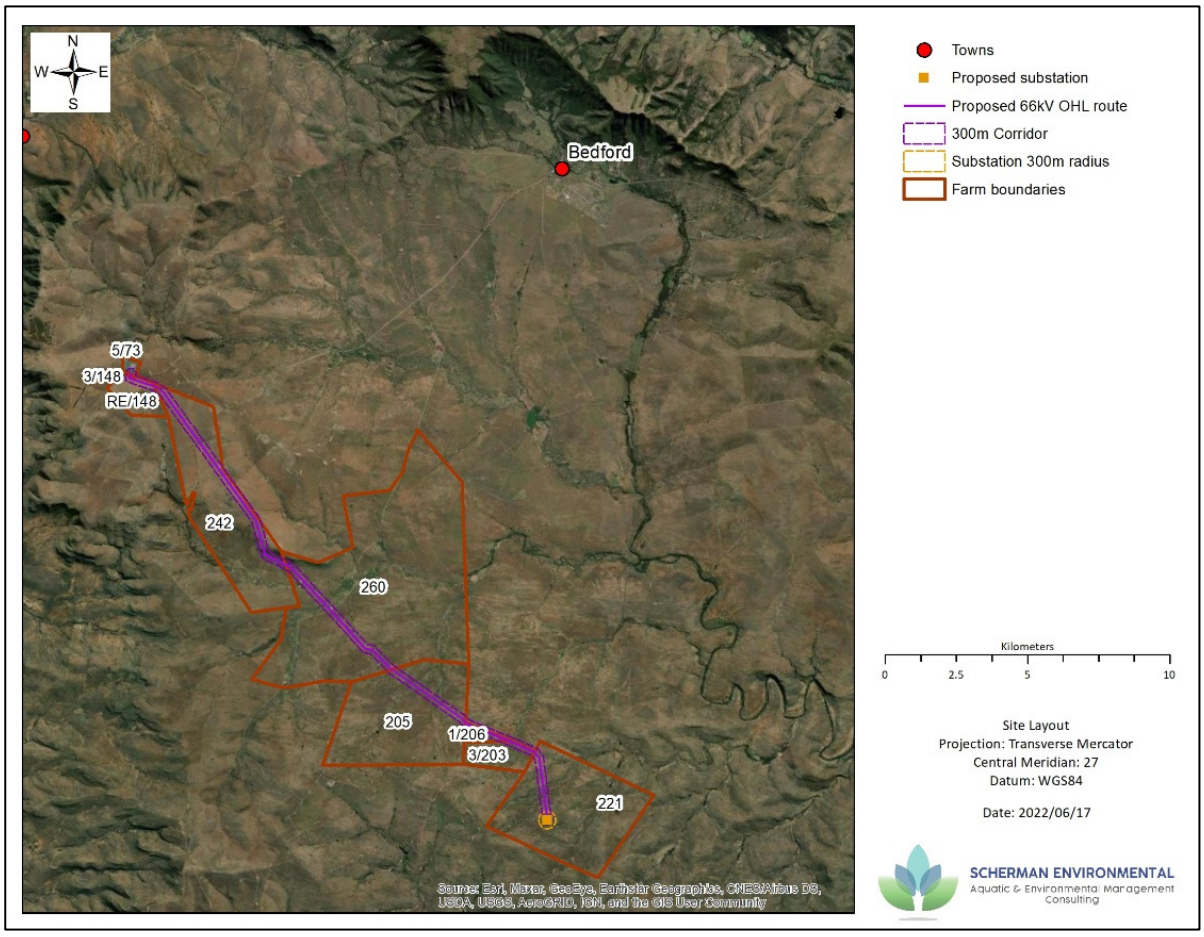

Figure 1.1. Locality map showing the Msenge Emoyeni WEF's proposed 66kV powerline

1.3 Project Activities

Project activities for this Basic Assessment (BA) are as follows (Nala Environmental, 2022):

- 66kV overhead single circuit powerline approximately 22.7km long in a 300m wide assessment corridor (150m on either side), from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS.
- Access tracks of up to 7m in width following the powerline route from the proposed onsite substation to the Poseidon MTS to enable construction and maintenance activities.
- Water course crossings along the powerline route from the proposed onsite substation to the Poseidon MTS.
- 33kV/132kV on-site substation with a footprint occupying an area of 250m x 200m, within a 300m radius to allow movement where possible.

The proposed powerline route and associated infrastructure is shown on **Figure 1.2.**

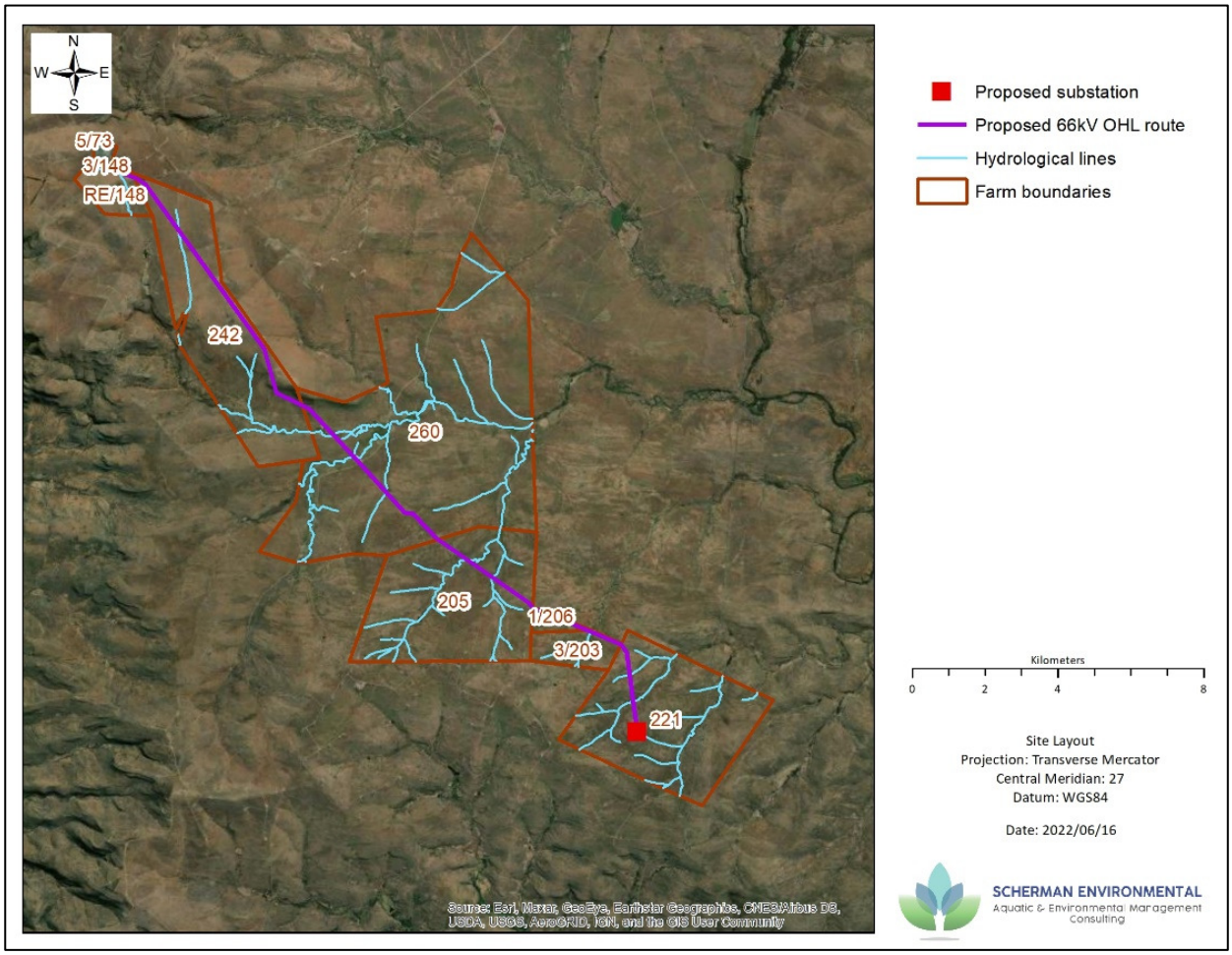

Figure 1.2. Msenge powerline routing and associated infrastructure

1.4 Project Team

The aquatic team consisted of the following members and associates of *Scherman Environmental*:

Specialist & role	Qualification and accreditation
Dr Patsy Scherman *Field Survey* *Author*	PhD, Biotechnology Professional Natural Scientist: Aquatic Science,120112 (SACNASP). South African Society for Aquatic Scientists (SASAQS).
Mr Nic Huchzermeyer *Mapping*	MSc, Geography

1.5 Relevant Legislation And Policy

Locally the South African Constitution, numerous Acts and international treaties allow for the protection of rivers and water courses. These systems are therefore protected by the following pieces of legislation and policies:

- Section 24 of The Constitution of the Republic of South Africa (Act No. 108 of 1996)
- Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998
- National Environmental Management (NEM) Act (referred to as NEMA), 1998 (Act No. 107 of 1998) inclusive of all amendments e.g. Government Gazette No. 38282 of December 2014), as well as the NEM: Biodiversity Act, 2004 (Act No. 10 of 2004) and 2009 (Act No. 291 of 2009), NEM: Protected Areas Act, 2003 (Act No. 57 of 2003) and NEM: Waste Act (Act No. 59 or 2008)
- National Biodiversity Strategy and Action Plan (2015)
- National Water Act (NWA), 1998 (Act No. 36 of 1998)
- National Water Services Act, 1997 (Act No. 108 of 1997)
- Environment Conservation Act, 1989 (Act No. 73 of 1989)
- National Agricultural Act, 1970 (Act No. 70 of 1970)
- Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983)
- Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
- Nature and Environmental Conservation Ordinance (Act No. 19 of 1974)
- National Forest Act (Act No. 84 of 1998)
- Environmental Impact Assessment (EIA) regulations of 2017
- National Freshwater Ecosystems Priority Areas (NFEPA; Nel et al., 2011): NFEPA provides guidance on which rivers, wetlands and estuaries should remain in a natural or near-natural condition. It supports the implementation of the National Water Act, the Biodiversity Act and the Protected Areas Act.
- Land Use Planning Ordinance (No. 15 of 1985)
- Land Use Management Act, 2007
- Spatial Planning and Land Use Management Act (SPLUMA), 2013

Specific legislation pertaining to wetlands are also available as follows:

- NEMA, 1998 (Act No. 107 of 1998). Definitions pertaining to wetland ecosystems are contained in the 7 April 2017 revision (GN R324-7).
- NWA, 1998 (Act No. 36 of 1998)
- CARA, 1983 (Act No. 43 of 1983)
- RAMSAR Convention on Wetlands of International Importance (signed in 1971)
- World Heritage Convention Act (Act No. 49 of 1999)

1.5.1 National planning tools

National Freshwater Ecosystem Priority Areas (NFEPA), 2011

The NFEPA project was initiated to meet national biodiversity goals for freshwater ecosystems, and to provide protection measures for delineated FEPAs. A NFEPA atlas and implementation manual were the main

products of this study, spearheaded by the Council for Scientific and Industrial Research (CSIR). NFEPAs were identified based on a range of criteria:

- Representing river, wetland and estuary ecosystem types;
- Representing free-flowing rivers;
- Maintaining water supply areas in areas with high water yield and high groundwater recharge;
- Identifying connected systems;
- Representing threatened fish species and associated migration corridors;
- Preferentially identifying FEPAs that overlapped with:
    - Any free-flowing river;
    - Priority estuaries identified in the National Biodiversity Assessment 2011; and
    - Existing protected areas and Department of Environmental Affairs' focus areas for protected area expansion.

Note that NFEPAs were identified on a desktop basis using specialist expertise and mapping, so the best available information at the time. Wetlands identified included both natural and artificial wetlands, which have been ground-truthed to some degree over time, with the latest information on natural wetlands captured in the National Wetlands Map version 5 (NWM5). Note that an update of NFEPA 2011 is currently in the planning phase.

PES/EI/ES (Present Ecological State / Ecological Importance / Ecological Sensitivity) assessment, 2014

In the absence of detailed studies to assess ecological state, and to aid decision-making, Present Ecological State (PES) and Ecological Category (EC) data for rivers are available on a desktop basis through a study funded jointly by the Department of Water and Sanitation (DWS) and the Water Research Commission, i.e. the PES/EI/ES study, completed for all WMAs of South Africa in 2014.

Data available in 2011 were forwarded to project teams and updated to include all known and recent data, so as to produce the final present state and recommended ecological categories per sub-quaternary reach (SQR) and catchment for the country. Each SQR was assessed thoroughly by a team of specialists using available data and Google Earth (GE) to "ground-truth" assessed rivers. During the PES/EI/ES study, the present state is assessed according to the following six metrics that represents a very broad qualitative assessment of both the instream and riparian components of a river. Each metric is scored from zero to five.

- Potential instream habitat continuity modification
- Potential riparian/wetland habitat continuity modification
- Potential instream habitat modification activities
- Potential riparian/wetland zone modifications
- Potential flow modification
- Potential physico-chemical modification activities

SQR data provided to specialists by the DWS were for significant water sources from the 1:500 000 spatial dataset of the rivers of South Africa. This is a valuable tool when desktop first level assessments are required, or when a catchment overview of present state is needed. The approach and results for Eastern Cape catchments are documented in Birkhead et al. (2013) and DWS (2014). Note that the update of the 2014 PES/EI/ES database is currently out for tender.

National Biodiversity Assessment (NBA), 2018

The NBA uses a series of headline indicators, providing information on the threat status and protection level of ecosystems and species, and provides information on the risk of potential extinction of species or collapse of ecosystems (SANBI, 2019).

One of the main improvements since the 2011 NBA is the mapping of wetlands, resulting in the production of NWM5, used as a mapping tool for this aquatic assessment. A South African Inventory of Inland Aquatic Ecosystems (SAIIAE, van Deventer et al., 2018) was established during the NBA 2018 and offers a collection of data layers pertaining to ecosystem types and pressures for both rivers and inland wetlands. This inventory builds on previously available information from studies such as NFEPA, PES/EI/ES and NBA 2011 to provide updated mapping products for rivers and wetlands.

Strategic Water Source Areas (SWSAs), 2018

Water Source Areas are *natural* places or areas, such as water catchments, which produce disproportionately greater volumes of water per unit area than other areas. Surface water SWSAs are all located in high rainfall areas. SWSAs are therefore defined as areas of land that either (a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important, or (b) have high groundwater recharge and where the groundwater forms a nationally important resource, or (c) areas that meet both criteria (a) and (b). They are vital for water and food security in South Africa and also provide the water used in generating most of the electricity (Le Maitre et al., 2018a).

Twenty-two (22) SWSAs for surface water and 37 for groundwater were delineated as significant and strategically important at a national level, and a further nine surface water SWSAs at a sub-national level. Documentation for identification, delineation and importance, and a management framework and implementation guidelines were published in 2018 (Le Maitre et al., 2018a and b).

1.5.2 Regional and provincial legislation and policy, and spatial planning tools

The following **biodiversity and spatial planning** documents are relevant to the Eastern Cape:

- Eastern Cape Environmental Conservation Bill (2003)
- Eastern Cape Biodiversity Conservation Plan (ECBCP) (Berliner & Desmet, 2007; ECBCP, 2019).

Note that the ECBCP is a systematic biodiversity plan, and a key informant of the Eastern Cape Biodiversity Strategy and Action Plan (ECBSAP). A Biodiversity Conservation Plan (BCP) is a provincial dataset that guides and informs land use and resource-use planning and decision-making in order to preserve long-term functioning and health of priority areas outside of the protected areas network (ECBCP, 2019).

Critical Biodiversity Areas (CBAs)

CBAs are selected to meet biodiversity targets for species, ecosystems and ecological processes. These include:

- Critically Endangered and Endangered Ecosystems
- Critical linkage points (bottle-necks or pinch-points) in the corridor network
- All areas required to meet biodiversity targets and to ensure future persistence of species, ecosystems and special habitats.

CBAs are therefore areas of high biodiversity value and should therefore be maintained in a natural state, with no further loss of habitat.

Ecological Support Areas (ESAs)

ESAs are areas NOT essential for meeting biodiversity targets, but are essential in terms of:

- Terrestrial landscape: Ensuring connectivity between CBAs, strengthening climate change resilience, and proper function of ecosystem infrastructure for delivery of ecosystem services. From a terrestrial perspective, ESAs may include riparian areas, coastal corridors, ridges, etc.
- Aquatic landscape: ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands.
- ESAs need to be maintained in a semi-natural, if not natural, state.

2 AQUATIC ASSESSMENT

Requirements stipulated in the *"Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the National Environmental Management Act (NEMA), 1998, when applying for Environmental Authorisation"*, (GN 320, 20 March 2020), Protocol for the assessment and reporting of Environmental impacts on aquatic biodiversity, were followed and presented in this report. The Screening reports prepared by Nala Environmental (Pty) Ltd. on 8/5/2022 showed that the Aquatic Biodiversity Theme for the substation development is of Low Sensitivity, therefore requiring an Aquatic Biodiversity Compliance Statement. The Aquatic Biodiversity Theme for the powerline route is of Very High Sensitivity due to Freshwater ecosystem priority area quinary catchments, and it was therefore concluded to conduct a full specialist report.

According to GN 320, a site sensitivity verification must be undertaken to verify the rating recorded in the Screening Report, through the use of:

- A desktop analysis, using satellite imagery,
- preliminary on-site inspection, and
- any other available and relevant information.

2.1 Scope of Work

- A desktop assessment to enable the collation of as much information as possible prior to any fieldwork.
    - This step includes mapping of the drainage lines, streams and wetlands in the study area using latest available overlays, imagery and documents such as the 2019 Eastern Cape Biodiversity Conservation Plan (ECBCP).
    - The desktop PES/EI/ES database of the DWS (DWS, 2014) to provide information on the current state of rivers and streams, prior to a site survey.
- Undertake one site assessment or survey to ground-truth the desktop assessment.
- Preparation of maps showing sensitive areas (Google Earth kmz files to be generated).
- Identification of any No Go areas, with reasons.
- Identify and rate potential environmental impacts in terms of acceptable EIA methodology to be provided by the client.
- Identify mitigations for negative and positive impacts, while proposing suitable buffers if necessary.
- Make recommendations for the Environmental Management Programme Report (EMPr).
- Prepare the relevant chapter of the BAR.

2.2 Approach and Methodology

The following GE kml files were prepared and provided to the aquatic specialist before the field survey was initiated.

- Topo Rivers Line from the CD: NGI (Chief Directorate: National Geo-Spatial Information) dataset 2006
- Hydrological layer of drainage lines, rivers and stream from NFEPA rivers 2010 - this only included two drainage lines; the focus was therefore on the data from CD: NGI
- NFEPA 2011 wetlands and wetland clusters (Nel et al., 2011)
- NBA Artificial Wetlands 2018
- NBA NWM5 2018

Ground-truthing was undertaken on 29-30 March and 13 April 2022, and relied on an evaluation of instream and riparian habitat and mapping and aerial imagery. Drainage lines were primarily dry at the time of the field surveys.

2.3 Assumptions and Limitations

It is acknowledged that the following constraints may have affected this assessment:

- There is a reliance on previous reports and surveys and desktop mapping due to the extent of drainage features in the area.
- Field surveys provide a 'snap-shot' of the current aquatic environment, with little water evident in drainage lines across the study site.
- A handheld GPS was used in the mapping of significant points on-site. The accuracy of the GPS is affected by the availability of corresponding satellites and accuracy ranges from 3 to 6 meters.

2.4 Desktop Assessment

Various land use data, contour data, geology and the latest aerial imagery were examined in a thorough desktop review of the site. The use of GIS included the desktop consideration of the following data sets:

- The National Freshwater Ecosystems Priority Areas (Nel et al., 2011), showing wetlands delineated by NFEPA.
- National Biodiversity Assessment (NBA, 2018) and National Wetlands Map 5 (NWM5), showing *natural* wetlands delineated in the area.
- The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019), defining Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) across the site.
- Delineated SWSAs were reviewed (Le Maitre et al., 2018a). None appear on this site.

2.5 Site Survey and Methodology Of Assessment

Due to the extensive spread of hydrological features in the landscape, the purpose of the aquatic assessment was to cover as much of the study area as possible and evaluate drainage features through ground-truthing, as compared to mapped features.

Note that the BA specialist assessment has utilized previous data and information on the Msenge WEF site (e.g. Colloty, 2013 and The Biodiversity Company (TBC), 2020), as well as the Walkthrough notes and reports prepared as part of Msenge Wind Farm Wind Farm (Pty) Ltd.'s proposed current wind farm layout of the Msenge WEF (Scherman Environmental, 2022). Although the proposed onsite substation and powerline deviation corridor is at specific locations and along specific routes, coverage of the area from a drainage and aquatic features perspective is wider than these specified areas.

3 RESULTS

3.1 Desktop Assessment

The systems were classified as follows during the BA undertaken in 2012 (Colloty, 2013):

- Upper foothill drainage lines, with no visible channels, with limited inundation, and only contains small amounts of surface run-off during high rainfall events
- Lower foot hill streams, with visible channels, narrow riparian zones and small pools
- Farm dams, classified as man-made or artificial; primarily identified by NFEPA.
- Natural wetlands; identified by NWM5.

The aquatic specialist work was updated and redone in October 2020 by The Biodiversity Company (TBC, 2020), with this report presenting an additional iteration related to the powerline deviation.

3.1.1 Biodiversity Conservation Planning and mapping outputs

A number of biodiversity planning and mapping outputs are included below:

The desktop assessment included the identification of **CBAs and ESAs**, as shown in **Figure 3.1.** The freshwater (aquatic) landscape in the footprint of the proposed infrastructure predominantly falls within ESA 1. Two of the water course crossings are classified as CBA 1 areas and several CBA 2 areas occur within close proximity to the buffer zone of the OHL.

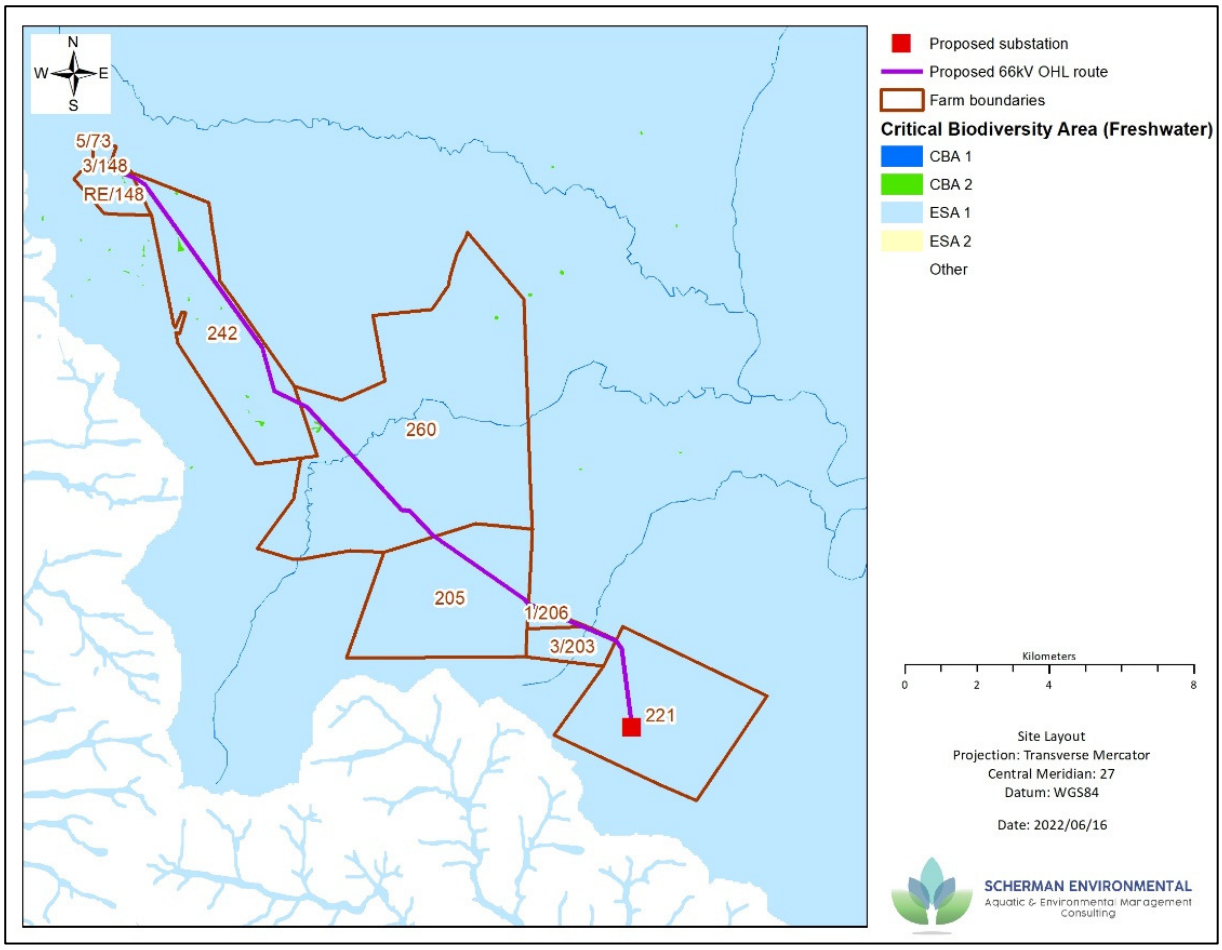

Figure 3.1. Map of aquatic CBAs and ESAs identified for the study area

The link between CBA category and management objective is shown below, according to ECBCP (2019).

CBA Map Category	Desired State	Land management objective
CBA 1	Natural	Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA1, the following objectives must apply: • Ecosystem and species must remain intact and undisturbed; • Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met; • Important: these biodiversity features are at, or beyond, their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented.
CBA 2	Natural	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA2, the following objectives must apply: • Ecosystem and species must remain intact and undisturbed; • There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA2 area may elevate other CBA 2 areas to a CBA 1 category.

		• These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented
ESA 1	Functional	Maintain ecological function within the localized and broader landscape. A functional state means that the areas must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA 1, the following objectives apply: • These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. • These systems may vary in condition and maintaining function is the main objective, therefore: - ecosystems still in natural or near natural state should be maintained - ecosystems that are moderately disturbed/degraded should be restored

The National Protected Area Expansion Strategy (NPAES), updated in 2017, presents a 20-year strategy for the expansion of protected areas in South Africa for improved ecosystem representation, ecological sustainability and resilience to climate change (DEA, 2016). The proposed powerline corridor and associated grid infrastructure does not fall within the 2017 NPAES (**Figure 3.2**).

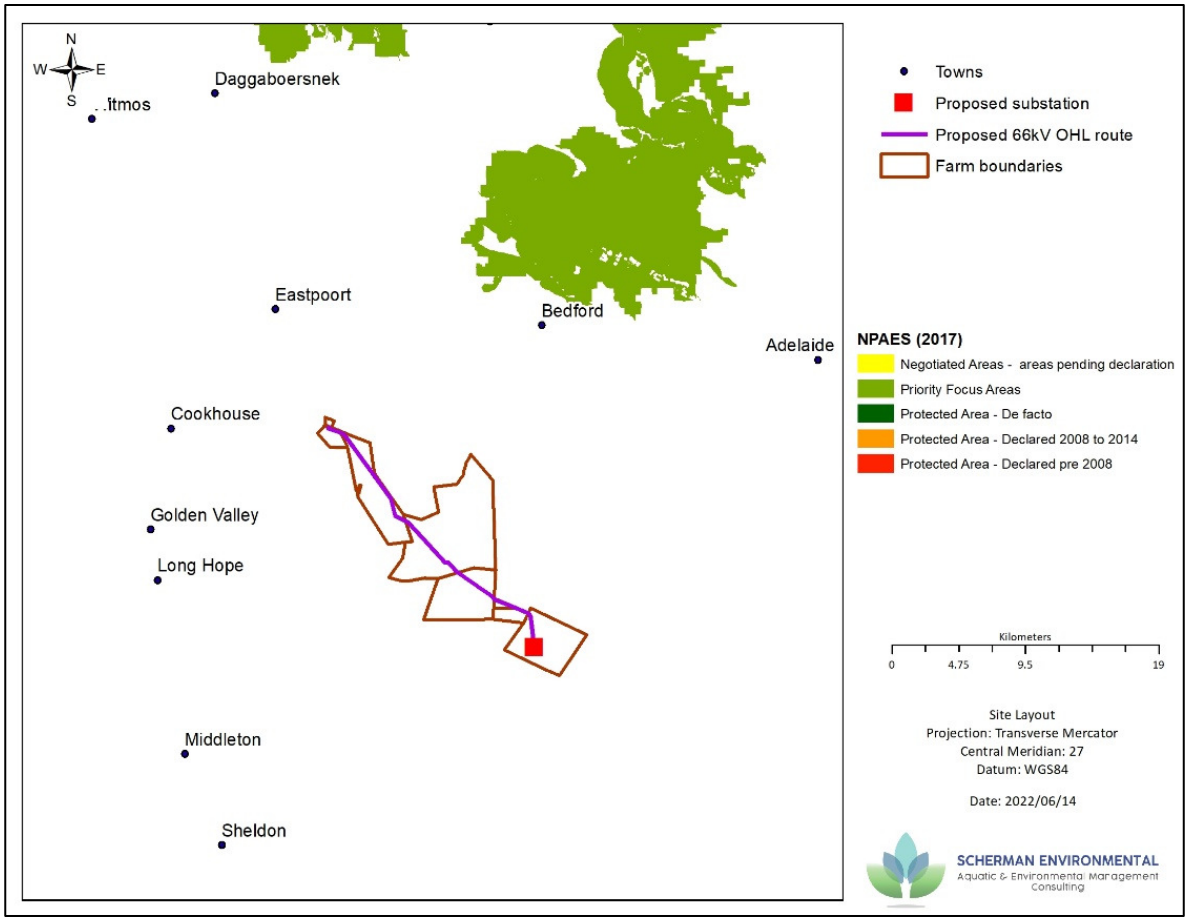

Figure 3.2. Protected areas in the Bedford district (according to NPAES, 2017)

Another source of information that contributed to mapping products for the desktop assessment, was the NBA 2018 and its identification of Ecosystem Threat Status (ETS; Red List for Ecosystems). Ecosystem Threat Status is a key indicator of the degree to which South Africa's ecosystems are still intact, or losing vital aspects of their structure and functioning. The ETS has been traditionally assessed for species, in the form of national or global Red Lists. In a similar way, endangered ecosystems are ecosystem types that are close to becoming Critically Endangered. Any further loss of natural habitat or deterioration of condition in these ecosystem types should be avoided, and the remaining healthy examples should be the focus of conservation action. Vulnerable ecosystems are ecosystem types that still have the majority of their original extent (measured as area, length or volume) left in natural or near-natural condition, but have experienced some loss of habitat or deterioration in condition. Least concerned ecosystems are ecosystem types that have experienced little or no loss of natural habitat or deterioration in condition (Nel & Driver, 2012; cited in van Deventer et al., 2019).

In terms of the NBA 2018 IUCN Red listing of Ecosystems, the Msenge site falls within the classification Least Concern **(Figure 3.3)**. An ecosystem type has to have > 60% of its total extent in a good OR moderately modified (A, B or C ecological category) to be classified as Least Concern.

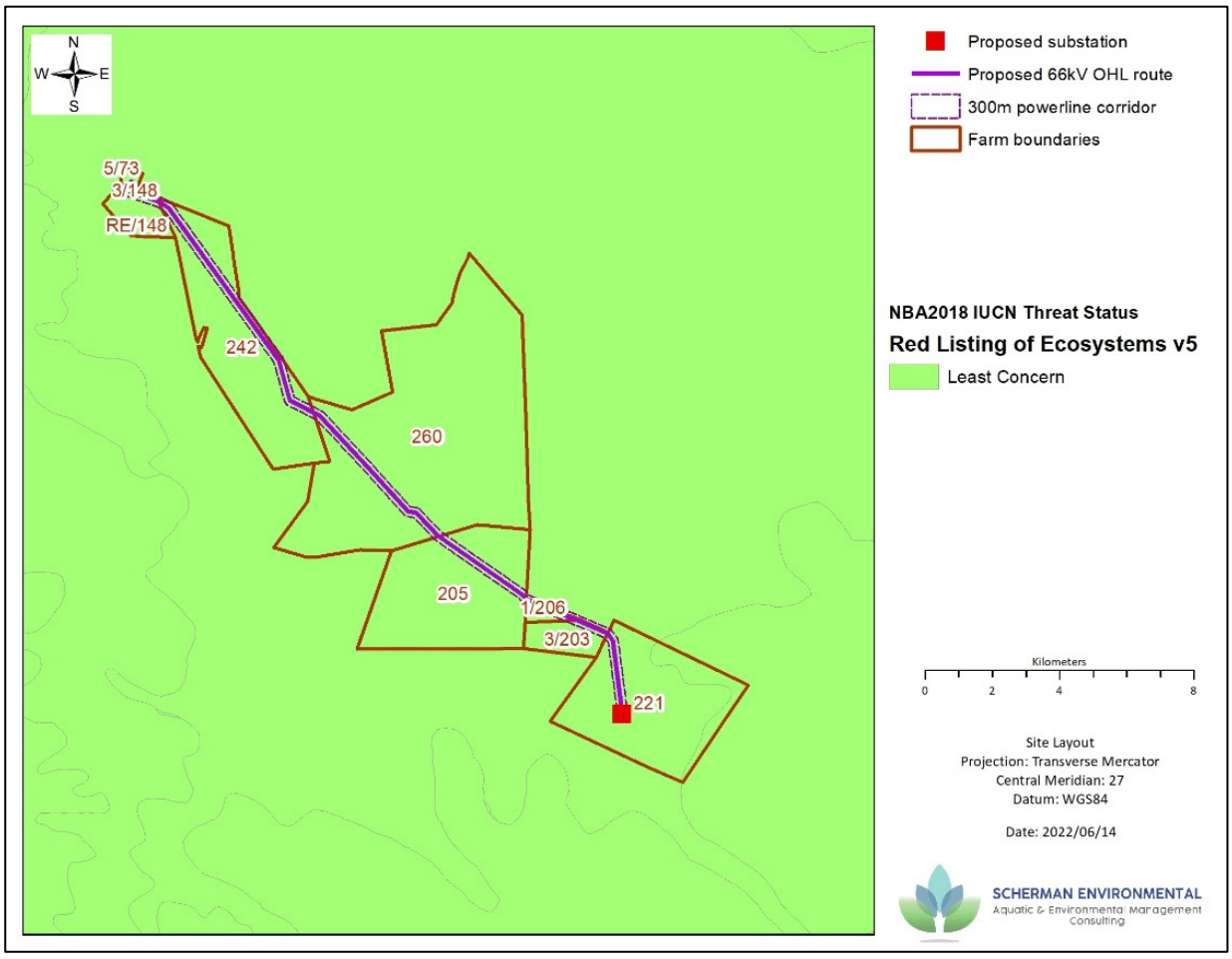

Figure 3.3. Ecosystem threat status classification for the Msenge site (NBA, 2018)

The SWSA map for South Africa **(Figure 3.4)** shows that no SWSAs are found in the Bedford/Cookhouse area.

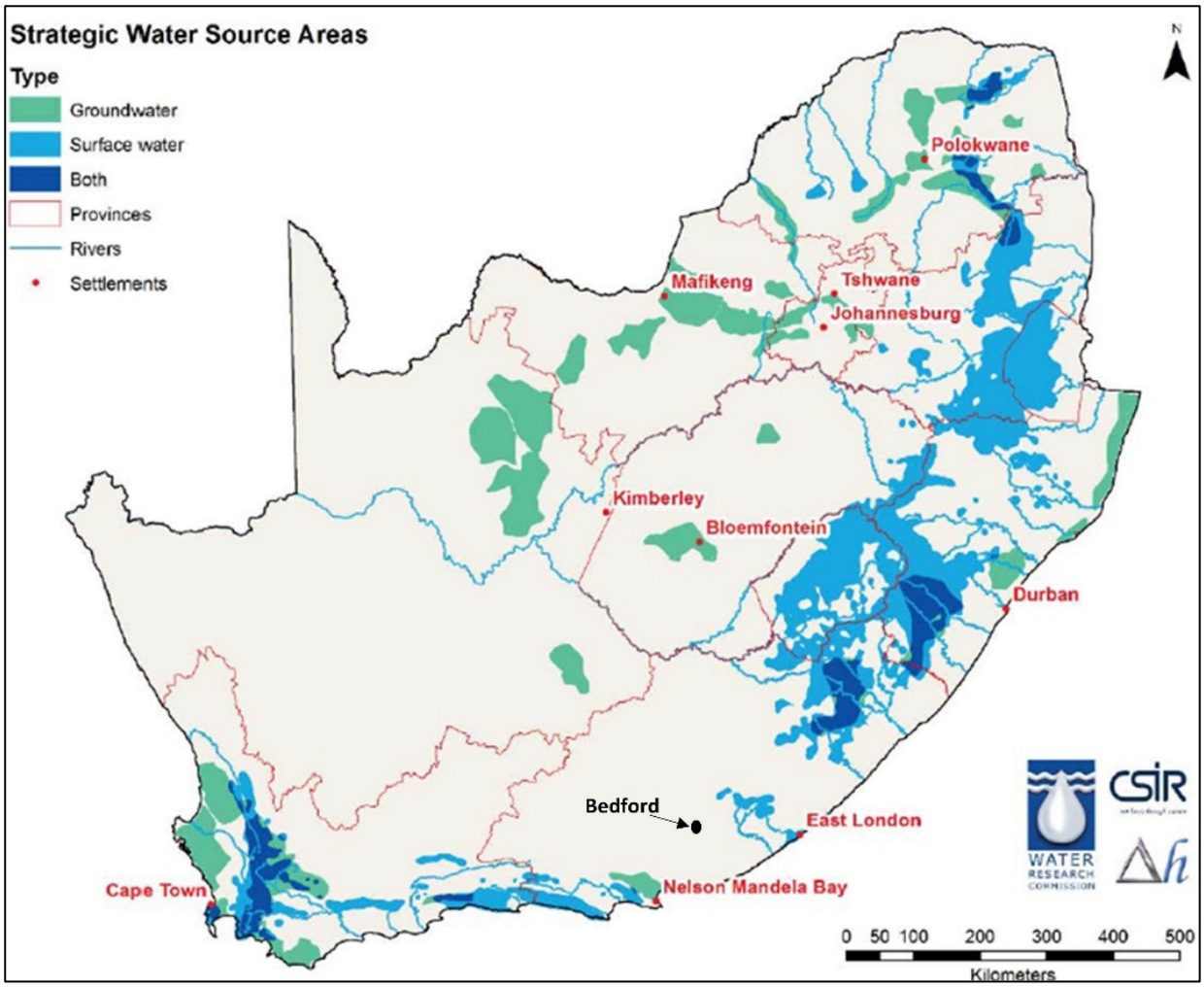

Figure 3.4. SWSAs identified in South Africa (Le Maitre, 2018a)

3.2 Field Survey: March and April 2022

The following hydrological features were seen along the powerline route:

- Extensive farm dams, mostly in-channel; see an example on Farm 242 **(Figure 3.5)**.

Figure 3.5. A farm dam, or artificial wetland, on Farm 242

- Off-channel dams and livestock watering points.
- Other artificial features such as quarries.
- Few natural wetlands, with most being outside the powerline deviation route and location of the proposed substation. An example is shown as **Figure 3.6**.

Figure 3.6. Wetland on Farm 242

- A network of highly fragmented and mostly dry drainage lines across the study area, mostly with narrow riparian zones and little protective intact vegetation buffer **(Figure 3.7)**.

Figure 3.7. Highly disturbed dry drainage features with narrow riparian zones

3.2.1 Present state

The present state categorisation for the main river systems across the site – Biesiesleegte (SQR Q92F-07942) and eNyara (SQR Q92F-07889) was a C category, i.e. Moderately Modified according to DWS (2014). This assessment was confirmed by Colloty (2013) and TBC (2020). No change is apparent on the site, confirming the C categorization for drainage features across the site.

3.2.2 Buffers

An important aspect of sensitivity mapping is to delineate appropriate buffer zones around streams, drainage lines and wetlands or pans. Buffer zones are used in land-use planning to protect natural resources and limit the impact of one land use on another. Different types of buffers can be evaluated, e.g. aquatic impact buffer zones, or buffers for the conservation of biodiversity. Various provincial guidelines on buffers have been issued within the Eastern Cape Province, with the regulatory buffers along drainage lines and streams set at 32m (guidelines set out in the gazetted Eastern Cape Biodiversity Conservation Plan (ECBCP)- see **Table 3.1**. These regulatory guidelines are set throughout the country, with a 500m regulatory zone around wetlands and pans. **Table 3.2** shows the conditions and buffers required for Aquatic CBA and ESA delineated areas, according to ECBCP (2019).

Table 3.1. Recommended buffers for rivers (the predominant buffer for the study region is highlighted in blue) (ECBCP; Berliner & Desmet 2007).

River criterion used	Buffer width (m)	Rationale
Mountain streams and upper foothills of all 1:500 000 rivers	50	These longitudinal zones generally have more confined riparian zones than lower foothills and lowland rivers and are generally less threatened by agricultural practices.
Lower foothills and lowland rivers of all 1:500 000 rivers	100	These longitudinal zones generally have less confined riparian zones than mountain streams and upper foothills and are generally more threatened by development practices.
All remaining 1:500 000 streams	32	Generally smaller upland streams corresponding to mountain streams and upper foothills, smaller than those designated in the 1:500 000 rivers layer. They are assigned the riparian buffer required under South African legislation.

Table 3.2. Conditions and buffer zones required for Aquatic ESA delineated areas (ECBCP, 2019).

AQUATIC CBAs and ESAs		
CBA 1	Critical Rivers (main stem)	Main stem rivers of high irreplaceability plus a 32 metre buffer. This included fish sanctuaries and free flowing / flagship rivers.
	Critical Wetlands	Umzimvubu Wetland Complex, Karst/Limestone wetlands, additional oxbow wetlands, dune and dune bypass wetlands.
	Critical Estuaries	Estuaries with a National Biodiversity Assessment (2011) ranking field "core = 1" plus Regionally important estuaries that are linked to CBA 1 rivers or Protected Areas.
CBA 2	Important Rivers (main stem)	Main stem river lines plus 32 metre buffer that fall within fish corridors and other selected catchments (wetland clusters) to achieve connectivity, best design sites.
	Wetlands	All remaining wetlands.
	Estuaries	CBA 1 estuary buffer 100m.
		Estuaries that are regionally important or are linked to CBA 1 rivers, or are associated with Protected Areas.
ESA 1	Rivers and River buffer	CBA1 rivers 1000m buffer.
		All other rivers plus 32m buffer.
	Catchments	All catchments that drain into CBA 1 and CBA 2 rivers.
	Wetland buffers	100m buffer around all wetlands.
		Wetland clusters that overlap given 500m buffer.
	Modelled Wetlands	Modelled stream channel and valley bottoms plus a 32m buffer.
	Estuary buffers	CBA 2 estuary buffer 100m.
		All remaining estuaries.
	Strategic Water Source Areas	Strategic surface water source areas based on the CSIR national MAR calculation. Identified at the level of sub-SQ4.
	Ground water source areas	Karst-Limestone landscape.

The 32m buffer generally used for planning along rivers, streams and drainage lines, and recommended in ECBCP (2019) for the Msenge site, was applied in the mapping delivered before ground-truthing was undertaken. It should however be noted that the 32m buffer width is a regulatory and planning guideline, with a wider buffer required for protection of aquatic drainage features. Due to the extensive number of instream farm dams across all the properties assessed during the site survey of March and April 2022, resulting in highly fragmented drainage systems, it is recommended that 100m buffers be applied across the area. Although there may be instances where a requirement for a 32m buffer may be argued, it was not possible to evaluate every drainage line and a general buffer width had to be assigned.

Implementation of a 100m buffer along drainage lines, many often include large instream artificial dams, may provide some protection for severely impacted drainage systems in the study area. Should infrastructure be required within this buffer, a site-specific assessment should be conducted to consider whether the 100m

"protection" buffer can be downgraded to a 32m regulatory/planning buffer. Note that water use licensing will be triggered in this instance.

Protection and regulatory buffers around wetlands and pans are set at 500m. NFEPA wetland mapping delineated this 500m buffer around all wetlands and pans, including artificial features such as dams, quarries and oxidation ponds. The preparation of NWM5 was an attempt to delineate natural wetlands across the country. Few NWM5 wetlands are mapped in the study area, with a few more identified during the site survey. The output regarding natural wetlands is not of high confidence, as it was not possible to check every delineated "wetland" in the study area. Note that 500m regulatory buffers around NFEPA wetlands were removed for an artificial structure, e.g. quarries or farm dam (Roets, DWS, pers. comm., 31 March 2022). These protective/regulatory buffers are only indicated around identified natural wetlands in the sensitivity mapping provided, although all dams and artificial features are indicted. Mapping shows the extensive spread of farm dams across the study area, severely impacting the status of drainage features, and creating highly modified drainage features across the study site. Note that reservoirs were not included in mapping; only the position of instream and off-channel dams.

Note that any activities within 500m buffers around wetlands or pans will trigger a Water Use License Application (WULA) process**.**

Appendix 1 depicts the locations for each property, the associated hydrological line crossings, wetlands, dams and general buffer lines as described above.

4 IMPACT ASSESSMENT

The impact assessment was conducted according to the methodology provided by Nala Environmental (Pty) Ltd., and shown in **Appendix 2**. Note that no development footprint alternatives were considered for the proposed development as there is only a single powerline deviation route. The no-go option would mean no development of the wind farm and leave the site as is.

4.1 Construction Phase

The following impacts are anticipated during the **Construction Phase**.

- Changes to the hydrological regimes of streams.
- Loss of riparian vegetation along streams and drainage channels.
- Sedimentation and increasing turbidity levels of instream habitats, loss of instream habitat and aquatic biota.
- Dumping of rubble in riparian zones and dry river channels.
- Chemical pollution of the streams.
- Impacts on wetlands.

Nature: **Changes to the hydrological regimes of streams.** The scores are impacted by the ephemeral nature of the streams, fragmentation and modified current state.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (45)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Reduce the number of crossings as far as practically possible by utilizing existing tracks. • Ensure pylons are placed outside buffers. • Conduct as much of the construction as possible during the dry season, and outside the 100m buffer. • Use crossing designs which will allow minimal change in streamflow. • No unnecessary construction-related activities, e.g. stockpiles, within the drainage lines or minimum of 100m buffer on either side of the active channel. • Crossings should cater for 1:100 year floods. • Silt traps must be in place to prevent sedimentation. • Appropriate stormwater management structures should be in place, according to the Stormwater Management Plan.		
Residual Impacts: None anticipated.		

Nature: **Loss of riparian vegetation along streams and drainage channels.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Reduce the number of crossings as far as practically possible by utilizing existing farm tracks.
- Ensure pylons are placed outside buffers.
- Conduct as much of the construction outside the 100m buffer.
- No unnecessary construction-related activities, e.g. stockpiles, within the 100m buffer on either side of the active channel.
- Translocate any species as identified, and according to the methods in the relevant Management Plans, e.g. Revegetation and Rehabilitation Plan.

Residual Impacts (taken from the Terrestrial Flora Report):

- Translocated species could succumb to drought or infection during the transplanting stage.
- Translocated species efforts could be nullified by overstocking and poor rangeland management.

Nature: **Sedimentation and increasing turbidity levels of instream habitats, loss of instream habitat and aquatic biota.** The scores are impacted by the ephemeral nature of the streams, fragmentation and modified current state.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

- Reduce the number of crossings as far as practically possible by utilizing existing tracks.
- Ensure pylons are placed outside buffers.
- Avoid any traffic along drainage lines or in buffer zones which may cause sediment movement.
- Conduct as much of the construction as possible outside the 100m buffer.
- Silt traps must be in place to prevent sedimentation.
- Appropriate stormwater management structures should be in place, according to the Stormwater Management Plan.

Residual Impacts:

None anticipated.

Nature: **Dumping of rubble in riparian zones and dry river channels.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Low (28)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

- Conduct as much of the construction outside the channel and 100m buffer.
- Conduct construction according to the Environmental Management Programme and Management Plans set up for construction.

Residual Impacts:

None anticipated.

Nature: **Chemical pollution of the streams.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (45)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Reduce the number of crossings as far as practically possible by utilizing existing tracks.
- Conduct as much of the construction as possible during the dry season, and outside the 100m buffer.
- No unnecessary construction-related activities, e.g. stockpiles or concrete mixing, within the drainage lines or minimum of 100m buffer on either side of the active channel.
- Silt traps must be in place to prevent sedimentation.
- Emergency protocols must be in place in case of spills.
- All construction materials must be stored and used so that there in so leaking into the streams.
- Laydown yards, camps and storage areas must be beyond the watercourse areas.
- Proper mitigations and management, especially in terms of materials used and management of domestic waste from construction workers on site.

Residual Impacts:

None anticipated.

Nature: **Impacts on wetlands.** Due to the limited number of natural wetlands, the extent of the impact will be wider than the site.		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Site (2)
Duration	Long -term (4)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Improbable (2), as few natural wetlands in the area or along the route	Improbable (2)
Significance	**Low (26)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To a limited degree, and there will be an impact on wetland function.	
Mitigation: • Reduce the number of crossings as far as practically possible by utilizing existing farm tracks. • Conduct construction outside the 500m buffer around the wetland, including pylon placements. • No unnecessary construction-related activities, e.g. stockpiles, within the 500m buffer around the wetland. • Any bypasses for the development of crossings of streams and drainage lines should not be on the side of the wetland, to minimize disturbance of the wetland systems.		
Residual Impacts: Residual impacts will be on wetland function and a reduction in PES and EIS scores.		

4.2 Operational Phase

The following impacts are anticipated during the **Operational Phase**. Impacts expected are minimal due to the stable nature of the operation, and includes maintenance activities during the operational phase, assuming best practise is followed. Hydrological disturbances occur primarily during construction, with impacts during operations considered minimal.

- Pollution of the streams and wetlands due to maintenance activities, including sedimentation from roads.

Nature: **Pollution of the streams and wetlands.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long (4)	Long (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		

• No unnecessary activities, e.g. stockpiles or concrete mixing, within the drainage lines or minimum of 100m buffer on either side of the active channel, or within the 500m regulatory buffer around wetlands. • Silt traps must be in place to prevent sedimentation. • Emergency protocols must be in place in case of spills. • All materials must be stored and used so that there in so leaking into the streams. • Laydown yards, camps and storage areas must be beyond the watercourse areas. • Proper mitigations and management, especially in terms of materials used and management of domestic waste from workers on site.
Residual Impacts: None anticipated.

4.3 Decommissioning Phase

The following impacts are anticipated during the **Decommissioning Phase**. Hydrological disturbances are not expected during decommissioning, as it is assumed that flow mitigation structures, e.g. culverts, stay in place. Decommissioning is assumed to rather relate to

- Sedimentation and increasing turbidity levels of instream habitats, loss of instream habitat and aquatic biota, due to activities on site.
- Dumping of rubble in riparian zones and dry river channels.
- Chemical pollution of the streams.
- Impacts on wetlands due to site-based activities.

Nature: **Sedimentation and increasing turbidity levels of instream habitats, loss of instream habitat and aquatic biota.** The scores are impacted by the ephemeral nature of the streams, fragmentation and modified current state.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Very short (1)	Very short (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (32)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Avoid any traffic along drainage lines or in buffer zones which may cause sediment movement.		
Residual Impacts: None anticipated.		

Nature: **Dumping of rubble in riparian zones and dry river channels.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Very short (1)	Very short (1)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Probable (3)

Significance	**Low (24)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: • Conduct decommissioning according to the Environmental Management Programme and Management Plans set up for the activity.		
Residual Impacts: None anticipated.		

Nature: **Pollution of the streams and wetlands.**		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Short (2)	Short (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (45)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Conduct as much decommissioning as possible during the dry season, and outside the 100m buffer. • No unnecessary activities, e.g. stockpiles, within the drainage lines or minimum of 100m buffer on either side of the active channel, or within the 500m regulatory buffer around wetlands. • Silt traps must be in place to prevent sedimentation. • Emergency protocols must be in place in case of spills. • Laydown yards, camps and storage areas must be beyond the watercourse areas. • Proper mitigations and management, especially in terms of materials used and management of domestic waste from workers on site.		
Residual Impacts: None anticipated.		

4.4 Cumulative Impact Assessment

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

Nature:

Fragmentation and loss of connectivity of streams in the development area. The scores are impacted by the ephemeral nature of the streams, current fragmentation and modified current state.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (2)	Regional (4)
Duration	Long (4)	Long (4)
Magnitude	Moderate (6)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (24)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Reduce the number of crossings as far as practically possible by utilizing existing tracks.
- Use crossing designs which will allow minimal change in streamflow.
- No unnecessary activities, e.g. stockpiles, within the drainage lines or minimum of 100m buffer on either side of the active channel.
- Silt traps must be in place to prevent sedimentation.
- Appropriate stormwater management structures should be in place, according to the Stormwater Management Plan.
- Conduct activities on site according to the Environmental Management Programme and Management Plans set up for the activity.

Residual Impacts:

None anticipated. The development of the project will not result in an unacceptable risk, unacceptable loss, complete or whole-scale changes to the environment or sense of place, or an unacceptable increase in impact. There is a *medium cumulative impact* of the project and other projects in the area, but that impact is related much more to farming practices and the extensive number of instream dams, than to the windfarm projects.

4.5 Environmental Management Programme

OBJECTIVE: Reduce fragmentation of drainage lines and wetlands and minimize impacts on instream habitats and aquatic biota.

Project component/s	Substation, access tracks, watercourse crossings and wetlands
Potential Impact	Primary potential impacts will be on connectivity of drainage features, changes in hydrological regimes and habitat degradation and fragmentation due to project-related activities on site.
Activity/risk source	Clearing of riparian vegetation. Roads resulting in further fragmentation of drainage features and loss of connectivity. Activities within wetland buffers. Inadequate management of sedimentation and impacts on habitat. Water quality impacts due to pollution, including rubble deposition in dry drainage lines.
Mitigation: Target/Objective	Minimize impacts and ensure buffer zones remain in place.

Mitigation: Action/control	Responsibility	Time-frame
All construction activities must take place outside delineated buffer zones.	Contractor	Construction
Institute 100m buffers around drainage lines and 500m buffers around natural wetlands.	Project Manager	Before construction
Construction must take place during the dry season.	Contractor	Construction
Install silt traps to reduce sediment loss.	Contractor	Construction, Decommissioning
Laydown areas must be created for stockpiling of equipment and chemicals, and for storage of materials during project-related activities.	Contractor and Environmental Compliance Officer (ECO)	Construction, Operational, Decommissioning
Emergency protocols must be in place in case of spills.	Contractor and Project Manager	Before construction
Prepare appropriate environmental management plans, e.g. stormwater and waste management plans, and monitor compliance.	Contractor and ECO	Construction, Operational, Decommissioning
Conduct training of on-site staff so as to ensure good environmental practice.	Project Manager	Construction
Reduce the number of crossings so as to reduce the impacts on connectivity of drainage lines.	Design Engineer and Project Manager	Before construction, Construction

4.6 Recommendation and Conclusions

Due to the extensive number of instream farm dams across all the properties assessed during the site survey of March and April 2022, resulting in highly fragmented drainage systems, it is recommended that 100m buffers be applied across the area. Implementation of a 100m buffer along drainage lines, many which may include large instream artificial dams, may provide some protection for severely impacted drainage systems in the study area. Should infrastructure be required within this buffer, a site-specific assessment should be conducted to consider whether the 100m "protection" buffer can be downgraded to a 32m regulatory/planning buffer.

Based on the findings of our surveys, previous reports, and relevant literature, we believe that the following developments will not have an irreversible and substantial negative effect on the aquatic ecology in the area and can go ahead provided the necessary mitigations described above are implemented:

- The proposed 66kV overhead power line within the 300m development corridor.
- Access tracks within the 300m development corridor provided that sensitive areas are avoided.
- Water course crossings within the 300m development corridor.
- The on-site substation within the 300m development radius.

The impact assessment showed that most impacts were Medium and can be mitigated to Low. Note that water use licensing (a General Authorisation (GA) is anticipated, provided no pylons are placed within drainage lines) will be required for the development.

Appendix 1 provides maps and implications of the layout on aquatic features per property. Farm 242 is considered the most vulnerable area in terms of natural wetlands, where particular care must be taken to restrict movement within the 500m buffer around the wetlands. Service roads running along the OHL should

be routed around wetland buffers and not through them. Should work within a buffer be required, even in the outer edge, a full water use license may be triggered.

Note that the list of natural wetlands on site, and possibly not mapped by NWM5, is not exhaustive, and care should be taken with every wetland encountered during construction.

The substation should be microsited so as to avoid drainage lines and 100m buffers.

Due to the wealth of drainage lines on site, it is difficult to evaluate sensitivities and no go areas per drainage line or per property. The following general statements apply to all properties, as have been stated elsewhere in the report:

- Sensitive zones and no go areas are drainage lines and wetlands, with their associated and respective 100m and 500m buffers.
- Development within or across drainage features and buffer zones, as required for the construction of watercourse crossings, will trigger licensing. Due to the modified nature of the aquatic features, and assuming effective mitigation measures can be implemented, a GA should suffice.
- Roads should never be built through a wetland, and pylons should not be placed in wetlands.
- Pylons should be designed and located so as to avoid impacts on drainage features. Should placement within drainage lines be unavoidable, water use licensing will be triggered, with the associated documentation required, e.g. a Construction Method Statement, Rehabilitation and Monitoring plans.
- The placement of the substation should avoid drainage lines and associated buffers.

5 REFERENCES

Berliner, D. & Desmet, P. 2007. Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry (DWAF). Project No. 2005-012. Pretoria. 1 August 2007.

Berliner, D., Desmet, P. and Hayes, R. 2007. Eastern Cape Biodiversity Conservation Plan Handbook. Department of Water Affairs and Forestry Project No 2005-012. Compiled by Amanda Younge Hayes, August 2017.

Birkhead, A., Uys, A., Scherman, P-A., Bok, A., Colloty, B. and Chalmers, R. 2013. Review and update of the 1999 EIS/PES of South African rivers, including expansion to priority tributaries and wetlands, according to quaternary catchments for the Water Management Areas 12 and 15. Prepared for the Department of Water Affairs and the Water Research Commission, South Africa. Water Research Commission Project No. K5/2045.

Colloty, B. 2013. Aquatic Sensitivity Assessment: Msenge Emoyeni Wind Farm Project. Prepared for Windlab Developments South Africa by Scherman Colloty & Associates. July 2013.

Department of Water and Sanitation (DWS). 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub-Quaternary Reaches for Secondary Catchments in South Africa. Secondary: N4. Compiled by RQIS-RDM: https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx. Technical team led by Scherman Colloty and Associates cc.

DEA, 2016. National Protected Area Expansion Strategy for South Africa. Department of Environmental Affairs, Pretoria, South Africa.

ECBCP. 2019. Eastern Cape Biodiversity Conservation Plan Handbook. Department of Economic Development and Environmental Affairs (King Williams Town). Compiled by G. Hawley, P. Desmet and D. Berliner.

Le Maitre, D.C., Seyler, H., Holland, M., Smith-Adao, L., Nel, J.L., Maherry, A. and Witthüser, K. 2018a. Identification, Delineation and Importance of the Strategic Water Source Areas of South Africa, Lesotho and Swaziland for Surface Water and Groundwater. Report No. TT 743/1/18, Water Research Commission, Pretoria, South Africa

Le Maitre, D.C., Walsdorff, A., Cape, L., Seyler, H., Audouin, M, Smith-Adao, L., Nel, J.A., Holland, M. and Witthüser. K. 2018b. Strategic Water Source Areas: Management Framework and Implementation Guidelines for Planners and Managers. Water Research Commission Report No. TT 754/2/18, Pretoria, South Africa.

Nala Environmental. 2022. Scope of Work document: Msenge Emoyeni Powerline Deviation.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas Project. Water Research Commission Report No. 1801/2/11, Pretoria, South Africa.

Scherman Environmental. 2022. Ecological (Terrestrial and Aquatic) Specialist Report for the layout of the proposed Msenge Emoyeni Energy Facility: Walkthrough Report. Prepared for Nala Environmental (Pty). Ltd. in June 2022 by Powell, M; Keates, C; Scherman, P-A and Huchzermeyer, N.

South African National Biodiversity Institute (SANBI). 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. 214 pp.

The Biodiversity Company. 2020. The Aquatic Ecology Baseline and Impact Assessments for the Msenge Emoyeni Project, Bedford, Eastern Cape. Prepared for Savannah Environmental, October 2020.

Van Deventer, H., Smith-Adao, L., Collins, N.B., Grenfell, M., Grundling, A., Grundling, P-L., Impson, D., Job, N., Lötter, M., Ollis, D., Petersen, C., Scherman, P., Sieben, E., Snaddon, K., Tererai, F. and Van der Colff, D. 2019. South African National Biodiversity Assessment 2018: Technical Report. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

6 APPENDICES

Appendix 1: Sensitivity Mapping

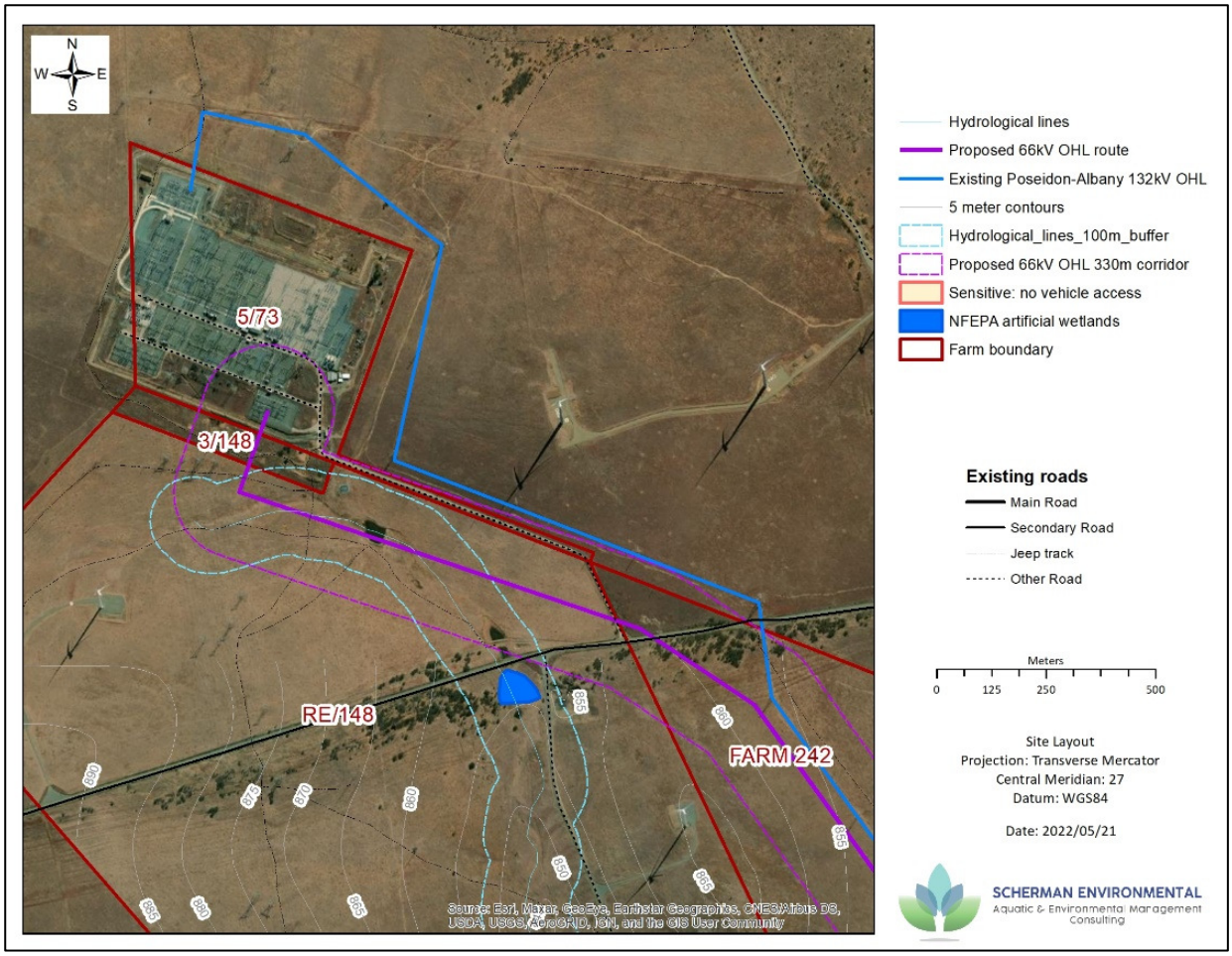

Figure 6.1. Farms 5/73, 3/148, RE/148 and 242

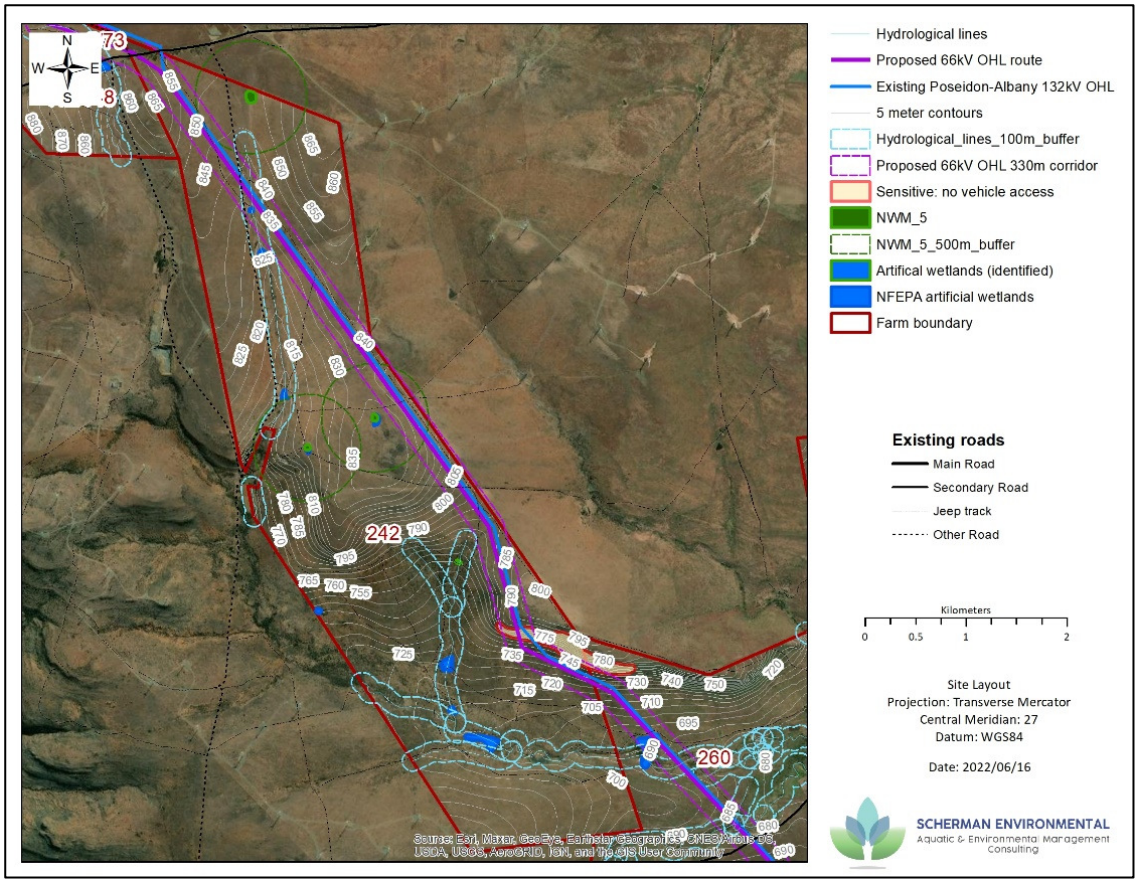

Figure 6.2. Farm 242

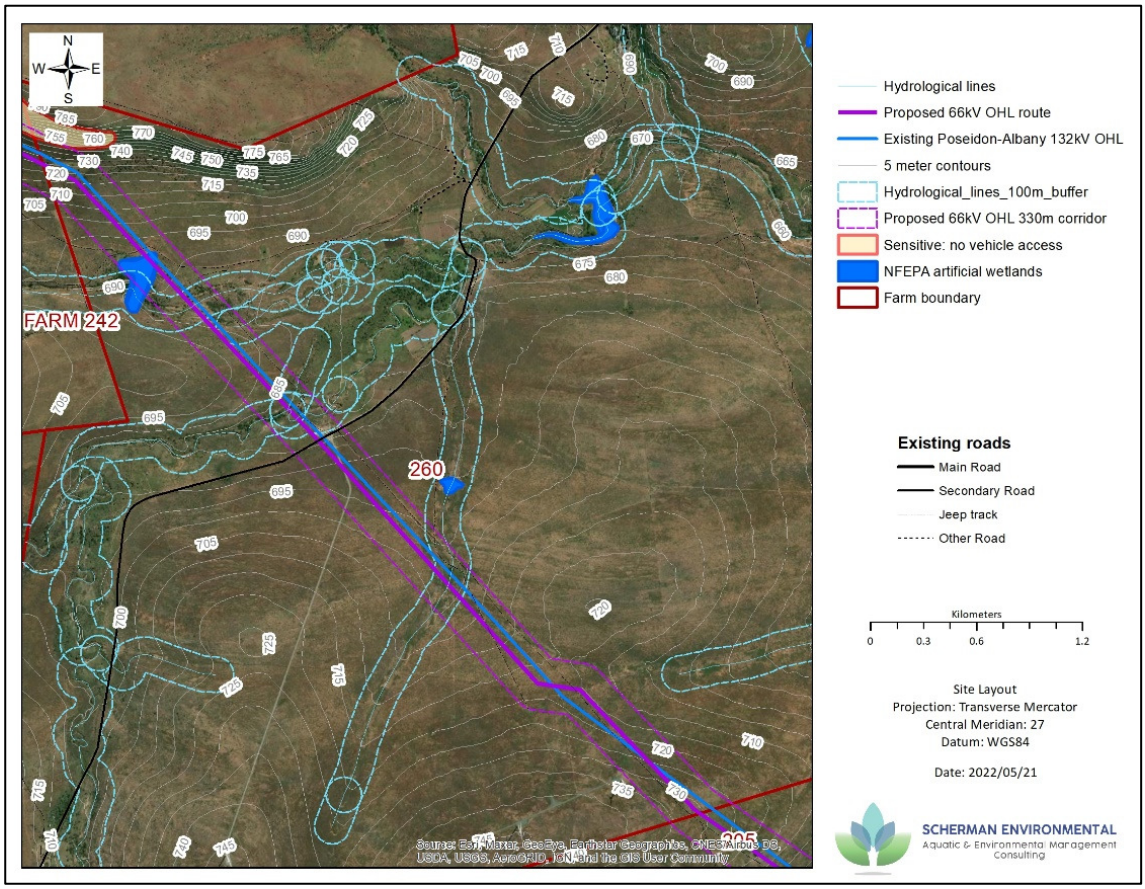

Figure 6.3. Farm 260

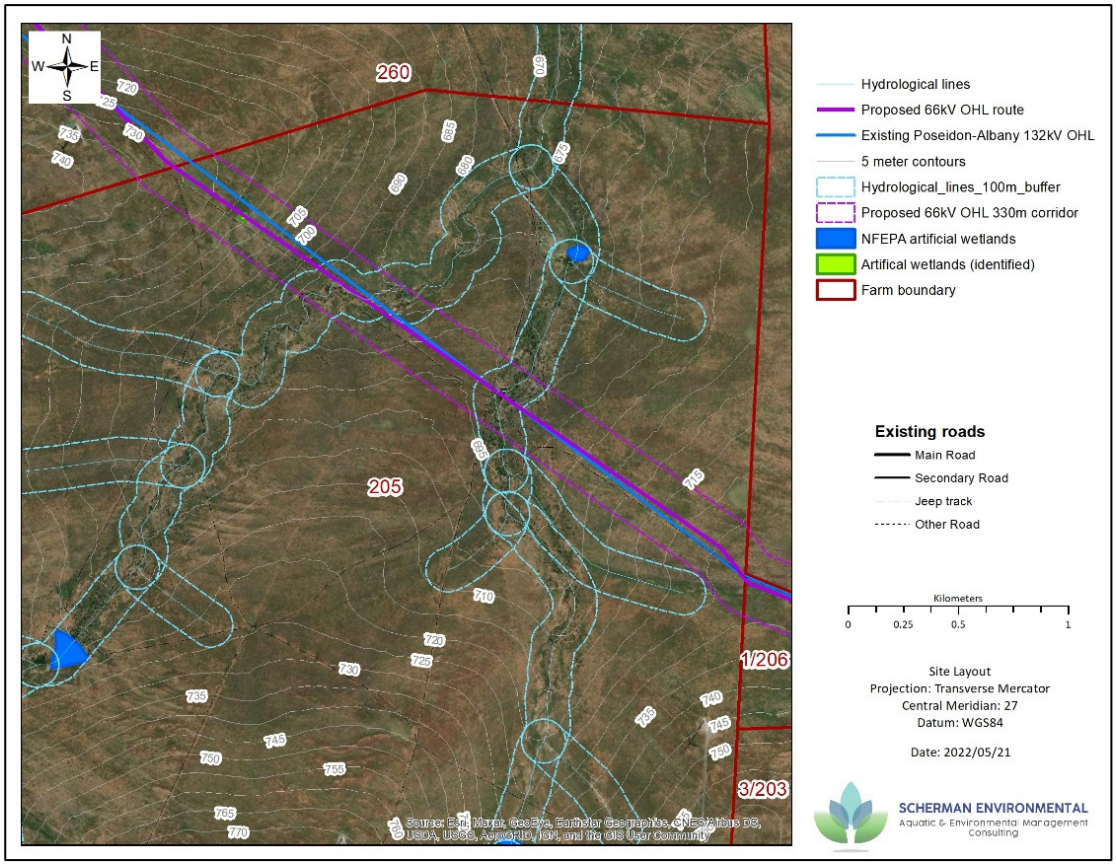

Figure 6.4. Farm 205

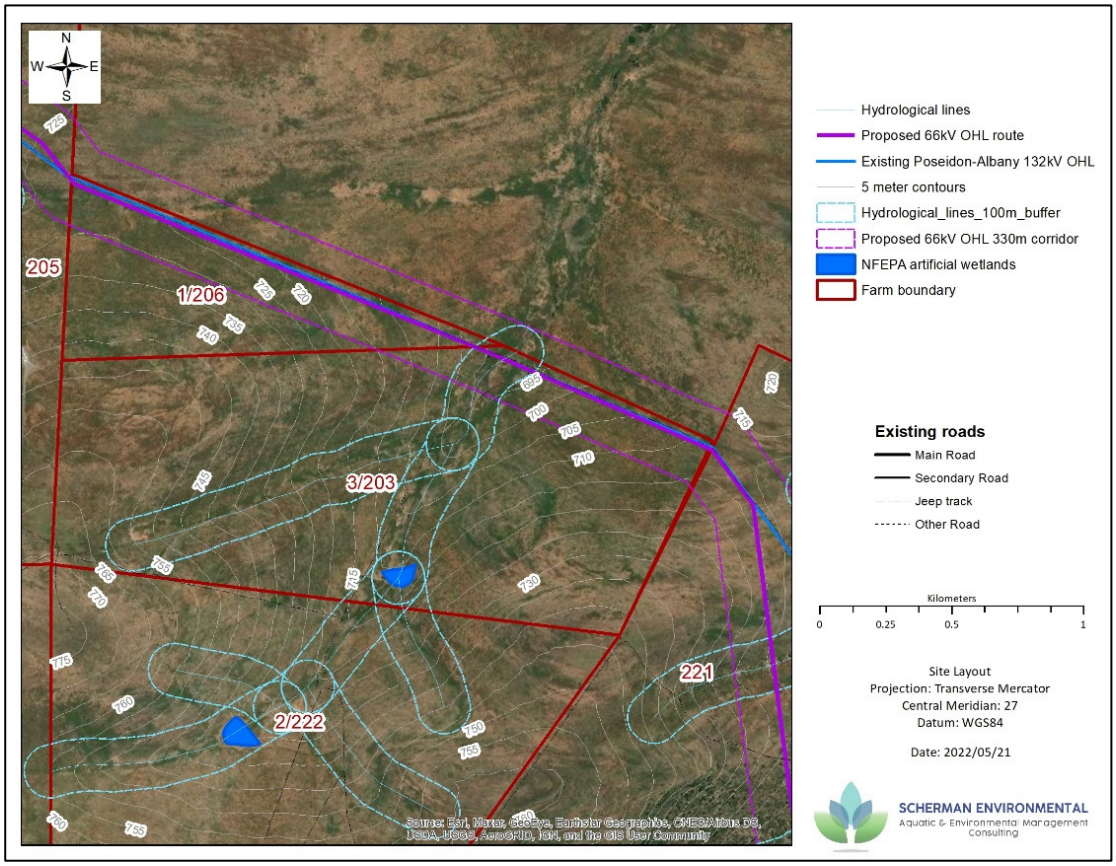

Figure 6.5. Farms 1/206 and 3/203

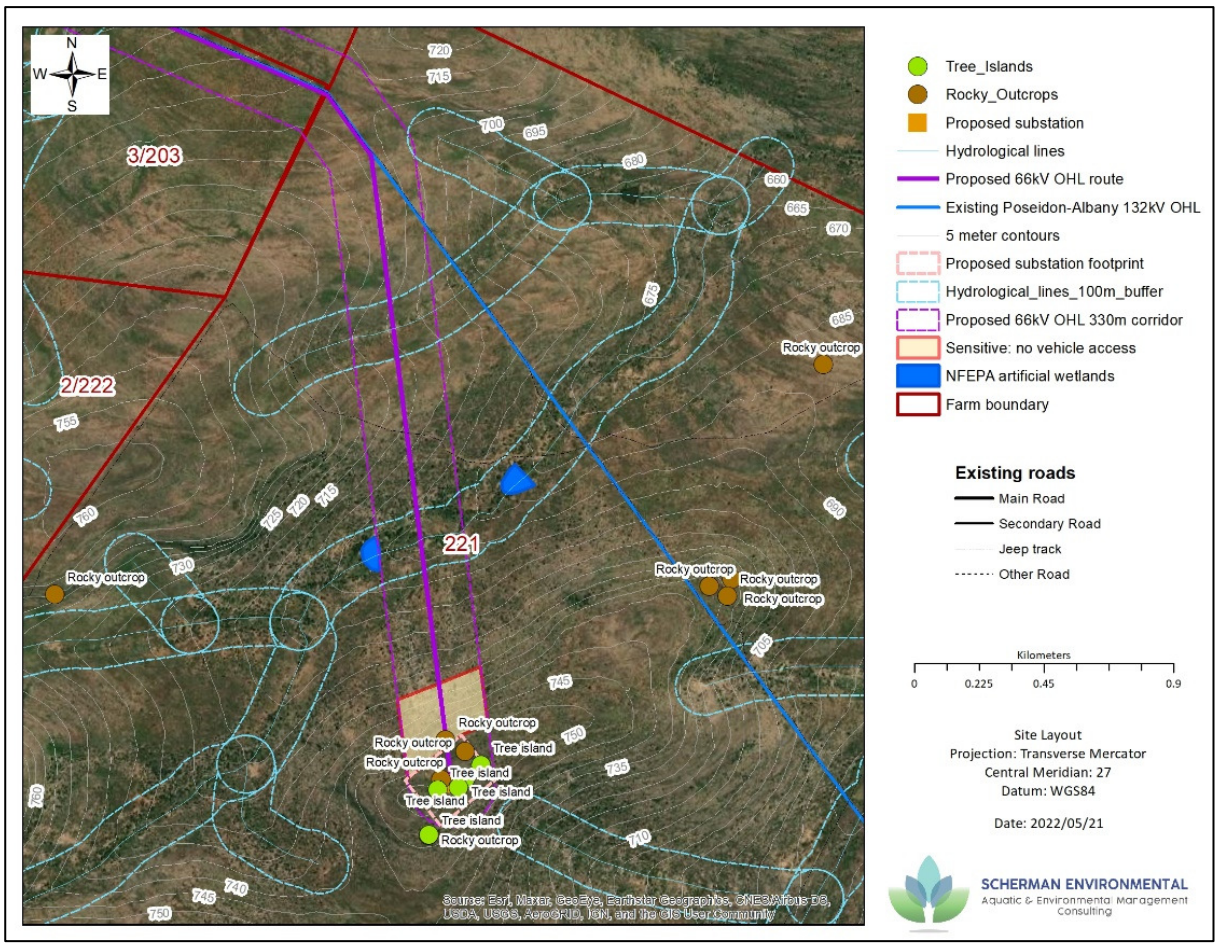

Figure 6.6. Farm 221

Appendix 2: Impact Assessment Methodology; Nala Environmental (Pty) Ltd.

Direct, indirect and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included.

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind		
Residual Impacts: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		

Assessment of Cumulative Impacts

As per DEA's requirements, specialists are required to assess the cumulative impacts. In this regard, please refer to the methodology below that will need to be used for the assessment of Cumulative Impacts.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably 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 become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1].

[l] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, GNR 326.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

» Unacceptable risk
» Unacceptable loss
» Complete or whole-scale changes to the environment or sense of place
» Unacceptable increase in impact

The specialist is required to conclude if the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

Example of a cumulative impact table:

Nature: Complete or whole-scale changes to the environment or sense of place (example)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Overall impact of the proposed project considered in isolation	***Cumulative impact of the project and other projects in the area***
Extent	Low (1)	High (3)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind		
Residual Impacts: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		

Environmental Management Programme

Measures for inclusion in the Environmental Management Programme must be laid out as detailed below:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies

Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures
Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.	
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting	