AQUATIC BIODIVERSITY AND SPECIES SPECIALIST ASSESSMENT:

Proposed Development of the Electrical Grid Infrastructure for the Mura Solar Projects, north of Beaufort West in the Western and Northern Cape Provinces

Report prepared for:

Mura 1 (Pty) Ltd

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Executive Summary

Red Cap Energy (Pty) Ltd is proposing to develop a grid connection for four separate solar facilities, collectively known as the Mura PV development. The grid corridor includes multiple connection routes of up to two 132 kV overhead lines running in parallel and switching stations to enable the connection of the PV projects to the approved Nuweveld Collector Substation. The study area is in the upper reaches of several tributaries of the Krom River, a tributary of the Sout River in the Groot / Gamtoos River System. The DFFE Screening Tool map for the Aquatic Biodiversity Combined Sensitivity at the site indicates most of the wider area to be of low sensitivity, with only the main channels of the larger rivers mapped as being of very high sensitivity. The very high sensitivity is linked to aquatic Critical Biodiversity Areas (CBAs) that are associated with larger rivers that contain instream wetland habitat. The findings of this assessment largely agree with the screening tool mapping.

The study area does not lie within a Freshwater Ecosystem Priority Areas (FEPA) River Subcatchment. The only natural instream wetland areas within the study area are within the larger channel of the Krom River downstream of the site that has been mapped in the FEPA Wetland mapping as Upper Nama Karoo unchanneled valley-bottom wetlands. These wetlands are also mapped in the National Wetland Map (version 5) as valley-bottom wetlands. All other FEPA wetland mapping within the study area comprises artificial wetlands associated with farm dams. The watercourses are all mapped as aquatic Ecological Support Areas (ESA1). Some aquatic ESAs (ESA2) occur where there is localised disturbance within the watercourses, such as at the track/road crossings. Within the terrestrial CBAs, the watercourses have also been mapped as aquatic CBAs.

The rivers and wetlands within the study area are still in a natural ecological condition with few modifications. The Krom River is more impacted by surrounding land use activities and is in a largely natural to moderately modified ecological condition. The Krom River in the study area is deemed to be of a high ecological importance and sensitivity. This is due to the importance of these larger aquatic ecosystems in providing a diversity of habitats and being important refugia for biota as well as corridors for the movement within the landscape. The wetland features within the study area are considered of moderate ecological importance and sensitivity as they are closely associated with the larger Krom River, providing habitat and ecological corridors for the movement of biota.

Based on the present ecological condition and the ecological sensitivity and importance, aquatic sensitivity and recommended buffers have been mapped to protect these ecosystems. The recommended buffer area between the aquatic features and the project components to ensure these aquatic ecosystems are not impacted by the proposed activities is 35m from the centre of these streams or along the delineated edge of the wide associated floodplain area.

As there is some flexibility relating to the exact location of the pylons, it is usually easy to mitigate the potential impact by locating them far from the freshwater features. Thus, it is usually the associated access track that potentially impacts more on the freshwater features where they need to cross freshwater features. Such crossings and disturbances of the aquatic features need to be minimised and mitigated as far as possible. Most of the potential aquatic ecosystem impacts of the proposed grid connection are likely to take place during the construction phase.

Overall Impact Significance (Post Mitigation):

Phase	*Overall Impact Significance*	*Cumulative Impact*
Construction	*Very low*	*Low/Very low*
Operational	*Very low*	*Low/Very low*
Decommissioning	*Very low*	*Very low*
Nature of Impact	*Negative*	*Negative*

***Recommended mitigation**:*

Construction Phase:

- *Locate pylons and switching stations outside of high-sensitivity areas and limit the placement of infrastructure in areas of medium aquatic sensitivity where possible.*
- *Use existing disturbed areas (e.g. access tracks) where possible. New service tracks with crossings through the high-sensitivity crossings should be kept to a minimum.*
- *A walk-down should be conducted by a specialist to identify the most suited new crossing positions over high sensitivity areas. New crossing structures should be properly designed to not result in blockage in the watercourses or erosion.*
- *Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features*
- *Source water from legal supply sources only (e.g. new or existing water allocation to the property and/or municipal supply)*
- *Apply the generic EMPr for power line and substation development.*

Operation Phase:

- *Access project infrastructure during maintenance activities using existing established roads and access tracks. Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.*
- *Invasive alien plant growth and signs of erosion should be monitored and managed on an ongoing basis.*
- *Stormwater runoff from access tracks must be monitored and managed to prevent erosion from taking place. Should erosion occur, it should immediately be remediated.*

Decommission Phase:

- *Minimise works within aquatic ecosystems as far as possible.*
- *Rehabilitate disturbed areas.*
- *Laydown areas should be placed at least 35m away from the delineated aquatic features.*
- *Apply the generic EMPr for power line and substation development to decommissioning activities*

Specific recommendations to be included in the EA are:

- *The water for construction for the EGI Corridor should be provided from a viable water source.*

- *No pylons and switching stations must be placed in high-sensitivity areas. The placement of infrastructure in areas of medium aquatic sensitivity should be limited where possible.*
- *Use existing disturbed areas (e.g. access tracks) where possible. New service tracks with crossings through the high-sensitivity crossings should be kept to a minimum. A specific walk down should be conducted with the specialist to identify the most suited crossing position. Where these crossings do occur, it needs to be monitored for erosion and blockages and remediated.*
- *Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features. Good housekeeping measures should be implemented at the construction sites that are set out in the EMPr and monitored by an appointed ECO for the project.*
- *Invasive alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants.*

Based on the findings of this specialist assessment, there is no reason, from a freshwater perspective, why the proposed Mura EGI corridor (with the implementation of the above-mentioned mitigation measures) should not be authorized.

The risk assessment determined that the proposed project poses a low risk of impacting aquatic habitat, water flow and water quality. The water use activities associated with the proposed project could potentially be authorised through the general authorisations for Section 21(a), (c) and (i) water uses.

SPECIALIST EXPERTISE: ANTONIA BELCHER

Name:	Antonia (Toni) Belcher ***(Pr. Sci. Nat)***
Profession:	Aquatic scientist
Nationality:	South African
Years experience:	30+ years
Professional Registration:	Professional Environmental Scientist (Pr. Sci. Nat 400040/10) Professional Ecological Science (Pr. Sci. Nat 400040/10)
Accreditation:	SASS5 (Macro-invertebrate assessment method)
Academic Qualifications:	1998 - M.Sc. in Environmental Management, Potchefstroom University (*cum laude*) 1989 - B.Sc. (Hons) in Oceanography, University of Port Elizabeth 1987 - B.Sc. – Mathematics, Applied Mathematics, University of Port Elizabeth 1984 – Matriculation, Lawson Brown High School, Port Elizabeth
Areas of specialisation:	Environmental water requirement studies River maintenance and management plans (MMP) Aquatic ecosystem monitoring and assessments Design of water quality and monitoring programmes for aquatic ecosystems Compilation of State of River reports (aquatic data collection, interpretation, presentation, graphic layout and design and preparation of technical and glossy print ready copies) Environmental Impact Assessments River classification and environmental water requirements (Ecological Reserve determinations) Integrated Water Resource Management River, Wetlands and Estuary management Water quality assessment and management reporting Water resource legislation Water resource institutions Water education
Countries Worked in:	South Africa, Namibia, Swaziland, Lesotho, Rwanda
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SPECIALIST DECLARATION

I, **Antonia Belcher**, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: 

Name of Specialist: Antonia Belcher

Date: 11 November 2022

LIST OF ABBREVIATIONS

BA	Basic Assessment
BGCMA	Breede Gouritz Catchment Management Agency
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries and the Environment
DWA(F)	Department of Water Affairs (and Forestry)
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EI&ES	Ecological Importance and Ecological Sensitivity
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
GA	General Authorisation
GIS	Geographic Information System
GN	Government Notice
ha	hectare
HI	Habitat Integrity
IUCN	International Union for Conservation of Nature
kW	kilowatt
MMP	Maintenance Management Plan
MW	megawatt
ONA	Other Natural Areas
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Area
NWA	National Water Act
PA	Protected Area
PES	Present Ecological Status
REC	Recommended Ecological Condition
REDZ	Renewable Energy Development Zone
SANBI	South African National Biodiversity Institute
SEA	Strategic Environmental Assessment
WCBSP	Western Cape Biodiversity Spatial Plan
WMA	Water Management Area
WUL	Water Use License
WULA	Water Use License Application

GLOSSARY

DEFINITIONS	
Catchment	The area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points
Critical Biodiversity Areas	Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.
Ecological Importance and Sensitivity	The rating of any given wetland or river reach that provides an indication of the ecological importance of the aquatic system using criteria such as conservation needy habitat or species, protected ecosystems or unique habitat observed. The sensitivity is then derived by assessing the resilience the habitat exhibits under stress as a result of changes in flow or water quality.
Ecological Support Areas	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Protected Areas or Critical Biodiversity Areas and are often vital for delivering ecosystem services.
Other Natural Areas	Areas that have not been identified as a priority in the biodiversity spatial plans but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for meeting biodiversity targets, they are still an important part of the natural ecosystem.
Present Ecological State	The current ecological condition of a watercourse as measured against the deviation from the natural or pre-impacted condition of the system
Protected Areas	Areas that are formally protected by law and recognised in terms of the National Environmental Management: Protected Areas Act. This includes gazetted private Nature Reserves and Protected Environments concluded via a stewardship programme.
Riparian habitat	The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas
River FEPA	Rivers currently in a good condition (A or B ecological category) that have been identified to achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species. They should remain in a good condition to contribute to the biodiversity goals of the country.
Upstream Management Areas	Sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream River FEPAs
Valley-bottom wetlands	Wetlands located on the valley floors that are mostly fed by overland inflow, hillslope interflow and groundwater. They may be channelled or un-channelled.
Watercourse	(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister of DWS may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;
Water management area	An area established as a management unit in the national water resource strategy within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.
Wetland FEPA	Wetlands currently in a good condition (A or B ecological category) that have been identified to achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species. They should remain in a good condition in order to contribute to the biodiversity goals of the country.

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1. INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

Red Cap Energy (Pty) Ltd is proposing to develop a grid connection for the Mura Solar PV Development. The grid corridor includes a "collector ring line" of up to two 132 kV overhead lines running in parallel and switching stations to enable the connection of the PV projects to the approved Nuweveld Collector Substation. The "collector ring line", is a circular grid line which results in greater stability for the grid.

The project is located between Loxton and Beaufort West, largely within the Western Cape Province, with a small area extending into the Northern Cape. This Aquatic Specialist Assessment is intended to inform an application for Environmental Authorisation for the proposed grid connection for the Mura PV Development. Assessment of the PV facilities has been undertaken in a separate specialist report.

1.2 Terms of Reference

The terms of reference for the Aquatic Impact Assessment are as follows:

a) Undertake and manage the aquatic impact assessment (including the required site verification report) for the proposed Grid Connection to the Mura PV Development.

b) Compile the DWS risk assessment matrix for the proposed Grid Connection to the Mura PV Development.

The compilation of this Specialist Impact Assessment Report is in compliance with the NEMA EIA Regulations 2014, including specific requirements for a Site Sensitivity Verification Report and the protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity (Government Gazette 43110, dated 20 March 2020).

1.3 Approach and Methodology

This report was informed by a combination of desktop assessments of existing freshwater ecosystem information for the study area and surrounding catchments, as well as by a more detailed field assessment of the freshwater features on the various farm portions that comprise the study area.

The site was visited for two days in March 2022. No additional site visits were deemed necessary. During the field visits, the characterisation and integrity assessments of the freshwater features were

undertaken. Mapping of the freshwater features was undertaken using a GPS Tracker and mapped in PlanetGIS and Google Earth Professional.

The following techniques and methodologies were utilised to undertake this study:

1 The guideline document, "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas" document, as published by DWAF (2005), was followed for the delineation of the wetland areas. According to the delineation procedure, the wetlands were delineated by considering the following wetland indicators: terrain unit indicator; soil form indicator; soil wetness indicator; and vegetation indicator;
2 The wetlands were subsequently classified according to their hydro-geomorphic determinants based on a classification system devised by Kotze *et al* (2004) and SANBI (2009). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present;
3 A Present Ecological State (PES) assessment was conducted for each hydro-geomorphic wetland unit identified and delineated within the study area;
4 The functional wetland assessment technique, WET-EcoServices, developed by Kotze *et al* (2009), was used to indicate the ecological benefits and services provided by delineated wetland habitats. This technique consists of assessing a combination of desktop and infield criteria to identify the importance and level of functioning of the wetland units within the landscape;
5 The present ecological condition of the watercourses was determined using national River Health Programme methodologies as described in this report;
6 The ecological importance and ecological sensitivity (EI&ES) assessment of the wetlands and watercourses was conducted according to the guidelines as developed by DWAF (1999); and
7 Recommendations are made with respect to the adoption of buffer zones within the development site based on the river and wetlands' functioning and site characteristics.

1.4 Assumptions and Limitations

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The methodologies and techniques used in this assessment have been developed nationally and are typically of a rapid nature, as is required for this freshwater impact assessment.

Given the topography at the site, it was not possible to cover the site in a high level of detail, however, extrapolation of the areas ground-truthed to those not covered was thus done using the latest available aerial imagery for the site. No baseline long-term monitoring was undertaken as part of this assessment. In addition, there is very little existing information available for the aquatic features within the study area. Data was utilised for adjacent aquatic ecosystems, and where available, more detailed assessments were used for the aquatic features within the area.

The impacts of powerlines on the aquatic features are well understood and can be effectively mitigated to ensure the impacts remain low. The preferred mitigation measure is to limit the disturbance to aquatic features as far as possible by avoiding and minimising the number of crossings and providing adequate buffer areas. This will also ensure that the cumulative impacts will remain low.

The level of aquatic assessment undertaken was considered to be adequate for this study. The assessment was undertaken in March 2022, after recent rainfall in the area and there was sufficient water present in the rivers at the time of the site visit to allow for the required level of assessment for this study. No further fieldwork will thus be required if the proposed project activities remain outside of the delineated aquatic features and the recommended buffers.

1.5 Source of Information

Information used in this freshwater impact assessment includes:

- The satellite image used as a background to all maps was obtained from PlanetGIS and Google Earth Professional;
- The SANBI Biodiversity GIS, CapeFarmMapper and Freshwater Biodiversity Information System websites were consulted to identify any constraints in terms of geology, soils, natural vegetation cover, fine-scale biodiversity conservation mapping as well as possible freshwater features mapped in the Freshwater Ecosystem Priority Areas maps;
- Available PES and EI&ES data from the watercourses in the area was obtained from the national Desktop PES EI ES Assessment undertaken by DWA in 2012;
- Water Resources 2012 and climate data from the South African Atlas of Climatology and Agrohydrology (2009, RE Schulze) were utilised to determine the runoff; and
- Project information was sourced from the client.

2. DESCRIPTION OF PROJECT

The proposed Grid Connection to the Mura PV Facilities is located in the upper catchment of the Krom River, a tributary in the Groot / Gamtoos River System. The rivers within the study area lie within the Fish to Tsitsikamma Water Management Area, within Quaternary Catchment L11A and L11D. Figure 1 shows the main rivers and the quaternary catchments within the wider study area.

The Mura grid connection corridor is located on the following properties: Leeuwkloof Farm 43; Bultfontein Farm 13; Portion 4 of Duiker Kranse Farm 45; Portion 3 of Duiker Kranse Farm 45; Portion 12 of Bultfontein Farm 387; Aangrensend Abramskraal Farm 11; RE of Abrams Kraal Farm 206; Sneeuwkraal Farm 46; RE of Duiker Kranse Farm 45; and Portion 2 of Paardeberg Farm 49

The proposed Electrical Grid Infrastructure (EGI) corridor contains the following components:

- Eight Eskom Switching stations (two per solar facility) will be located adjacent to the solar farm substations within the solar area footprint and have a footprint of up to 150 m x 75 m each.
- Four additional up to 150 m x 75 m switching stations will be located within the corridor;
- ~70 km of overhead 132 kV lines (~40 km will be single overhead 132 kV lines and ~30 km will be up to two overhead 132 kV lines running in parallel running between the switching stations supported by monopole pylons with a max height of 38m). The spans (distance between pylons)

on the monopole pylons (without stays) are, on average, 260 m. Various steel double and single tower and monopole structures will be utilised depending on the requirement; and

- Access tracks: Existing access roads and tracks (upgraded to ± 2-4 m wide where needed) will be used as far as possible and new access tracks will be created where needed (±2-4 m wide). These are required for all project phases.
- Temporary laydown areas will be identified along the alignment, with the main equipment and construction yards being located along the alignment, in one of the surrounding towns, or at the solar site camp. The total area required for the temporary laydown areas is up to 5 ha, with two areas being required.

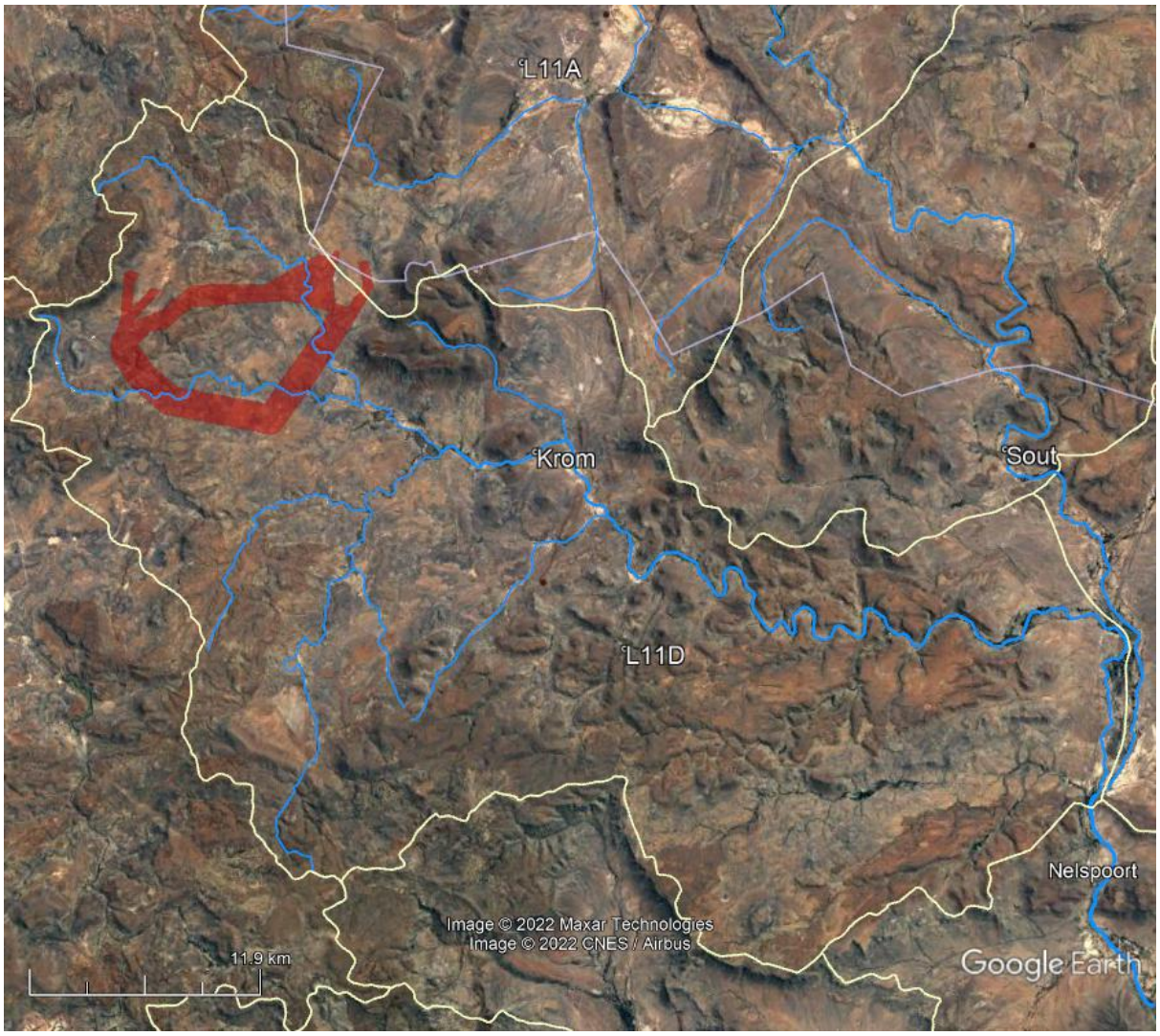

Figure 1. Google Earth image showing the proposed Grid Connection Corridor in relation to the main rivers and the quaternary catchments in the area.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Topography

The proposed Grid Connection Corridor for the Mura PV development is located between Loxton and Beaufort West, along the border between the Western and Northern Cape (Figure 2). The study area is in the upper reaches of several tributaries of the Krom River, a tributary of the Sout River in the Groot / Gamtoos River System (Figure 2). The rivers drain towards the southeast, towards the Groot River.

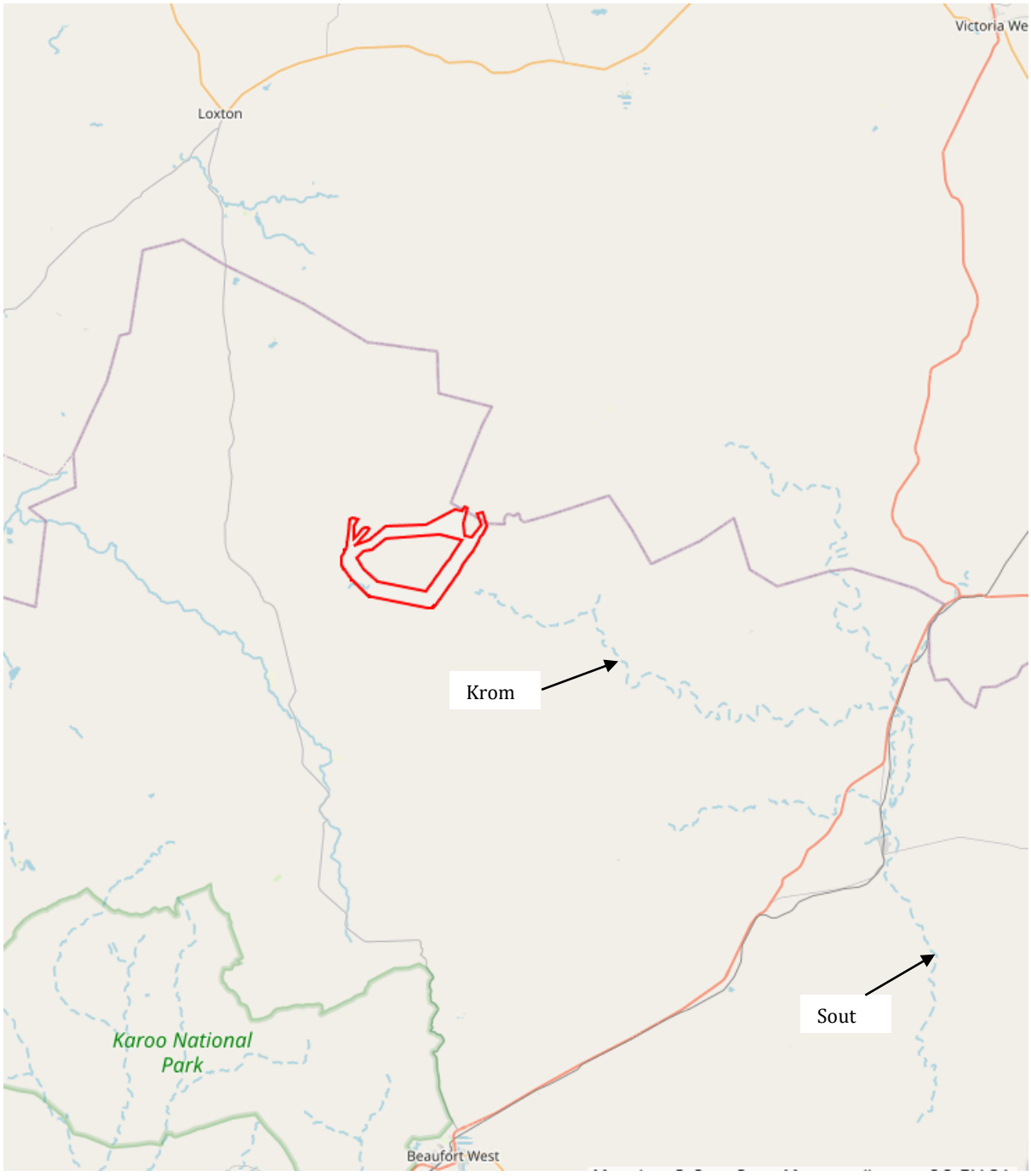

Figure 2. Relief map for the area, showing the topography and main watercourses and the location of the Mura EGI corridor (CapeFarmMapper, 2022)

Table 1 provides an overview and summary of the water resource information for the study area.

Table 1: Key water resources information for the proposed Grid Connection Corridor for the Mura PV projects

Descriptor	Name / details	Notes
Water Management Area	Fish Tsitsikamma WMA	
Catchment Area	Krom and smaller tributaries of the Sout River	Upper portion of the Groot/ Gamtoos Catchment
Tertiary Catchment	Sout River (L11)	
Present Ecological State	Krom: C (moderately modified) Sout: B (largely natural)	DWS (2012)
Ecological Importance and Ecological Sensitivity	Moderate EI and ES	
Type of water resources	Rivers, ephemeral streams and valley bottom wetlands	

3.2 Climate and Hydrology

The study area experiences a low rainfall of 160mm per annum. Rainfall falls mostly in late summer/autumn, with March being the highest rainfall month on average. Winters (June – August) are typically colder than summers which experience average daily highs of 20°C (December – February) (Figure 3). Flow in the smaller tributaries in the upper catchment tends to be episodic (Figure 4), with very little to no flow in the rivers for much of the year. Flow typically only occurs for a short period following localised rainfall. These rainfall events tend to mostly occur in the higher rainfall months in late summer and into autumn. When flow occurs in the watercourses, it occurs as a high-flow event. This flow pattern is unlikely to change significantly due to longer-term climatic changes. The flow nature does, however, make erosion control measures in the watercourses, particularly on the slopes, essential mitigation.

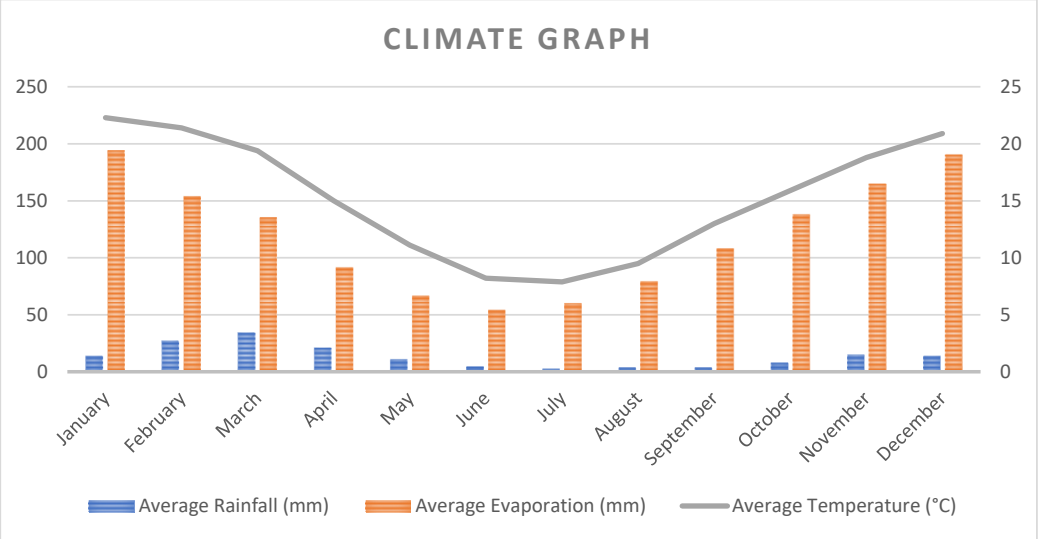

Figure 3. Average monthly rainfall, evaporation and temperatures for the study area, collected between 1950 and 2000 (Schulze, 2009)

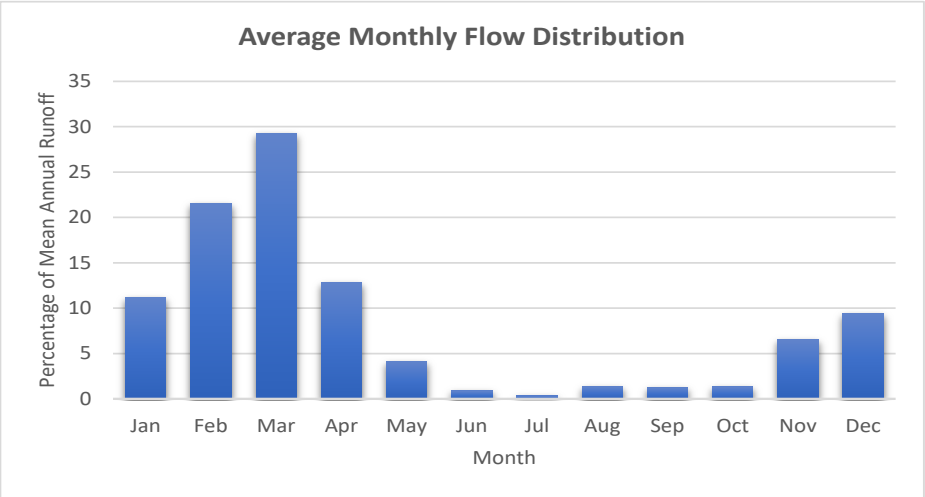

Figure 4. Monthly flow distribution within the rivers in the area, with the month flow shown as a percentage of the natural mean annual runoff (nMAR) for the catchment

3.3 Geology and Soils

The underlying geology in the area comprises mudstone and shale of the Beaufort Group and the Karoo System, overlain by alluvial deposits along the river systems and with dolerite intrusions in places. The soils are usually shallow on a hard or weathering rock in higher-lying areas. Within the valley floor of the larger rivers, Glenrosa and/or Mispah soil forms occur that have a moderate erodibility.

3.4 Vegetation

Under unmodified conditions, four vegetation types occur across the wider study area. These are primarily Eastern Upper Karoo (Least Threatened) with bands of Upper Karoo Hardeveld (Least Threatened) (Figure 6). The natural vegetation reflects the varied topography and associated geology of the area. Upper Karoo Hardeveld occurs on all the koppies, tabletops and higher-lying areas, while Eastern Upper Karoo occurs in the valleys and lower slopes.

Vegetation along the larger watercourses comprises *Vachellia karroo* or *Tamarix usneoides* thickets fringed by tall *Salsola aphylla*-dominated shrubland and comprising of *Stipagrostis namaquensis* grass within the sandy drainage lines. Most of the vegetation associated with the aquatic features within the valley floors in the study area is still largely natural and comprises a mix of low trees and shrubs such as *Vachellia karroo*, *Searsia lancea, Euclea undulata*, *Melianthus comosus, Lycium* spp. and *Asparagus striatus* within the riparian zones. Patches of common *Phragmites australis* reeds, grasses such as *Stipagrostis namaquensis* with *Juncus* rushes within the instream habitat. There is a low density of invasive alien plants such as *Eucalyptus* and pepper trees (*Schinus molle*) occurring in the more disturbed aquatic habitats.

3.5 Biodiversity Conservation Value

The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool map for the Aquatic Biodiversity Combined Sensitivity for the corridor (Figure 5) indicates most of the wider area to be of low sensitivity, with only the main channels of the larger rivers mapped as being of very high sensitivity. The very high sensitivity is linked to aquatic Critical Biodiversity Areas that are associated with larger rivers that contain instream wetland habitat. These larger river channels will need to be crossed by the proposed Grid Connection infrastructure.

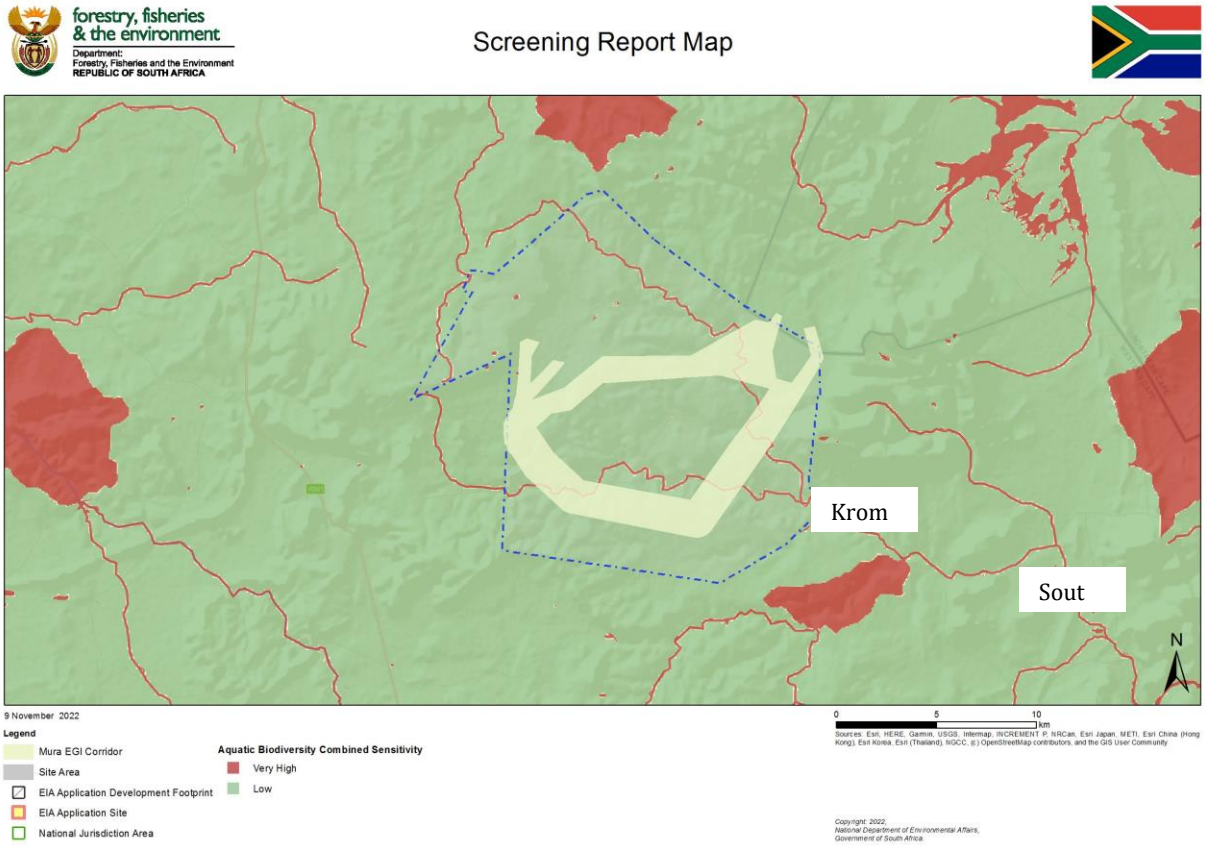

Figure 5. DFFE Screening Tool mapping of the area for Aquatic Biodiversity Combined Sensitivity

There are three freshwater biodiversity conservation mapping initiatives of relevance to the study area because the site is split over two provinces: the national Freshwater Ecosystem Priority Areas (FEPAs), the 2017 Western Cape Biodiversity Spatial Plan (WCBSP) and the 2016 Northern Cape Critical Biodiversity Area.

FEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting the sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The study area does not lie within a FEPA River Subcatchment (green areas in Figure 7). The only natural instream wetland areas within the study area are within the larger channel of the Krom River downstream of the site that has been mapped in the FEPA Wetland mapping as Upper Nama Karoo unchanneled valley-bottom wetlands. These wetlands are also mapped in the National Wetland Map (version 5) as valley-bottom

wetland (Figure 8). All other FEPA wetland mapping within the study area comprises artificial wetlands associated with farm dams.

The 2017 WCBSP used available land cover data to identify areas of potential biodiversity importance. The use of land cover data means that data collected by a site visit is still required to confirm the ecological condition of the area. The WCBSP mapping comprises the following categories:

- CBA1- Critical Biodiversity Areas likely to be in a natural condition (terrestrial and aquatic);
- CBA2 – Potentially degraded Critical Biodiversity Areas or those that contain secondary vegetation (terrestrial and aquatic);
- ESA1 – Natural or near natural Ecological Support Areas (terrestrial and aquatic);
- ESA2 – Ecological Support Areas degraded and require restoration where feasible; and
- ONA – Other Natural Areas have not been identified as a priority to meet biodiversity targets.

Within the WCBSP, the watercourses are all mapped as aquatic ESAs (ESA1). Some aquatic ESAs (ESA2) occur where there is localised disturbance within the watercourses, such as at the track/road crossings. Within the terrestrial CBAs, the watercourses have also been mapped as aquatic CBAs.

The portion of the EGI corridor that lies within the 2016 Northern Cape CBA mapping is within an area indicated as Other Natural Areas that are natural or semi-natural areas not required to meet biodiversity targets or support natural ecological processes and can thus be used for various land use activities.

This aquatic ecosystem assessment concurs with the Aquatic Biodiversity Combined Sensitivity mapping, that the wider area is of low sensitivity, with only the larger rivers being of very high sensitivity.

3.6 Aquatic Habitat and Species of Concern

The watercourses in the study area are non-perennial, however, some rock pools and dams are likely to contain water for most of the year. As a result, no indigenous fishes occur for most of the river systems, with some indigenous fish, such as smallscale redfin *Psuedobarbus asper* (vulnerable), moggel *Labeobarbus umbratus* (least concern) and chubbyhead barb *Barbus anoplus* (least concern), occurring in the larger rivers where there are deep pools that contain water through the dry season.

The amphibian diversity within the study area is also likely to be relatively low. No species of conservation concern are thus known to occur in the study area from an aquatic perspective. The amphibian species likely to be present are quite widespread and of low conservation concern. These include the Karoo Dainty Frog *Cacosternum karooicum* (Data Deficient), Poynton's River Frog *Amietia poyntoni*, the Cape Sand Frog, *Tomopterna delalandii,* Pygmy Toad *Poyntonophrynus vertebralis* and the Karoo Toad, *Vandijkophrynus gariepensis*. The latter two amphibian species are listed as "Not Threatened". A faunal species potentially in the area and associated with the watercourses in the landscape is the Riverine Rabbit, which is listed as Critically Endangered. The habitat preference of Riverine Rabbits is alluvial seasonal watercourses, browsing on *Pteronia erythrochaetha, Kochia pubescens, Salsola glabrescens* and Mesembryanthemaceae. They are unable to survive in heavily overgrazed or agriculturally transformed habitats. The riverine rabbit is being assessed in a separate assessment for this development by the terrestrial ecologist.

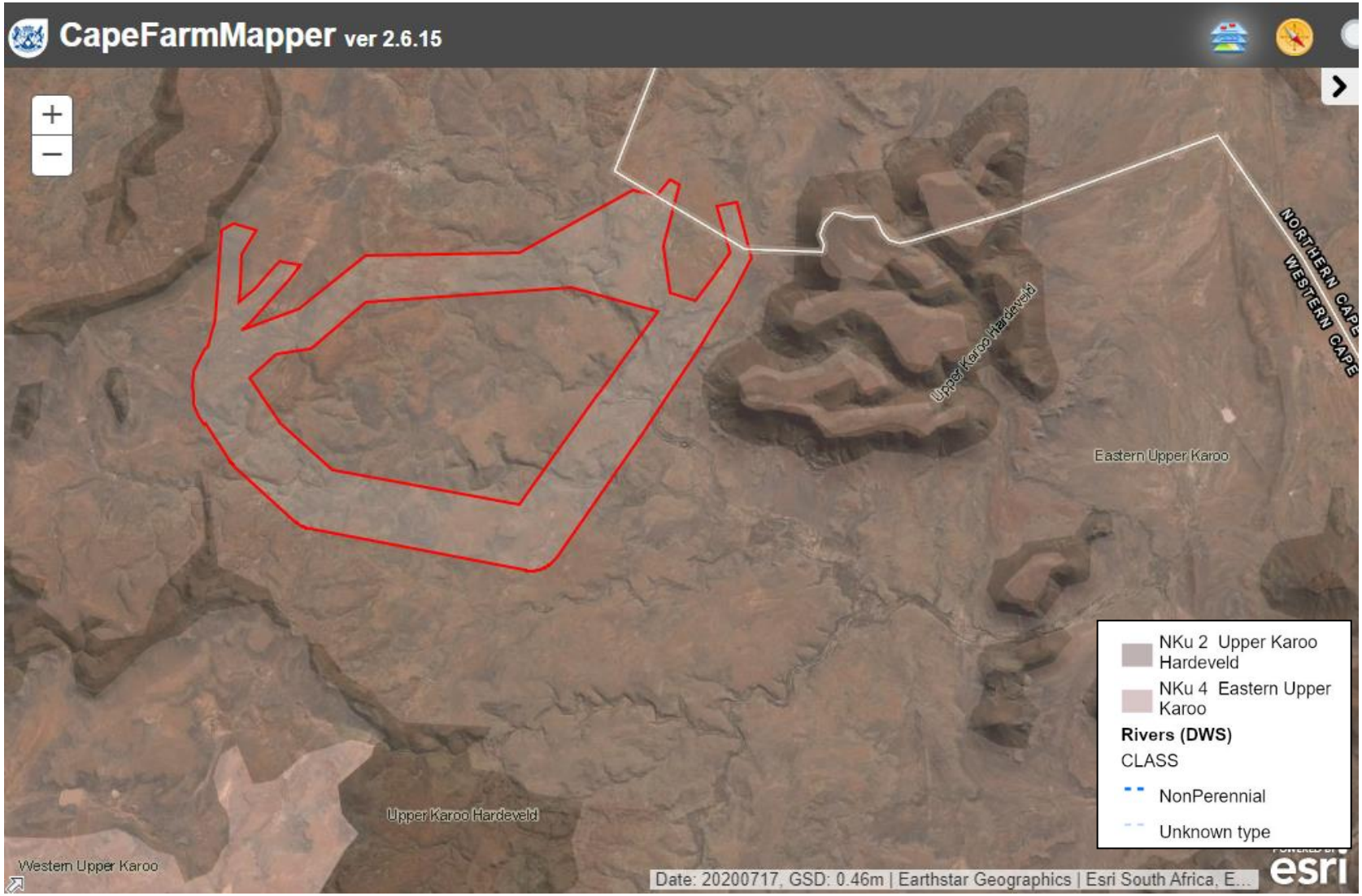

Figure 6. National Vegetation Map (2018 VegMap) for the EGI corridor (red outlined area) (CapeFarmMapper, 2022)

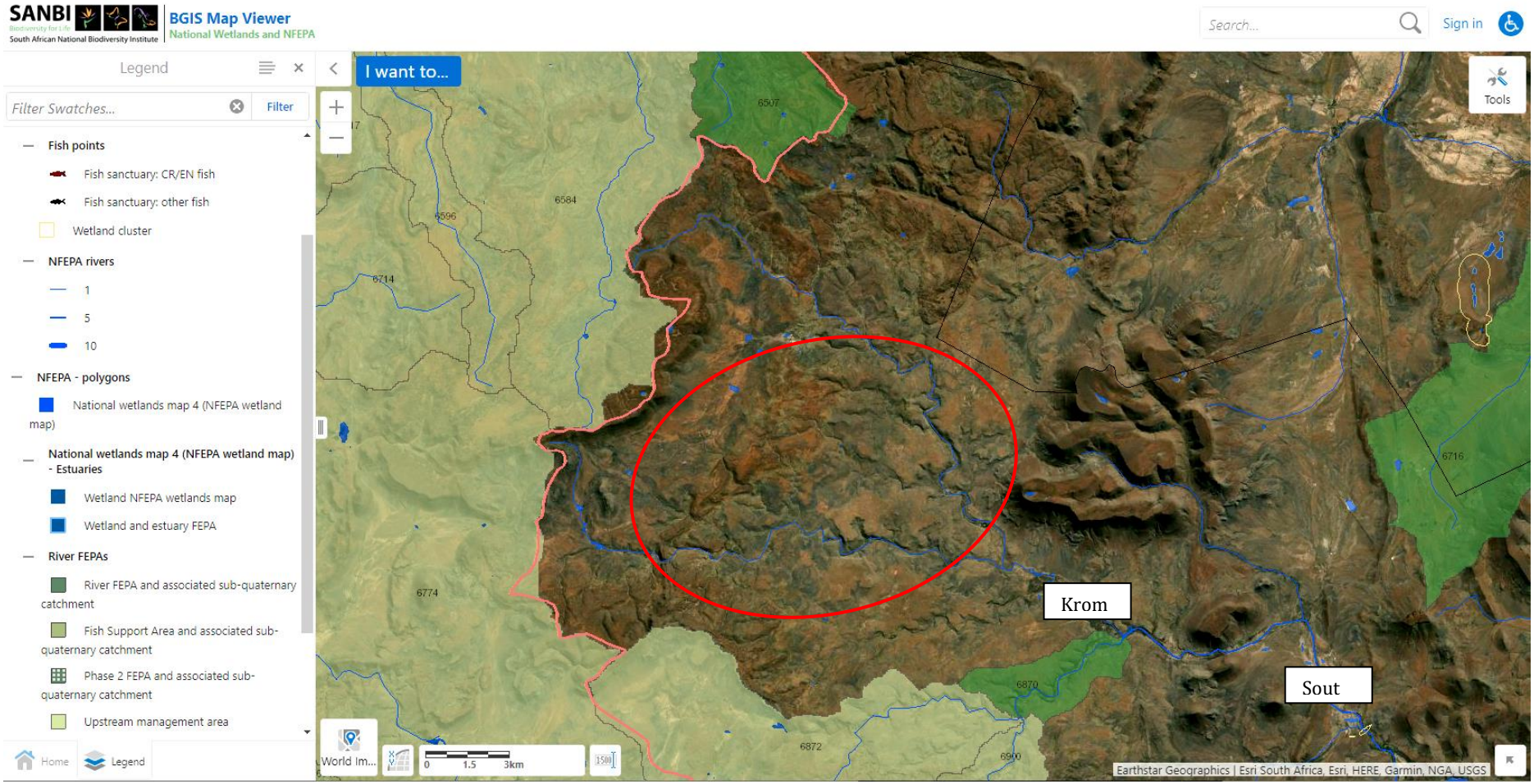

Figure 7. National Freshwater Ecosystem Priority Areas for the study area (red oval) (SANBI Biodiversity GIS, 2022)

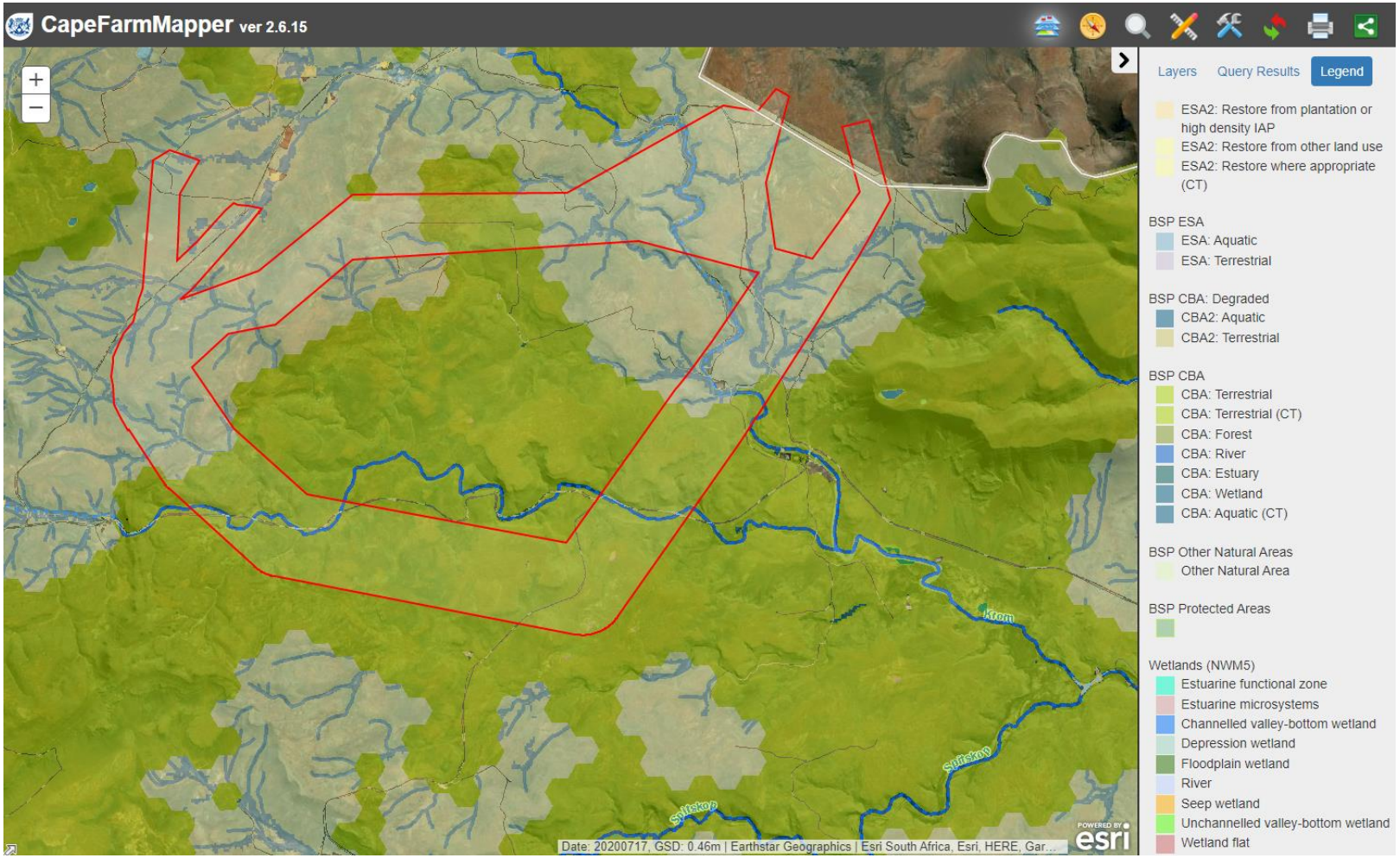

Figure 8. The 2017 Western Cape Biodiversity Spatial Plan and National Wetland Map (version 5) for the Mura EGI corridor (CapeFarmMapper, 2022)

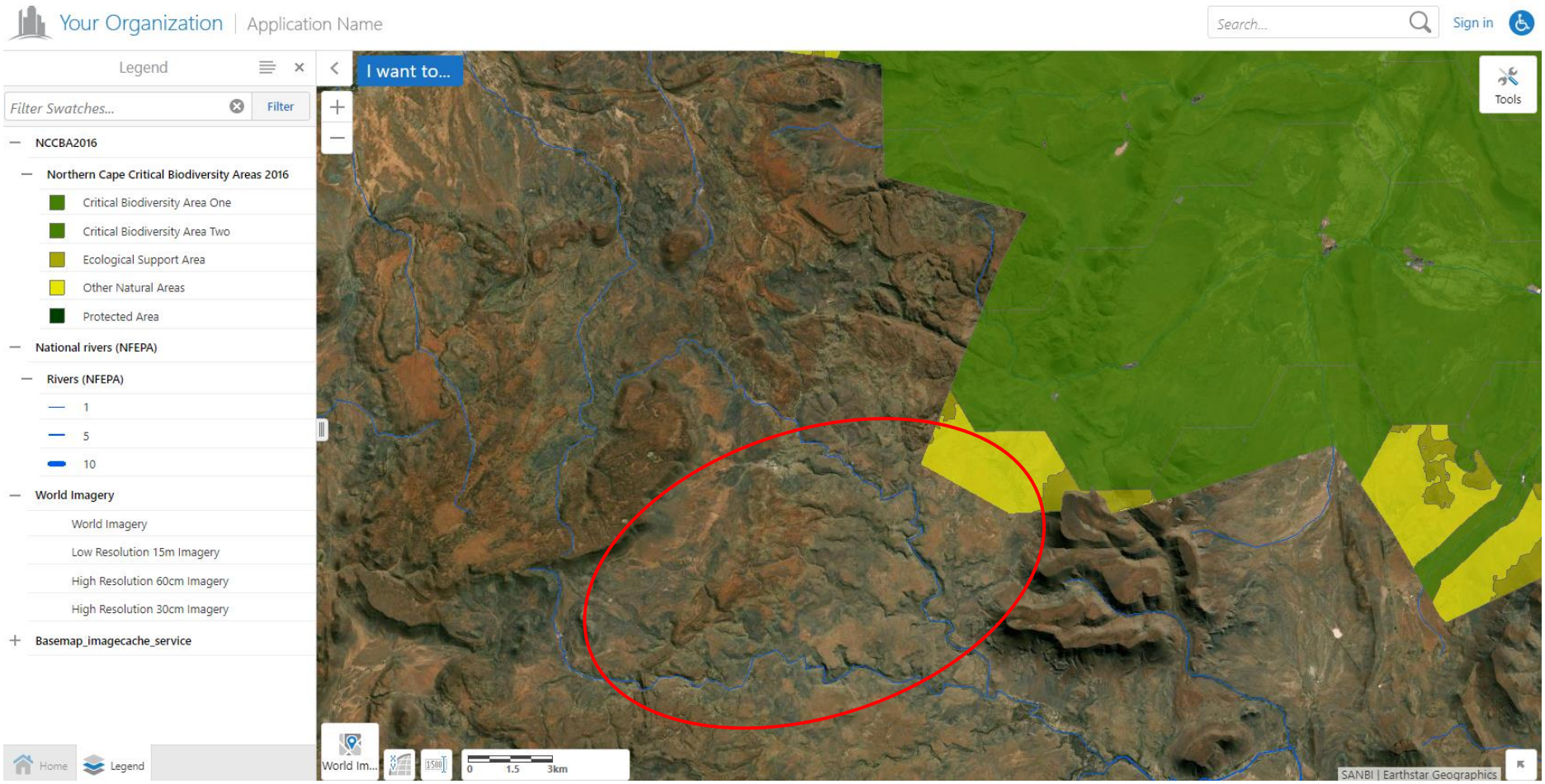

Figure 9. The 2016 Northern Cape Critical Biodiversity Areas for the study area (red outlined area) (SANBI Biodiversity GIS, 2022)

4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The proposed development needs to take cognizance of the legislative requirements, policies, strategies, guidelines and principles of the relevant regulatory documents such as the National Water Act (NWA) and the National Environmental Management Act (NEMA).

4.1 The National Environmental Management Act (Act No. 107 of 1998)

NEMA is the overarching piece of legislation for environmental management in South Africa and includes provisions that must be considered to give effect to the general objectives of integrated environmental management.

Chapter Seven of the NEMA states that:

"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".

The Act also clearly states that the landowner, or the person using or controlling the land, is responsible for taking measures to control and rectify any degradation. These may include measures to:

"(a) investigate, assess and evaluate the impact on the environment;

(b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment:

(c) cease, modify or control any act, activity or process causing the pollution or degradation:

(d) contain or prevent the movement of pollutants or degradation: or

(e) eliminate any source of pollution or degradation: or

(f) remedy the effects of the pollution or degradation."

4.2 NEMA Environmental Impact Assessment Regulations, 2014, as amended

NEMA provides for the identification of activities that will impact the environment in terms of Section 24. These activities were promulgated in terms of Government Notice No. R. 324, 325 and 327, dated 4 December 2014, as amended, and requires environmental authorisation. The impacts of the listed activities must be investigated, assessed and reported to the competent authority before authorisation to commence with such listed activities can be granted.

4.3 National Water Act, 1998 (Act No. 36 of 1998)

The purpose of the National Water Act, 1998 (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are defined by the Act as national resources which cannot be owned by any individual and rights which are not automatically coupled to land rights but for which prospective users must apply for authorisation and register as users. The NWA also provides measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard. Defined water use activities require the approval of DWS in the form of a General Authorisation (GA) or Water Use Licence (WUL). There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

Section 22(3) of the NWA allows for a responsible authority (DWS) to dispense with the requirement for a WUL if it is satisfied that the purpose of the Act will be met by the grant of a licence, permit or authorisation under any other law.

4.3.1 Regulations requiring that a water user be registered, GN R.1352 (1999)

Regulations requiring the registration of water users were promulgated by the Minister of Water Affairs in terms of provision made in Section 26(1)(c), read together with Section 69 of the National Water Act, 1998. Section 26(1)(c) of the Act allows for registration of all water uses, including existing lawful water use, in terms of Section 34(2). Section 29(1)(b)(vi) also states that in the case of a GA, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Art. 3) oblige any water user, as defined under Section 21 of the Act, to register such use with the responsible authority and effectively apply for a Registration Certificate as contemplated under Art. 7(1) of the Regulations.

4.3.2 General Authorisations in terms of Section. 39 of the NWA

According to the preamble to Part 6 of the NWA, 1998, "*This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette*…" and further states that "*The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary*…"

The GAs for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA were revised in 2016 (Government Notice R509 of 2016). The proposed works associated with the Mura EGI within, or adjacent to, the wetland areas and river channels are likely to change the characteristics of the associated freshwater

ecosystems and may therefore require authorization. Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a GA. A risk assessment has been undertaken for the new proposed Grid Connection to the Mura PV Facilities and is included in this report (see Section 7.7).

5. ECOLOGICAL ASSESSMENT OF THE AQUATIC FEATURES WITHIN THE STUDY AREA

This section comprises a description of the aquatic ecosystems within the study area as well as an assessment of their present ecological condition and their ecological importance and ecological sensitivity. The aquatic features within the study area consist of the upper reaches of:

- Krom River, with its lesser, unnamed tributaries, as well as
- Some valley bottom wetlands associated with larger watercourse and some artificial depression wetland associated with small dams.

The Present Ecological Status (PES) of the rivers and tributaries was determined using Habitat Integrity (HI) Assessments and the Site Characterisation information. The ecological importance and sensitivity of the rivers were also assessed. The patches of valley bottom wetland areas are closely associated with the rivers and thus have been included in the rivers' assessments.

5.1. Description of Aquatic Features

The study area is mostly drained by smaller seasonal streams that feed into the larger Krom River. The rivers flow in a southeasterly direction towards the Sout River, a tributary of the Kariega River in the Groot/Gamtoos River System. The Krom River is a larger watercourse with some instream wetland habitat that tends to contain water for longer periods. The rivers are still in a natural ecological condition with little to no disturbance except for farm roads along the river.

The larger Krom River corridor is mapped as aquatic CBA, with the smaller tributaries mapped as aquatic ESAs. The only mapped natural FEPA Wetlands and National Wetland Map areas are downstream of the study area in the larger Krom River.

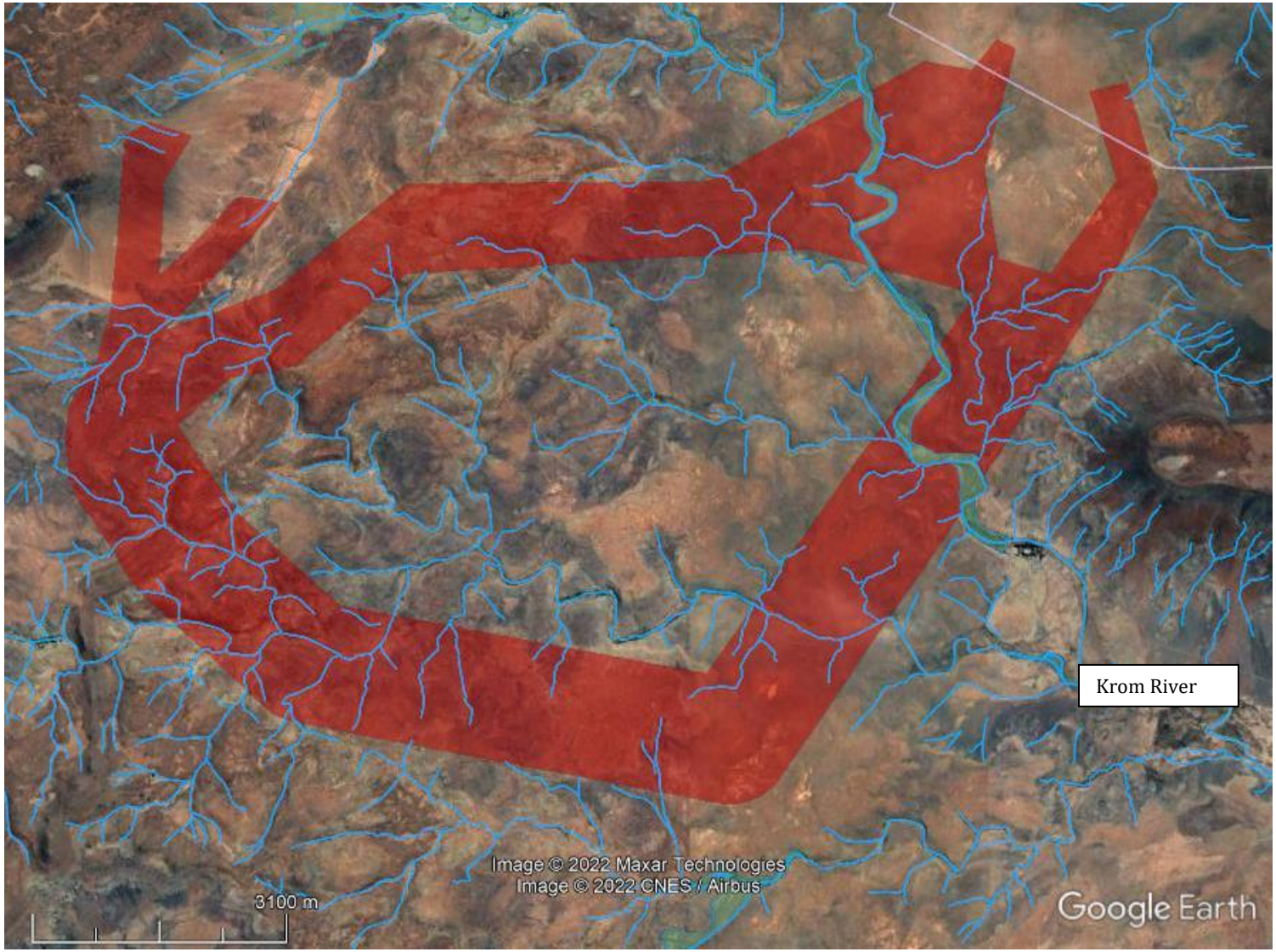

Figure 10. Google Earth image with the mapped aquatic features shown as well as the proposed project location

Figure 11. View of some of the larger Krom River (top) and the typical smaller watercourses that drain the study area (bottom)

5.2 Classification of aquatic features

Classification of the watercourses within the study area

To assess the condition and ecological importance and sensitivity of the watercourses, it is necessary to understand how they might have appeared under unimpacted conditions. This is achieved by classifying the rivers according to their ecological characteristics, so that they can be compared to ecologically similar rivers.

River typing or classification involves the hierarchical grouping of rivers into ecologically similar units so that inter- and intra-river variation in factors that influence water chemistry, channel type, substratum composition and hydrology are best accounted for. Any comparative assessment of river conditions should only be done between rivers that share similar physical and biological characteristics under natural conditions. Thus, the classification of rivers provides the basis for assessing river conditions to allow comparison between similar river types. The primary classification of rivers is a division into Ecoregions. Rivers within an ecoregion are further divided into sub-regions.

Ecoregions: groups of rivers within South Africa which share similar physiography, climate, geology, soils and potential natural vegetation. For this study, the ecoregional classification presented in DWAF (1999), which divides the country's rivers into ecoregions, was used. The study area falls within the Great Karoo Ecoregion (Table 2).

Table 2. Characteristics of the Great Karoo Ecoregion

Main Attributes	Characteristics
Terrain Morphology:	Plains: Moderate to Low Relief Lowlands; Hills and Mountains: Moderate and High Relief Open Hills, Lowlands; Mountains: Moderate to High Relief Closed Hills; Mountains: Moderate and High Relief; Table-Lands: Moderate and High Relief
Vegetation types	Valley Thicket; Spekboom Succulent Thicket (limited); Central Nama Karoo; Eastern Mixed Nama Karoo; Great Nama Karoo; Upper Nama Karoo; Bushmanland Nama Karoo (limited), Lowland Succulent Karoo; Upland Succulent Karoo; and Escarpment Mountain Renosterveld
Altitude	300-1700m; 1700-1900m (limited occurrence)
MAP	0 to 500m
Rainfall seasonality	Very late summer to winter
Mean annual temp.	10 to 20 °C
Median annual simulated runoff	<5 to 60 mm for quaternary catchment

Sub-regions: sub-regions (or geomorphological zones) are groups of rivers, or segments of rivers, within an ecoregion, which share similar geomorphological features, of which gradient is the most important. The use of geomorphological features is based on the assumption that this is a major factor in the determination of the distribution of the biota. Table 3 provides the geomorphological and physical features of the rivers within the study area. From the Site Characterisation assessment, the geomorphological and physical characteristics of the channels can be classified as follows:

Table 3. Geomorphological and physical features of the watercourses on site

River	Krom River	Minor unnamed tributaries & drainage features
Geomorph Zone	Lower Foothill Zone	
Lateral mobility	Semi-Confined by topography	
Channel form	Single to multiple channels	Simple single channel
Channel pattern	Braided channel with moderate sinuosity	Single channel, moderate to low sinuosity
Channel type	Bedrock, alluvial and gravel	
Channel modification	Channel is fairly natural with some flow and habitat modification	Natural with very small disturbances
Hydrological type	Seasonal to episodic	Episodic
Ecoregion	Great Karoo	
DWA catchment	L11A and L11D	
Vegetation type	Eastern Upper Karoo	
Rainfall region	Very late summer to autumn	

Classification of the watercourses within the study area

Wetlands can be broadly classified according to their flow and geomorphic characteristics. The wetlands are associated with the lower Krom River in the study area and are classified as channelled valley bottom wetlands. Flow into and out of the wetland areas is mostly associated with the watercourses within the study area as opposed to sub-surface flow.

Table 4: Classification of wetland areas within the study area

Name	Valley bottom wetlands
System	Inland
Ecoregion	Great Karoo
Landscape setting	Channeled valley floor
Longitudinal zonation	Lower foothill
Drainage	With channel in- and outflow
Seasonality	Seasonally inundated
Modification	Largely natural to Moderately modified
Geology	Shale and siltstone of the Ecca Group; Karoo Sequence
Vegetation	Eastern Upper Karoo
Substrate	Bedrock, gravel and alluvium
Salinity	Fresh to brackish

5.3 Present Ecological Condition

Habitat Integrity of the Watercourses

The evaluation of Habitat Integrity provides a measure of the degree to which a river has been modified from its natural state. The methodology (DWAF, 1999) involves a qualitative assessment of the number and severity of anthropogenic perturbations on a river and the damage they potentially inflict upon the system. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of the degradation of a river. The severity of each impact is ranked using a six-point scale from 0 (no impact) to 25 (critical impact). The Habitat Integrity Assessment is based on an assessment of the impacts of two components of the river, the riparian zone and the instream habitat. The total scores for the instream and riparian zone components are then used to place the habitat integrity of both in a specific habitat category (Table 6).

Table 5. Instream Habitat Integrity assessment for the watercourses within the study area

Instream Criteria	Unnamed tributaries	Krom River	Riparian Category	Unnamed tributaries	Krom River
Water Abstraction	2	8	Vegetation Removal	2	6
Flow Modification	3	9	Exotic Vegetation	2	6
Bed Modification	3	8	Bank Erosion	3	5
Channel Modification	3	4	Channel Modification	2	5
Water Quality	2	5	Water Abstraction	2	6
Inundation	3	6	Inundation	3	5
Exotic Macrophytes	0	0	Flow Modification	3	7
Exotic Fauna	0	0	Water Quality	2	5
Rubbish Dumping	0	2			
Instream Integrity Class	**A**	**B/C**	**Riparian Integrity Category**	**A/B**	**B/C**

The habitat integrity assessment was divided into the smaller watercourses that have few modifications and the larger Krom River within the study area. The rivers within the study area are still in a natural ecological condition in their upper reaches with few modifications. The Krom River is more impacted by surrounding landuse activities and is in a largely natural to moderately modified ecological condition.

Table 6. Habitat Integrity categories (From DWAF, 1999)

Category	Description	Score (%)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-90
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. Large loss of natural habitat, biota and ecosystem function has occurred.	40-59
E	The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota.	0

Wetland Habitat Integrity

The Wetland PES Method (DWAF 2005) was used to establish the integrity of the wetlands in the study area and was based on the modified HI approach developed by Kleynhans (DWAF, 1999; Dickens *et al*, 2003). Table 7 displays the criteria and results from the assessment of the habitat integrity of the wetlands within the study area. These criteria were selected based on the assumption that anthropogenic modification of the criteria and attributes listed under each selected criterion can generally be regarded as the primary causes of the ecological integrity of a wetland. The valley bottom wetlands have been slightly modified but are still in a largely natural ecological condition (Category B).

The WET-Health method was then used to determine the overall PES for the wetlands. PES scores were determined for geomorphology, hydrology, water quality and vegetation to generate the overall score and ecological category (Table 9). Modification to the indigenous vegetation being the most impacted component of the wetlands as a result of direct disturbances of adjacent land use activities (i.e. agriculture / grazing) and infrastructure (road) development.

Table 7. Habitat integrity assessment and criteria for palustrine wetlands (assessment (score of 0=critically modified to 5=unmodified))

Criteria	Relevance	Wetlands
Hydrologic		
Flow Modification	Abstraction, impoundments or increased runoff from developed areas. Change in flow regime, volume, velocity & inundation of habitats resulting in floristic changes or incorrect cues to biota.	3.4
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	3.7
Water Quality		
Water Quality Modification	From point or diffuse sources such as upstream agriculture, human settlements and industry. Aggravated by volumetric decrease in flow delivered to the wetland.	3.8
Sediment Load Modification	Reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rate of erosion, accretion, infilling of wetlands &habitat change.	3.2
Hydraulic/Geomorphic		
Canalisation	Desiccation or change to inundation of wetland and change in habitat	3.8
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities that reduce or change wetland habitat	3.6
Biota		
Terrestrial Encroachment	Desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat	3.9
Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	3.8
Invasive Plants	Affects habitat characteristics through changes in community structure and water quality changes	4.5
Alien Fauna	Presence of alien fauna affecting faunal community structure.	3.5
Biota Over use	Overgrazing, over fishing, etc.	4.5
Category		**B**

Table 8. Relation between scores given and ecological categories

Scoring Guidelines	Interpretation of Scores: Rating of Present Ecological Status Category (PESC)
Natural, unmodified – score=5.	CATEGORY A >4; Unmodified, or approximates natural condition.
Largely natural – score=4.	CATEGORY B >3 and ≤4; Largely natural with few modifications, with some loss of natural habitat.
Moderately modified-score=3.	CATEGORY C >2 and ≤3; moderately modified, but with some loss of natural habitats.
Largely modified – score=2.	CATEGORY D ≤2; largely modified. Large loss of natural habitat & basic ecosystem function
	OUTSIDE GENERALLY ACCEPTABLE RANGE
Seriously modified – rating=1.	CATEGORY E >0 and <2; seriously modified. Extensive loss of natural habitat & basic ecosystem function.
Critically modified – rating=0.	CLASS F 0; critically modified. Modification reached critical levels with system completely modified.

Table 9: WET-Health assessment of valley bottom wetland areas in the study area

Components	Method used for assessment	PES% Score	Ecological Category
Hydrology PES	WET-Health Hydro Module	85 %	B
Geomorphology PES	WET-Health Geomorph Module	88 %	A/B
Water quality PES	Landuse-WQ Model	91 %	A/B
Vegetation PES	WET-Health Veg Module	83 %	B
Overall Wetland PES	WET-Health default weightings	86 %	B

5.4 Ecological Importance and Sensitivity

The Ecological Importance and Ecological Sensitivity (EI&ES) assessment for both watercourses and wetlands consider several biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale (Table 10).

Table 10. Scale used to indicate either ecological importance or sensitivity

Scale	Definition
1	One species/taxon judged as rare or endangered at a local scale.
2	More than one species/taxon judged to be rare or endangered on a local scale.
3	One or more species/taxon judged to be rare or endangered on a Provincial/regional scale.
4	One or more species/taxon judged as rare or endangered on a National scale

The median of the resultant score is calculated to derive the EI&ES category (Table 12). The results of the EIS assessment are shown in Table 13. The EI&ES have been determined for the larger watercourses and the smaller unnamed tributaries separately.

Table 11. Ecological importance and sensitivity categories (DWAF, 1999)

EISC	General description	Median
Very high	Quaternaries/delineations unique on a national and international level based on unique biodiversity. These rivers are usually very sensitive and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations unique on a national scale based on biodiversity. These rivers may be sensitive to flow modifications and may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations unique on a provincial/ local scale due to biodiversity. These rivers are not very sensitive to flow modification and have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations not unique on any scale. These rivers are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 12. Results of the EI&ES assessment of the watercourses in the study area

Biotic and Aquatic Habitat Determinants	Krom River	Smaller tributaries
Rare and endangered biota	1.5	2
Unique biota	2	1
Intolerant biota	2	2
Species/taxon richness	1.5	1.5
Diversity of aquatic habitat types or features	2.5	2
Refuge value of habitat type	2.5	2
Sensitivity of habitat to flow changes	2.5	3
Sensitivity of flow related water quality changes	2	2.5
Migration route/corridor for instream & riparian biota	2.5	1
National parks, wilderness areas, Nature Reserves & areas, PNEs	1.5	1.5
EIS CATEGORY	High	Moderate

The Krom River in the study area is deemed to be of a high ecological importance and sensitivity. This is due to the importance of larger river in providing a diversity of habitats and being important refugia for biota as well as corridors for the movement within the landscape. The smaller tributaries are of moderate ecological importance and sensitivity and tend to be more sensitive to flow and water quality changes. Indigenous fish and amphibian diversity in the rivers are likely to be relatively low. Potential fish and amphibian populations that may occur in the wetter Krom River are listed in Section 3.6 of this report.

The results from the wetland EIS assessment are provided in Table 13. The assessment of the ecosystem services supplied by the wetland areas (divided into Hydrological Functional Importance

and Direct Human Benefits) is included in the table and was conducted according to the guidelines as described by Kotze *et al* (2005).

Table 13: Results of the EIS assessment for the wetland areas

Ecological Importance	Valley bottom wetlands
Biodiversity support	2.17
Presence of Red Data species	1
Populations of unique species	2
Migration/breeding/feeding sites	3.5
Landscape scale	1.40
Protection status of the wetland	1
Protection status of the vegetation type	1
Regional context of the ecological integrity	2
Size and rarity of the wetland type/s present	1
Diversity of habitat types	2
Sensitivity of the wetland	1.93
Sensitivity to changes in floods	2.8
Sensitivity to changes in low flows/dry season	2
Sensitivity to changes in water quality	1
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.17
Flood attenuation	3
Streamflow regulation	1
Sediment trapping	2.5
Phosphate assimilation	1
Nitrate assimilation	1.5
Toxicant assimilation	1
Erosion control	2
Carbon storage	1
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.63
Water for human use	1.5
Harvestable resources	1.5
Cultivated foods	0
Cultural heritage	0
Tourism and recreation	2
Education and research	1
IMPORTANCE OF DIRECT HUMAN BENEFITS	1.00
OVERALL IMPORTANCE (highest score of ecological, hydrological and direct human benefits)	2.17

The wetland features within the study area are considered of moderate ecological importance and sensitivity as they are closely associated with the larger Krom River, providing habitat and ecological corridors for the movement of biota.

5.5 Recommended Ecological Condition of Aquatic Ecosystems

Considering the moderately modified to largely natural ecological condition of the aquatic ecosystems within the study area and their moderate to high ecological importance and ecological sensitivities, the recommended ecological condition (REC) of these features would be that they remain in their current condition or be improved where possible. These rivers should not be allowed to degrade further. The proposed Grid Connection for the Mura PV Facilities will need to cross over the larger Krom River, its

associated valley bottom wetland, as well as several of the smaller watercourses but is unlikely to result in any significant degradation of aquatic ecosystem integrity as the associated infrastructure can be placed outside of the recommended buffers or setback areas. If new access tracks have to traverse these areas, then the crossing should subject to a walkdown and approval by a qualified aquatic specialist.

6. SITE SENSITIVITY VERIFICATION

Prior to commencing with the Aquatic Biodiversity Specialist Assessment in accordance with the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (Government Notice 320, dated 20 March 2020), a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

The details of the site sensitivity verification are noted below:

Date of Site Visit	7-8 March 2022
Specialist Name	Toni Belcher
Professional Registration Number	400040/10
Specialist Affiliation / Company	BlueScience (Pty) Ltd

The proposed grid connection to the Mura PV Projects was assessed in terms of its aquatic biodiversity sensitivity by means of a desktop analysis using available aquatic ecosystem mapping, aerial imagery and a site visit undertaken on 7-8 March 2022. A literature survey was also undertaken to determine any aquatic biodiversity sensitivities that may occur in the surrounding area.

The study area is in the upper reaches of several tributaries of the Krom River, a tributary of the Sout River in the Groot / Gamtoos River System. The Screening Tool map for the Aquatic Biodiversity Combined Sensitivity at the site indicates most of the wider area to be of low sensitivity, with only the main channels of the larger rivers mapped as being of very high sensitivity. The very high sensitivity is linked to aquatic Critical Biodiversity Areas that are associated with larger rivers that contain instream wetland habitat. These larger river channels will need to be crossed by the proposed service tracks for the grid line. The findings of this assessment largely agree with the screening tool mapping.

Below is a summary of the aquatic ecological condition, ecological importance and sensitivity and recommended ecological category, as well as the sensitivity and associated buffers for the aquatic features, based on the field assessment.

Table 14. Summary of condition, ecological importance and sensitivity of aquatic features together with recommended buffers

Aquatic feature	PES	EIS		REC	Sensitivity	Recommended buffer
Krom River	B/C	High		B/C	High	35m and surrounding valley bottom and floodplain wetland and buffer
Small tributaries	A/B	Moderate		A/B	Medium	35
Valley bottom wetlands	B	Moderate		B	Medium	35

Based on the PES, EI&ES and REC above, aquatic sensitivity and recommended buffers have been mapped to protect these ecosystems. The recommended buffer area between the aquatic features and

the project components is 35m from the centre of these streams or along the delineated edge of the wide associated floodplain area. The buffer areas are an area of protection recommended as a development setback for the proposed Grid Connection that are intended to reduce the edge effect and direct impacts on the integrity and functionality of the aquatic ecosystems.

As there is some flexibility relating to the exact location of the pylons and switching stations, it is easy to mitigate the potential impact by locating them outside of the freshwater features. Where the proposed grid connection needs to cross the watercourses mapped as being of high sensitivity, the powerline would be able to span the watercourse such that the pylons could still be constructed outside of the watercourse and the recommended buffer. The proposed switching stations may not be placed within the areas of high sensitivity areas.

Thus, it is usually the associated access track that potentially impacts more on the freshwater features where they need to cross freshwater features. Such crossings and disturbances of the aquatic features need to be minimised and mitigated as far as possible. Existing access roads should be utilised where possible through the watercourse to prevent new crossings from being constructed. A walk-down should be conducted by a specialist to identify the most suited new crossing positions should a new crossing be required. The new crossing structures should be properly designed to not result in blockage in the watercourses or erosion.

Figure 12 indicates the aquatic sensitivity layers and their associated recommended buffers for the proposed grid connection. The no-go areas (red lines) are areas of high aquatic sensitivity that should be avoided for the pylon placements and switching stations. New access tracks through these areas should be kept to a minimum and microsited. The medium sensitivity (yellow areas) should ideally be avoided, or adequately mitigated as stipulated in this report.

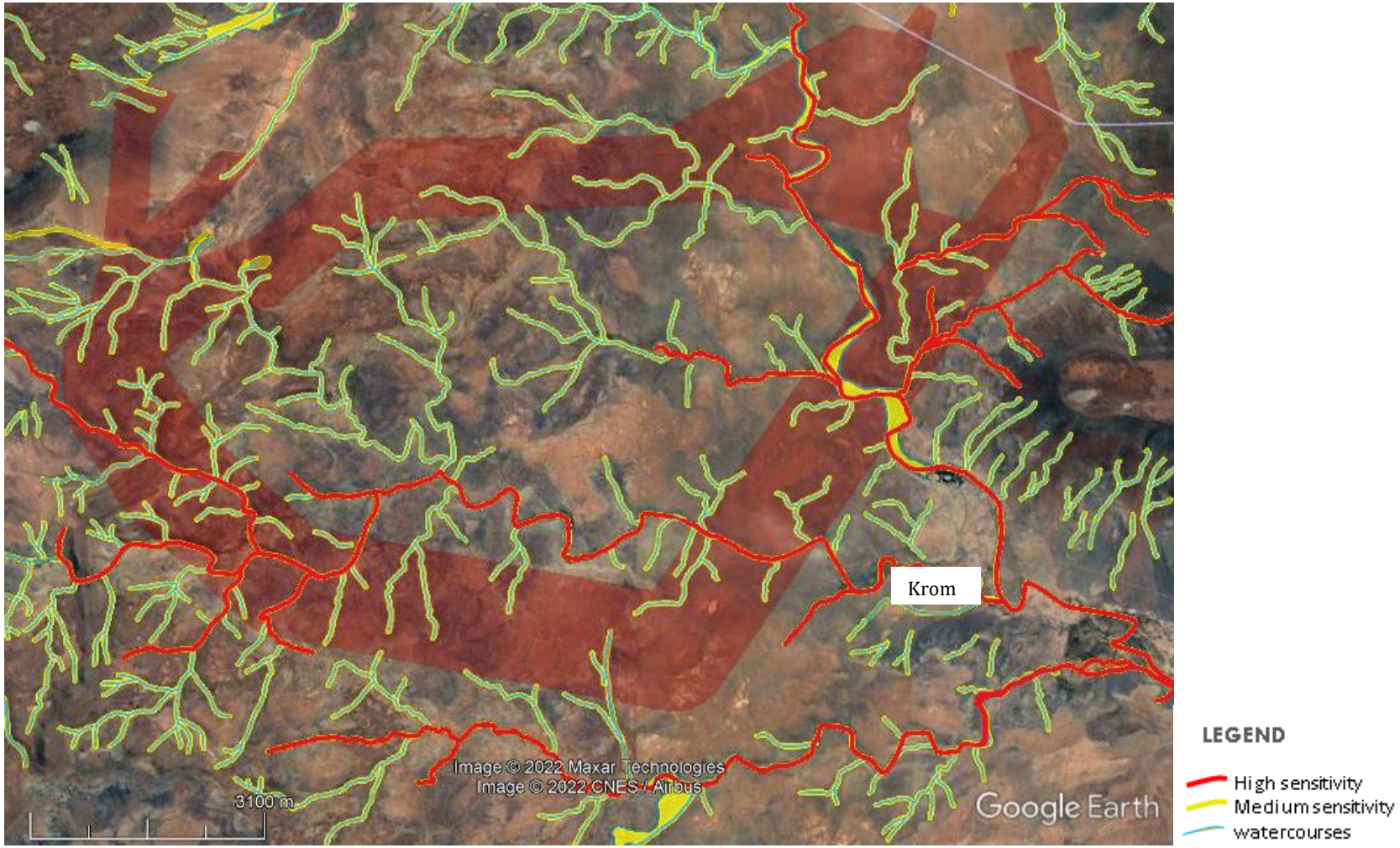

Figure 12. The EGI corridor overlain (dark red) overlain with a Google Earth image showing the recommended aquatic buffers areas and associated aquatic ecosystem sensitivity mapping for the proposed project. The red areas are areas of high aquatic sensitivity that should be treated as no-go areas (no footprint of pylons and switching stations and limited new access tracks) and the yellow areas are of medium sensitivity that should be avoided if possible, or adequately mitigated.

7. IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

7.1. Description of Potential Aquatic Ecosystem Impacts

The potential aquatic ecosystem impacts associated with the proposed Grid Connection to the Mura PV Facilities are as follows:

Construction Phase: **Direct Impacts**: Disturbance or modification of aquatic habitat; increased water use and water quality impacts **Indirect Impacts**: Degradation of aquatic ecosystem integrity
Operational Phase**:** **Direct Impacts:** Aquatic habitat disturbance **Indirect Impacts:** Degradation of aquatic ecosystem integrity; erosion and alien vegetation invasion
Decommissioning Phase**:** **Direct Impacts:** Disturbance of aquatic habitats and water quality impacts
Cumulative impacts**:** **Indirect Impacts:** Degradation of the ecological condition of aquatic ecosystems

As there is some flexibility relating to the exact location of the pylons, it is usually easy to mitigate the potential impact by locating them far from the freshwater features. Thus, it is usually the associated access track that potentially impacts more on the freshwater features where they need to cross freshwater features. Such crossings and disturbances of the aquatic features need to be minimised and mitigated as far as possible. Most of the potential aquatic ecosystem impacts of the proposed grid connection are likely to take place during the construction phase.

The potential impacts and the associated issues identified for the **construction phase** include:

1. **Disturbance of aquatic habitats and species of special concern** within the watercourses with the associated impacts on sensitive aquatic biota. Construction activities within watercourses could result in the disturbance or destruction of sensitive habitats and any listed and or protected plant or animal species. The construction activities would, however, be unlikely to modify aquatic habitat and biota to such an extent that the present or future desired state of the watercourses would be compromised.
2. **Water availability is already limited in the area and construction may lead to greater water availability limitations**. Any proposal to utilise water will need to be assessed to ensure a sustainable water use practice takes place. The water use will need to be authorised and registered with the Department of Water and Sanitation.
3. **Increased sedimentation and risks of contamination of surface water runoff during construction impacting local water quality.** During construction, the earthworks near watercourses will expose and mobilise soil as well as construction materials and chemicals that may end up in the water resources. Any spills during transport or while works are conducted in proximity to a watercourse also have the potential to affect the surrounding biota. Given the low rainfall in the area, if work is undertaken during the drier periods of the year, this impact would be unlikely.
4. **The removal of indigenous riparian and instream vegetation** will reduce the ecological integrity and functionality of the watercourses. Construction works, in particular could result in the loss of riparian vegetation that provides ecosystem services within site. This would occur for the required access track as the pylons could easily avoid delineated aquatic habitats and the recommended buffers. The impact would only be very localised at crossings through

watercourses and would not impact the wider river reaches of the watercourses. With rehabilitation, this impact could be reduced to a negligible level.

During the **operational phase** of the proposed grid connection, potential impacts would include:

1. **Ongoing disturbance of aquatic features and associated vegetation along the access track.** The disturbance of aquatic habitat is likely to be very localised to the crossings and would not impact the larger aquatic ecosystem. Disturbance of the aquatic constraints areas indicated should be avoided and any disturbed areas should be rehabilitated after construction activities are complete.
2. **Erosion** as a result of increased road use and intensity of runoff along the access track for the powerline may take place where gradients are steep and may result in erosion along the access track. This can easily be mitigated by the shaping of the track (placement of humps) which will disperse or impede the runoff. Ongoing monitoring and maintenance of the access track would prevent this potential impact from taking place.
3. **Alien vegetation infestation within the aquatic features due to disturbance.** The current presence of alien vegetation on the site is limited. Sources of alien seed should be prevented from being brought onto the site with imported materials. Monitoring post-construction for the growth of alien vegetation can mitigate this potential impact.

During the **decommissioning phase**, the potential impacts would largely be:

1. Increased disturbance of aquatic habitat due to the increased activity on the site. Disturbance of the aquatic constraints areas indicated should be avoided and any disturbed areas should be rehabilitated after construction activities are complete.
2. Increased sedimentation and risks of contamination of surface water runoff may also occur. The decommissioning works near sensitive aquatic features should preferably be undertaken in the dry season. If necessary, sediment traps should be placed downstream of works to capture sediment

7.2. Summary of Issues identified during the Public Consultation Phase

No aquatic ecosystem issues have as yet been raised, as the public participation process for the project has not yet been undertaken.

7.3. Summary of Impact Tables for Construction, Operation and Decommissioning Phases

The summary tables for the various impacts identified during the construction, operation and decommissioning phases of the proposed project are provided on the following pages.

Impact Summary Table: Construction Phase

Direct Impacts: Disturbance or modification of aquatic habitat; increased water use and water quality impacts;

Indirect Impacts: Degradation of aquatic ecosystem integrity

Table 15. Impact table for the potential aquatic biodiversity impacts of the project during the construction phase

CONSTRUCTION																			
Impact no.	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Aquatic Ecosystem Integrity	Disturbance of aquatic habitats within the watercourses with the associated impact to sensitive aquatic biota	Construction	Negative	moderate/high	2	1	1	2	2	12	N1	1	1	2	1	1	5	N1
					Significance	N1 - Very Low							N1 - Very Low						
Impact 2:	Water quality deterioration	Increased sedimentation and risks of contamination of surface water runoff during construction	Construction	Negative	high	2	1	1	2	1	6	N1	2	1	1	1	1	5	N1
					Significance	N1 - Very Low							N1 - Very Low						
Impact 3:	Water availability	Demand for water for construction could place stress on the existing available water resources	Construction	Negative	moderate	2	2	3	3	2	20	N2	2	1	1	2	2	12	N1
					Significance	N2 - Low							N1 - Very Low						
Impact 4:	Decrease in habitat integrity	Removal of aquatic vegetation	Construction	Negative	high	2	1	3	2	2	16	N2	1	1	1	2	1	5	N1
					Significance	N2 - Low							N1 - Very Low						

Recommended mitigation:

- Locate pylons and switching stations outside of high-sensitivity areas and limit the placement of infrastructure in areas of medium aquatic sensitivity where possible.
- Using existing disturbed areas (e.g. access tracks) where possible. New service tracks with crossings through the high-sensitivity crossings should be kept to a minimum.

- A walk-down should be conducted by a specialist to identify the most suited new crossing positions over high sensitivity areas. New crossing structures should be properly designed to not result in blockage in the watercourses or erosion.
- Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features
- Source water from legal supply sources only (e.g. new or existing water allocation to the property and/or municipal supply)
- Apply the generic EMPr for power line and substation development.

Impact Summary Tables: Operational Phase

Direct Impacts: Aquatic habitat disturbance

Indirect Impacts: Degradation of ecological condition of aquatic ecosystems; erosion; alien riparian vegetation invasion

Table 16. Impact table for the potential aquatic biodiversity impacts of the project during the operation phase

OPERATIONAL																		
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Aquatic Ecosystem Integrity	Ongoing disturbance and degradation of aquatic features and associated vegetation along access tracks or adjacent to the infrastructure that needs to be maintained	Operational	Negative		1	1	1	2	3	15	N1	1	1	1	2	2	10	N1
					Significance	N1 - Very Low							N1 - Very Low						
Impact 2:	Aquatic Ecosystem Integrity	Disturbance of cover vegetation and soil and modified runoff characteristics that have the potential to result in erosion of hillslopes and watercourses and invasion of disturbed areas with alien vegetation	Operational	Negative		2	1	3	2	3	24	N2	1	1	1	2	2	10	N1
					Significance	N2 - Low							N1 - Very Low						

Recommended mitigation:

- Access project infrastructure during maintenance activities using existing established roads and access tracks. Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.
- Invasive alien plant growth and signs of erosion should be monitored and managed on an ongoing basis.
- Stormwater runoff from access tracks must be monitored and managed to prevent erosion from taking place. Should erosion occur, it should immediately be remediated.

Impact Summary Tables: Decommissioning Phase

Direct Impact: Disturbance of aquatic habitats and water quality impacts.

Table 17. Impact table for the potential aquatic biodiversity impacts of the project during the decommissioning phase

DECOMISSIONING																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Aquatic Ecosystem Integrity	Increased disturbance of aquatic habitat due to the increased activity on the site	Decommission	Negative	High	2	1	1	2	2	12	N1	1	1	1	2	1	5	N1
					Significance	N1 - Very Low							N1 - Very Low						
Impact 2:	Aquatic Ecosystem Integrity	Increased sedimentation and risks of contamination of surface water runoff	Decommission	Negative	High	2	1	1	2	2	12	N1	1	1	1	2	1	5	N1
					Significance	N1 - Very Low							N1 - Very Low						

Recommended mitigation:

- Minimise works within aquatic ecosystems as far as possible.
- Rehabilitate disturbed areas.

- Laydown areas should be placed at least 35m away from the delineated aquatic features.
- Apply the generic EMPr for power line and substation development to decommissioning activities.

7.4. Cumulative Impacts

Land use in the area currently consists mostly of low-density livestock farming due to the limited water supply and poor carrying capacity of the cover vegetation. Current land and water use impacts on the watercourses and surrounding area are, therefore, low to very low.

Figure 13 shows the approved and proposed renewable energy projects as well as the associated grid connections proposed within 30 km of the EGI corridor. These projects include 4 Hoogland wind farms (proposed), 3 Nuweveld wind farms (Approved EA), Gamma Grid, Mura EGI, Soutrivier WEF, and Taaibos WEF. The projects all lie within the catchment of the Krom and larger Sout River in the Gamtoos River System and thus do have some potential to result in cumulative impacts. These impacts can however be easily mitigated.

The cumulative impacts of these projects are:

- **Reduce the integrity of the watercourses** if not properly mitigated and managed. The nature of the proposed powerline allows it to have minimal impact on the surface water features since the pylons can be placed far enough away from the freshwater features (35m buffers) to not impact them. The largest potential impact of these projects is a result of the associated access track, which can be mitigated such that its impact on the aquatic ecosystems will be of low significance.
- **Water quality deterioration** may occur during construction however given the arid area, this potential impact is unlikely, especially if the works is conducted in the dry season.
- **Limited water availability** - the water requirements associated with the EGI corridor would only be during the construction phase. It is assumed that these projects will not have overlapping construction phases and will adhere to the abstraction thresholds applicable to groundwater abstraction. Given this, the impact is expected to be of low significance.

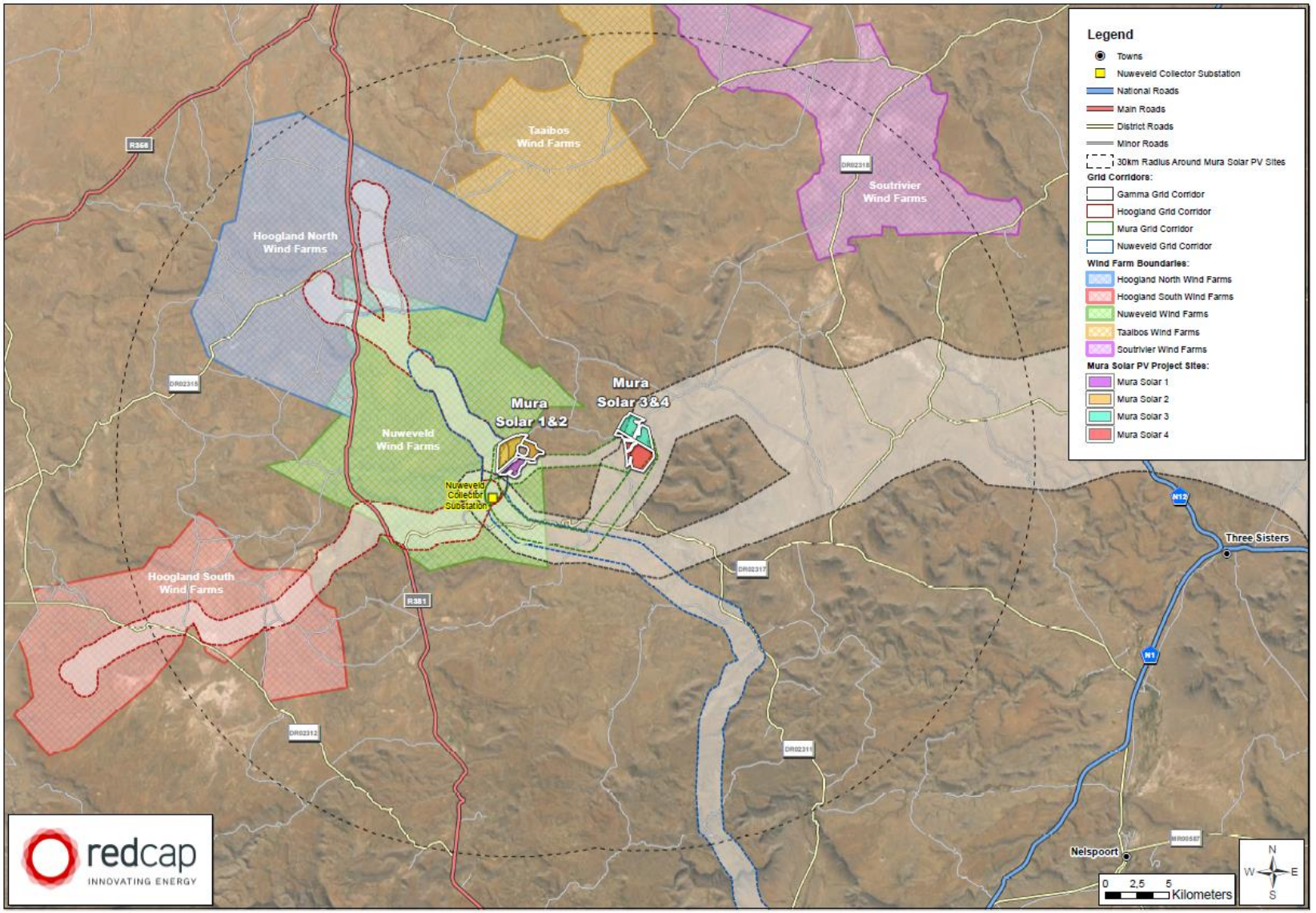

Figure 13. Map showing the renewable energy projects within 30km of the proposed Grid Connection to the Mura PV Facilities

Impact Summary Tables: Cumulative Impacts

Indirect Impacts: Degradation of the ecological condition of aquatic ecosystems.

Table 18. Impact table for the potential cumulative aquatic biodiversity impacts of the project during construction, operation and decommissioning

CUMULATIVE																			
Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Aquatic Ecosystem Integrity	Increased disturbance of aquatic habitat due to the increased activity	Cumulative	Negative	Moderate	2	1	3	3	3	27	N2	2	2	2	2	2	16	N2
					Significance	N2 - Low							N2 - Low						
Impact 2:	Water quality deterioration	Increased sedimentation and risks of contamination of surface water runoff during construction	Cumulative	Negative	Moderate	2	1	3	2	1	8	N1	2	1	1	2	1	6	N1
					Significance	N1 - Very Low							N1 - Very Low						
Impact 3:	Water availability	Demand for water for construction could place stress on the existing available water resources	Cumulative	Negative	High	2	2	3	3	2	20	N2	2	1	1	2	1	6	N1
					Significance	N2 - Low							N1 - Very Low						

Recommended mitigation:

- Minimise works within aquatic ecosystems as far as possible.
- Construct in the dry season. This is only relevant to works adjacent to the larger watercourses that have instream wetland habitat and are mapped as having a high sensitivity in the aquatic ecological sensitivity mapping.
- Share the infrastructure or use existing disturbed areas (e.g. roads and access tracks).
- Infrastructure and access tracks are designed to mitigate the stormwater runoff impacts leaving the developed areas. Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.
- Monitor invasive alien plant growth and signs of erosion on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants.
- Apply the generic EMPr for power line and substation development.

7.5. Impact Assessment Summary

This section provides the overall impact significance findings following the implementation of the proposed mitigation measures. These are shown in the table below:

Table 19: Overall Impact Significance (Post Mitigation)

Phase	Overall Impact Significance	Cumulative Impact
Construction	Very low	Low/Very low
Operational	Very low	Low/Very low
Decommissioning	Very low	Very low
Nature of Impact	Negative	Negative

7.6. Consideration of Alternatives

The proposed EGI corridor has been through an iterative design process whereby the environmental and technical constraints associated with a grid connection in the area have been considered and the EGI corridor identified as a potential collector ring line connection for the Mura projects. Any layout/routing option within the corridor is acceptable, if the recommended sensitive areas are avoided. The impacts assessed in this report would be applicable to any layout alternative that avoided high-sensitivity areas with pylon placement and the proposed switching stations identified, and where any new crossings over high sensitive areas are minimised and microsited. Provided that the mitigation specified in the report and in the generic EMPr for power line development, limited placement of infrastructure in areas of medium aquatic sensitivity is acceptable,

The project alternative assessed is the '**No-Go' alternative**. The 'No-Go' alternative is the option of not constructing the grid connection and the status quo would prevail. In this instance, potential very low significance impacts on aquatic ecology would be avoided should the No-Go alternative be selected.

7.7. Risk Assessment

A risk assessment was carried out for the proposed grid connection. The assessment indicates the level of risk certain activities pose to aquatic ecosystems where the outcomes are used to guide decisions regarding water use authorisation of the proposed development. A summary of the potential risks and the risk rating classes can be seen below.

Table 20. Summary risk assessment for the proposed project

Phases	Activity	Impact	Significance	Risk
Construction	Construction work for grid connection	Loss of biodiversity & habitat, impeding flow & water quality impact	51	L
Operation	Operation/maintenance of grid connection	Disturbance to aquatic habitat - Facilitation of erosion and invasion by alien plants	36	L
Decommission	Removal of gridline infrastructure	Habitat disturbance and some flow and water quality impacts	36	L

Table 21: Risk rating classes for the Risk Assessment

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

The risk assessment determined that the proposed grid connection poses a low risk of impacting aquatic habitat, water flow and water quality. With these findings of the risk assessment, the water use activities associated with the proposed project could potentially be authorised through the general authorisations for Section 21(a), (c) and (i) water uses.

8. RECOMMENDATIONS AND CONCLUSIONS

The study area is in the upper reaches of several tributaries of the Krom River, a tributary of the Sout River in the Groot / Gamtoos River System. The Screening Tool map for the Aquatic Biodiversity Combined Sensitivity at the site indicates most of the wider area to be of low sensitivity, with only the main channels of the larger rivers mapped as being of very high sensitivity. The very high sensitivity is linked to aquatic Critical Biodiversity Areas that are associated with larger rivers that contain instream wetland habitat. These larger river channels will need to be crossed by the proposed Grid Connection infrastructure. The findings of this assessment largely agree with the screening tool mapping.

The study area does not lie within a FEPA River Subcatchment. The only natural instream wetland areas within the study area are within the larger channel of the Krom River downstream of the site that has been mapped in the FEPA Wetland mapping as Upper Nama Karoo unchanneled valley-bottom wetlands. These wetlands are also mapped in the National Wetland Map (version 5) as valley-bottom wetland. All other FEPA wetland mapping within the study area comprises artificial wetlands associated with farm dams. The watercourses are all mapped as aquatic ESAs (ESA1). Some aquatic ESAs (ESA2) occur where there is localised disturbance within the watercourses, such as at the track/road crossings. Within the terrestrial CBAs, the watercourses have also been mapped as aquatic CBAs.

The rivers and wetlands within the study area are still in a natural ecological condition with few modifications. The Krom River is more impacted by surrounding landuse activities and is in a largely natural to moderately modified ecological condition. The Krom River in the study area is deemed to be of a high ecological importance and sensitivity. This is due to the importance of this larger aquatic ecosystem in providing a diversity of habitats and being important refugia for biota as well as corridors for the movement within the landscape. The wetland features within the study area are considered of moderate ecological importance and sensitivity as they are closely associated with the larger Krom River, providing habitat and ecological corridors for the movement of biota.

Based on the present ecological condition and the ecological sensitivity and importance, aquatic sensitivity and recommended buffers have been mapped to protect these ecosystems. The

recommended buffer area between the aquatic features and the project components to ensure these aquatic ecosystems are not impacted by the proposed activities is 35m from the centre of these streams or along the delineated edge of the wide associated floodplain area.

As there is some flexibility relating to the exact location of the pylons, it is usually easy to mitigate the potential impact by locating them far from the freshwater features. Thus, it is usually the associated access track that potentially impacts more on the freshwater features where they need to cross freshwater features. Such crossings and disturbances of the aquatic features need to be minimised and mitigated as far as possible. Most of the potential aquatic ecosystem impacts of the proposed grid connection are likely to take place during the construction phase.

Overall Impact Significance (Post Mitigation):

Phase	Overall Impact Significance	Cumulative Impact
Construction	Very low	Low/Very low
Operational	Very low	Low/Very low
Decommissioning	Very low	Very low
Nature of Impact	Negative	Negative

Recommended mitigation:

Construction Phase:

- Locate pylons and switching stations outside of high-sensitivity areas and limit the placement of infrastructure in areas of medium aquatic sensitivity where possible.
- Use existing disturbed areas (e.g. access tracks) where possible. New service tracks with crossings through the high-sensitivity crossings should be kept to a minimum.
- A walk-down should be conducted by a specialist to identify the most suited new crossing positions over high sensitivity areas. New crossing structures should be properly designed to not result in blockage in the watercourses or erosion.
- Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features
- Source water from legal supply sources only (e.g. new or existing water allocation to the property and/or municipal supply)
- Apply the generic EMPr for power line and substation development.

Operation Phase:

- Access project infrastructure during maintenance activities using existing established roads and access tracks. Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.
- Invasive alien plant growth and signs of erosion should be monitored and managed on an ongoing basis.
- Stormwater runoff from access tracks must be monitored and managed to prevent erosion from taking place. Should erosion occur, it should immediately be remediated.

Decommission Phase:

- Minimise works within aquatic ecosystems as far as possible.
- Rehabilitate disturbed areas.
- Laydown areas should be placed at least 35m away from the delineated aquatic features.
- Apply the generic EMPr for power line and substation development to decommissioning activities

Specific recommendations to be included in the EA are:

- The water for construction for the EGI Corridor should be provided from a viable water source.
- No pylons and switching stations must be placed in high-sensitivity areas. The placement of infrastructure in areas of medium aquatic sensitivity should be limited where possible.
- Use existing disturbed areas (e.g. access tracks) where possible. New service tracks with crossings through the high-sensitivity crossings should be kept to a minimum. A specific walk down should be conducted with the specialist to identify the most suited crossing position. Where these crossings do occur, it needs to be monitored for erosion and blockages and remediated.
- Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features. Good housekeeping measures should be implemented at the construction sites that are set out in the EMPr and monitored by an appointed ECO for the project.
- Invasive alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants.

Should the development restrictions be adhered to, as recommended in the report, any grid routing and switching station placement within the EGI corridor would be acceptable. Based on the findings of this specialist assessment, there is no reason, from a freshwater perspective, why the proposed development (with the implementation of the above-mentioned mitigation measures) should not be authorized.

The risk assessment determined that the proposed project poses a low risk of impacting aquatic habitat, water flow and water quality. The water use activities associated with the proposed project could potentially be authorised through the general authorisations for Section 21 (a), (c) and (i) water uses.

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APPENDICES

APPENDIX A: PES, EI AND ES FOR THE MAJOR WATERCOURSES IN THE STUDY AREA (DWS, 2012)

SELECT SQ REACH	SQR NAME	LENGTH km	STREAM ORDER	PES ASSESSED BY XPERTS? (IF TRUE="Y")	REASONS NOT ASSESSED	PES CATEGORY DESCRIPTION	PES CATEGORY BASED ON MEDIAN OF METRICS
L11D-06798	Krom	23.75	1	Y		MODERATELY	C
MEAN EI CLASS	**MEAN ES CLASS**	**DEFAULT ECOLOGICAL CATEGORY (EC)**	**RECOMMENDED ECOLOGICAL CATEGORY (REC)**				
MODERATE	MODERATE	C	#NUM!				

PRESENT ECOLOGICAL STATE		ECOLOGICAL IMPORTANCE				ECOLOGICAL SENSITIVITY	
INSTREAM HABITAT CONTINUITY MOD	MODERATE	FISH SPP/SQ		INVERT TAXA/SQ	20.00	FISH PHYS-CHEM SENS DESCRIPTION	
RIP/WETLAND ZONE CONTINUITY MOD	SMALL	FISH: AVERAGE CONFIDENCE	#DIV/0!	INVERT AVERAGE CONFIDENCE	2.50	FISH NO-FLOW SENSITIVITY DESCRIPTION	
POTENTIAL INSTREAM HABITAT MOD	MODERATE	FISH REPRESENTIVITY PER SECONDARY: CLASS		INVERT REPRESENTIVITY PER SECONDARY,	HIGH	INVERT PHYS-CHEM SENS DESCRIPTION	MODERATE
RIPARIAN-WETLAND	SMALL	FISH REPRESENTIVITY PER SECONDARY: CLASS		INVERT RARITY PER SECONDARY:	LOW	INVERTS VELOCITY SENSITIVITY	HIGH
POTENTIAL FLOW MOD ACT.	LARGE	FISH RARITY PER SECONDARY: CLASS		ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX	LOW	RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) INTOLERANCE WATER LEVEL/FLOW CHANGES	LOW
POTENTIAL PHYSICO-CHEMICAL MOD ACTIVITIES	SMALL	ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) RATING	LOW	HABITAT DIVERSITY CLASS	HIGH	STREAM SIZE SENSITIVITY TO MODIFIED FLOW/WATER LEVEL CHANGES DESCRIPTION	VERY HIGH
		RIPARIAN-WETLAND NATURAL VEG RATING BASED ON % NATURAL VEG IN 500m (100%=5)	VERY HIGH	HABITAT SIZE (LENGTH) CLASS	MODERATE	RIPARIAN-WETLAND VEG INTOLERANCE TO WATER LEVEL CHANGES	LOW
		RIPARIAN-WETLAND NATURAL VEG IMPORTANCE BASED ON EXPERT RATING	LOW	INSTREAM MIGRATION LINK CLASS	HIGH		
				RIPARIAN-WETLAND ZONE MIGRATION LINK	VERY HIGH		
				RIPARIAN-WETLAND ZONE HABITAT INTEGRITY CLASS	VERY HIGH		
				INSTREAM HABITAT INTEGRITY CLASS	HIGH		

APPENDIX B: IMPACT ASSESSMENT CRITERIA AND SCORING SYSTEM

Criteria	Number of Points to Score				
	Score 1	Score 2	Score 3	Score 4	Score 5
Impact Magnitude (M)	Very low	Low	Medium	High	Very high
Impact Extent (E)	Site only	Local	Regional	National	International
Impact Reversibility (R)	Reversible		Recoverable		Irreversible
Impact Duration (D)	Immediate	Short Term	Medium term	Long term	Permanent
Probability of Occurrence (P)	Improbable	Low	Medium	High	Definite

Based on impact significance criteria determined by DEAT, 1998					
CRITERIA	**SCORE 1**	**SCORE 2**	**SCORE 3**	**SCORE 4**	**SCORE 5**
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	**Very low**	**Low**	**Medium**	**High**	**Very high**
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	**Site:** Site only	**Local:** Inside activity area	**Regional:** Outside activity area	**National:** National scope or level	**International:** Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	**Reversible:** Recovery without rehabilitation		**Recoverable:** Recovery with rehabilitation		**Irreversible:** Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	**Immediate:** On impact	**Short term:** 0-5 years	**Medium term:** 5-15 years	**Long term:** Project life	**Permanent:** Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	**Improbable**	**Low Probability**	**Probable**	**Highly Probably**	**Definite**
ENVIRONMENTAL SIGNIFICANCE = (MAGNITUDE + EXTENT + REVERSIBILITY + DURATION) x PROBABILITY					
TOTAL SCORE	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
ENVIRONMENTAL SIGNIFICANCE RATING	**Very low**	**Low**	**Moderate**	**High**	**Very High**

APPENDIX C: NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Preamble Page i
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Preamble Page ii
c) an indication of the scope of, and the purpose for which, the report was prepared;	1.1
(cA) an indication of the quality and age of base data used for the specialist report;	1.3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	5
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	1.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	1.3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	6
g) an identification of any areas to be avoided, including buffers;	6
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	6
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	1.3
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified	7

alternatives on the environment) or activities;	
k) any mitigation measures for inclusion in the EMPr;	7
l) any conditions for inclusion in the environmental authorisation;	7
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	8
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	7
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	-
q) any other information requested by the competent authority.	-
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	