# Appendix H.4

## AQUATIC BIODIVERSITY ASSESSMENT

# AQUATIC BIODIVERSITY AND SPECIES SPECIALIST ASSESSMENT:

## Proposed Development of the four Mura Solar Projects, north of Beaufort West in the Western and Northern Cape Provinces

*Report prepared for:*

Mura 1 (Pty) Ltd

Unit 2B, Mainstream Centre

Hout Bay

7806

*Report prepared by:*


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South Africa


**April 2023**

# Executive Summary

*Red Cap Energy (Pty) Ltd is proposing to develop four solar facilities on behalf of four separate Project Applicants, namely Mura 1 (Pty) Ltd, Mura 2 (Pty) Ltd, Mura 3 (Pty) Ltd, and Mura 4 (Pty) Ltd, collectively known as the Mura PV projects. This report covers all four proposed Mura Solar PV projects in a combined assessment. 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 (CBAs) that are associated with larger rivers that contain instream wetland habitat. These larger river channels will need to be crossed by the proposed access roads to the Mura PV facilities. 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 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 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. With adequate mitigation measures, the aquatic sensitivity and recommended buffers do not apply to underground cables and where existing roads need to be upgraded that may need to be routed through these systems.*

*In terms of the proposed sites, there are some minor watercourses that occur within each of the proposed PV Facilities. These watercourses are deemed of moderate sensitivity and the potential impact of the proposed activities is likely to be of low significance that they would not pose a constraint to the proposed*

*development if mitigated. The proposed access roads are along existing roads and the watercourse crossings can be adequately mitigated so that these aquatic ecosystems would not be a constraint to the required upgrade to the existing roads.*

***Overall Impact Significance (Post Mitigation):***

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

***Recommended mitigation measures**:*

*Construction Phase:*

- *Minimise any works within aquatic ecosystems and buffers. Locate all infrastructure outside of high-sensitivity areas (except for underground cables and where existing roads will be upgraded) and limit the placement of infrastructure in areas of medium aquatic sensitivity as far as possible. Make sure that any construction materials brought onto the site are certified to be free of alien plant seed.*
- *Rehabilitate disturbed aquatic habitats by revegetating them with suitable local indigenous vegetation.*
- *Use existing disturbed areas (e.g., roads and access tracks), where possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings. To ensure that all relevant mitigation required for such water crossings is properly taken account of by all parties involved in designing and constructing the crossing, a walk down should be conducted with the relevant specialist. Where these crossings do occur, it needs to be monitored for erosion.*
- *.*
- *Construction site camps should be placed at least 35m away from the delineated aquatic features*
- *Ensure road crossings structures do not result in blockages of the watercourses or erosion. For this area, a low water crossing, concrete slab through the watercourses is preferred.*
- *The water for construction should be obtained from an existing water allocation to the property or should be provided from a viable water source, including new boreholes.*
- *Construction 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; 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.*

*Operation Phase:*

- *Access project infrastructure using existing roads and access tracks established during the construction phase.*

- *Ensure road crossings structures are not resulting in blockage in the watercourses or erosion.*
- *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.*
- *Stormwater management measures must be in place along the access tracks and built areas to dissipate stormwater and prevent erosion. Cleared areas should be revegetated with suitable indigenous vegetation to assist with dissipation of runoff and encourage infiltration.*

*<u>Decommissioning Phase</u>:*

- *Minimise works within aquatic ecosystems as far as possible. If the layout of the PV has avoided these areas, the decommissioning of the PV would also be able to avoid aquatic habitats on the property.*
- *Rehabilitate disturbed areas.*
- *Decommission works near aquatic features should preferably be undertaken in the dry season; if necessary, sediment traps should be placed downstream of works to capture sediment; Laydown areas should be placed at least 35m away from the delineated aquatic features; Good housekeeping measures should be implemented for the decommissioning activities that are set out in the EMPr and monitored by an appointed ECO for the project.*

*Specific recommendations to be included in the EA are:*

- *The water for construction and operation of the PV facilities should be provided from a viable water source.*
- *No infrastructure or panels may be placed within the high sensitivity watercourses but the underground cables and limited-service tracks may be constructed through these features, as well as existing access roads widened.*
- *Use existing disturbed areas (e.g., roads and access tracks), where possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings. To ensure that all relevant mitigation required for such water crossings is properly taken account of by all parties involved in designing and constructing the crossing, a walk down should be conducted with the relevant specialist. Where these crossings do occur, it needs to be monitored for erosion.*
- *Construction 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.*
- *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 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(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)<br>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*)<br>1989 - B.Sc. (Hons) in Oceanography, University of Port Elizabeth<br>1987 - B.Sc. – Mathematics, Applied Mathematics, University of Port Elizabeth<br>1984 – Matriculation, Lawson Brown High School, Port Elizabeth |
| **Areas of specialisation:** | Environmental water requirement studies<br>River maintenance and management plans (MMP)<br>Aquatic ecosystem monitoring and assessments<br>Design of water quality and monitoring programmes for aquatic ecosystems<br>Compilation of State of River reports (aquatic data collection, interpretation, presentation, graphic layout and design and preparation of technical and glossy print ready copies)<br>Environmental Impact Assessments<br>River classification and environmental water requirements (Ecological Reserve determinations)<br>Integrated Water Resource Management<br>River, Wetlands and Estuary management<br>Water quality assessment and management reporting<br>Water resource legislation<br>Water resource institutions<br>Water education |
| **Countries Worked in:** | South Africa, Namibia, Swaziland, Lesotho, Rwanda |
| **Employment Record:** | 2020 – present Self-employed<br>2013 -2020 BlueScience (Pty) Ltd (Principal Specialist Scientist)<br>2007 – 2012 Self-employed<br>1999 – 2007 Assistant and Deputy Director, Water Resource Protection, Western Cape Regional Office, Department of Water Affairs, Cape Town<br>1995 – 1999 Institute for Water Quality Studies, Department of Water Affairs<br>1991 – 1995 Water Pollution Control Officer, Water Quality Management, Department of Water Affairs, Pretoria<br>1989 – 1990 Mathematics tutor and administrator, Master maths, Randburg and Braamfontein Colleges, Johannesburg<br>1987 – 1988 Part-time field researcher, Department of Oceanography, University of Port Elizabeth |

# 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: Belcher

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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# Aquatic Specialist Study: Mura PV Solar Facilities near Beaufort West

## 1. INTRODUCTION AND METHODOLOGY

### *1.1 Scope and Objectives*

Red Cap Energy (Pty) Ltd is proposing to develop four solar facilities on behalf of four separate Project Applicants, collectively known as the Mura PV development. The facilities are located between Loxton and Beaufort West in the Beaufort West Local Municipality and Ubuntu Local Municipality and the Central Karoo District Municipality and Pixley ka Sema District Municipality. The four solar facilities are assessed within this single combined specialist report. This Aquatic Specialist Assessment is intended to inform an application for Environmental Authorisation for the proposed solar facilities.

### *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 Mura PV Development.

b) Compile the DWS risk assessment matrix for the Mura PV Development.

The compilation of this Combined 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 an Aquatic Biodiversity Specialist Assessment.

### *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 nature of the proposed activities, however, also allows them to be placed some distance from any mapped aquatic features such that the significance of likely impacts would be very low. It is usually the associated infrastructure that has the potential to have a greater impact on the aquatic features. The impacts of access roads (assessed in this report) and overhead powerlines (assessed in a separate specialist report) on the aquatic features are, however, 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 however there has been recent rainfall in the area and sufficient water was 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 Mura PV Projects are located in the upper catchment of the Krom River, a tributary in the Groot / Gamtoos River System. The rivers within the 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.

Mura PV Projects comprises four separate projects as described below:

| Project Name | Generation capacity | Affected Farm portions |
|---|---|---|
| Mura Solar Project 1 | Up to 150 MW | Leeuwkloof Farm 43; and Portion 4 of Duiker Kranse Farm 45 |
| Mura Solar Project 2 | Up to 400 MW | Leeuwkloof Farm 43; Portion 4 of Duiker Kranse Farm 45; and Bultfontein Farm 13 |
| Mura Solar Project 3 | Up to 320 MW | Leeuwkloof Farm 43; RE of Abrams Kraal Farm 206; Portion 4 of Duiker Kranse Farm 45; Portion 3 of Duiker Kranse Farm 45; RE of Duiker Kranse Farm 45; Sneeuwkraal Farm 46; and Aangrensend Abramskraal Farm 11 |
| Mura Solar Project 4 | Up to 360 MW | Leeuwkloof Farm 43; Aangrensend Abramskraal Farm 11; Portion 4 of Duiker Kranse Farm 45; Portion 3 of Duiker Kranse Farm 45; RE of Duiker Kranse Farm 45; and Sneeuwkraal Farm 46 |

Each project will contain the following components:

**Solar Field, comprising Solar Arrays:** · Maximum height of 6 m; PV Modules that are located on either single axis tracking structures or fixed tilt mounting structures or similar

**Solar Farm Substation:** · Maximum height of 12m; Two up to 150 m x 75 m substation yards per Mura solar facility that will include: Substation building; and High voltage gantry.

**Building Infrastructure:** Maximum height of 8m; Offices; Operational and maintenance (O&M)/ control centre; Warehouse/workshop; Ablution facilities; and Converter/inverter stations.

**Li-ion or similar solid state Battery Energy Storage System (BESS):** Each solar farm will have up to a 3.5 ha area for a 240 MWac BESS; BESS substation (same specifications as the solar farm substations) Connected to the solar farm switching stations via an underground high voltage cable.

**Other Infrastructure located within the solar area footprint:** Internal underground cables of up to 132 kV; Internal gravel roads; Fencing (between 2 – 3 m high) around the PV Facility; Panel maintenance and cleaning area; Storm water management system; and Construction site camps.

**Associated Infrastructure (outside the solar area footprint but part of each solar project's application):** Internal access gravel roads will have a 2-4 m wide driving surface and may require side drains on one or both sides. During construction, the roads may be up to 12m wide but this will be a temporary impact and will be rehabilitated following the construction phase and up to two construction camps withing the access road corridor.


**Figure 1. Google Earth image showing the proposed Mura PV Facilities in relation to the main rivers and the quaternary catchments in the area.**

# 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

### *3.1 Topography*

The proposed Mura PV development is located between Loxton and Beaufort West, within the Western and Northern Cape Provinces. 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.

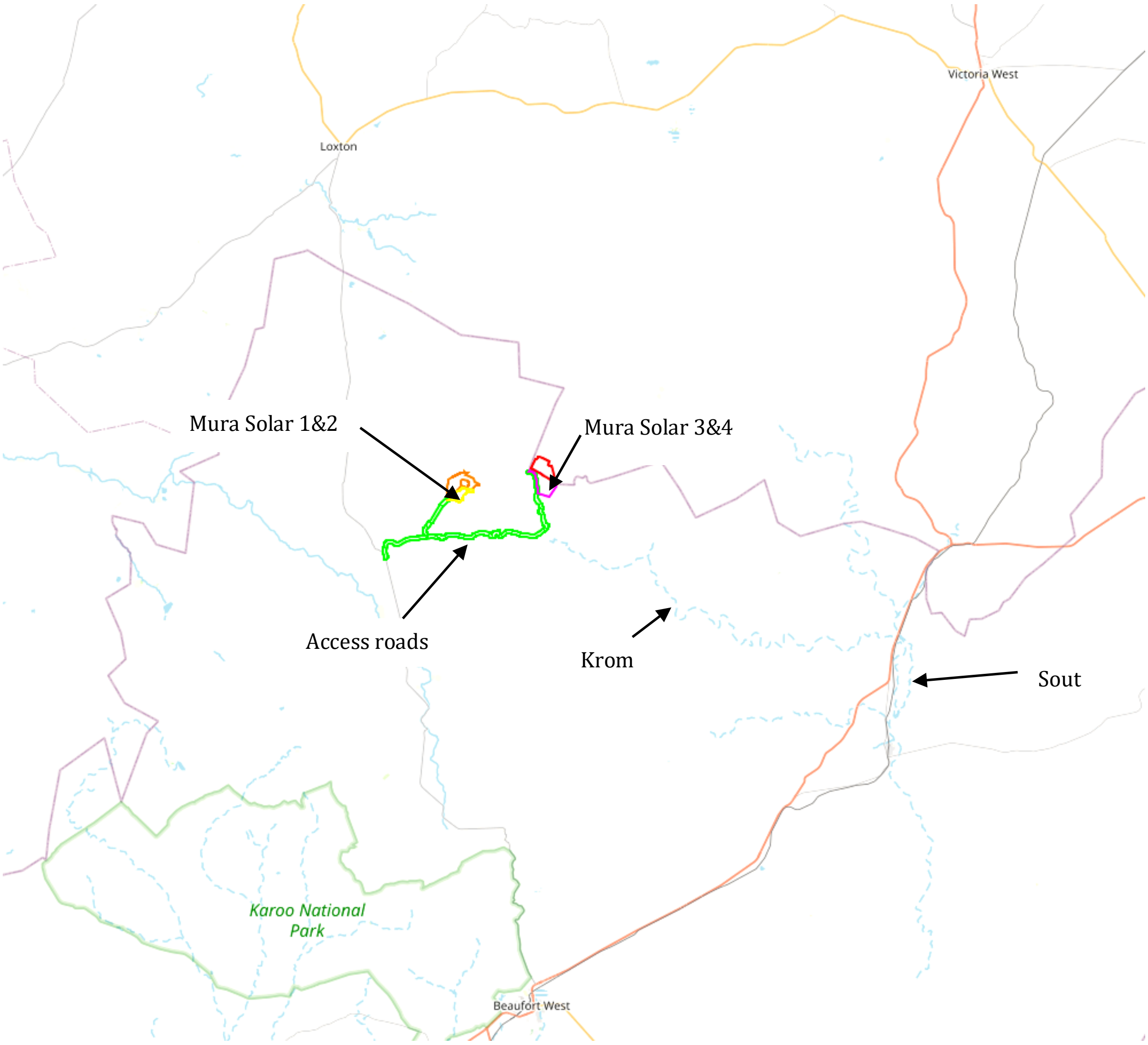


**Figure 2. Relief map for the area, showing the topography and main watercourses and the location of the projects(CapeFarmMapper, 2021)**

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 Mura PV development**

| 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)<br>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.

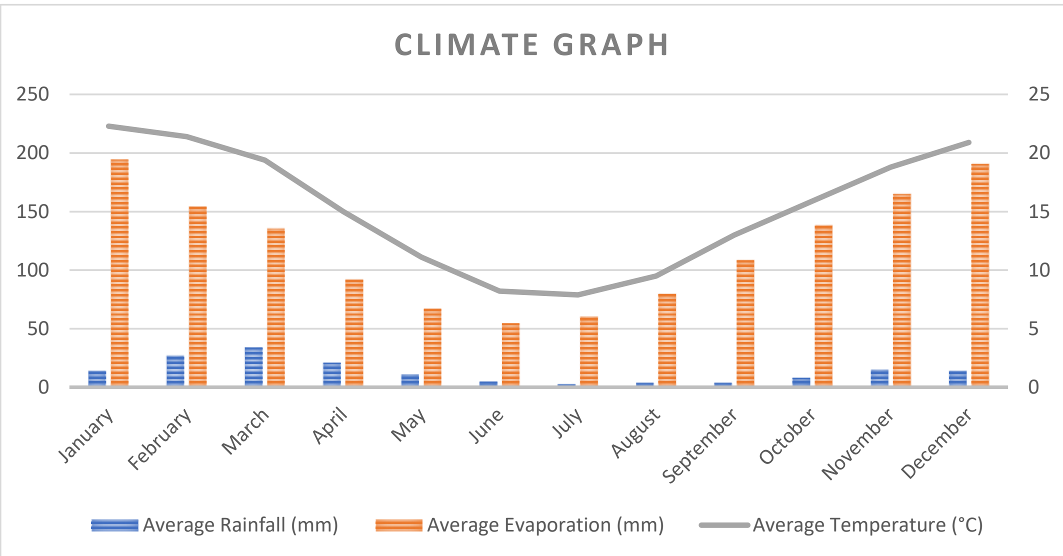


**Figure 3. Average monthly rainfall, evaporation and temperatures for the study area, collected between 1950 and 2000 (Schulze, 2009)**

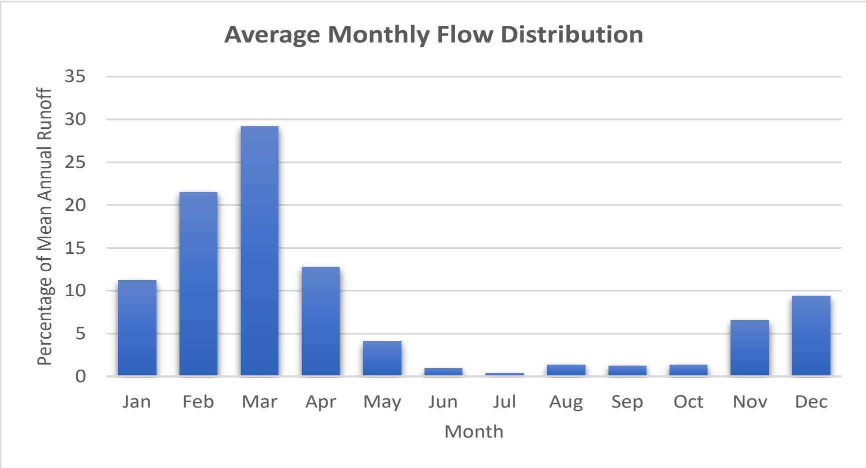


**Figure 4. Monthly flow distribution within the rivers in the study area, with the month flow shown as a percentage of the natural mean annual runoff (nMAR) for the catchment**

### 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 at the site (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 access roads to the Mura PV facilities. However, these are existing access roads that may need to be widened during construction.

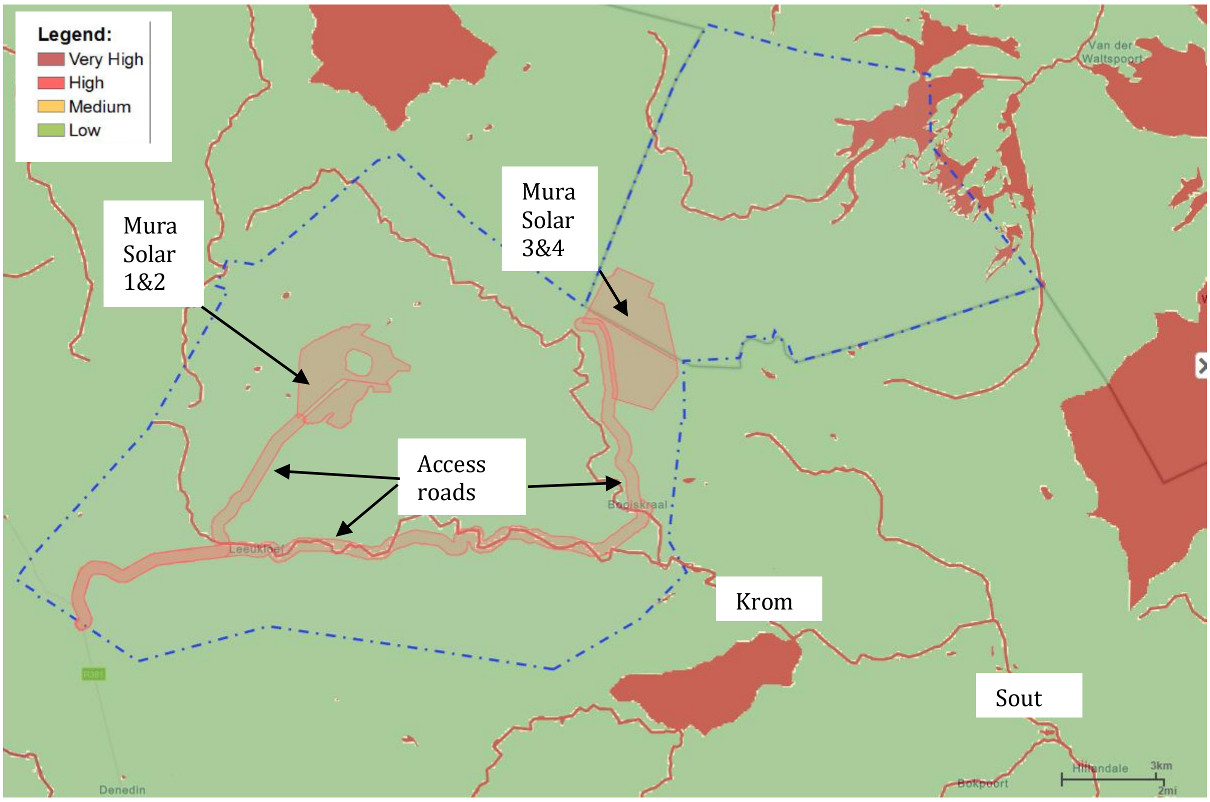


**Figure 5. DFFE Screening Tool map for Aquatic Biodiversity Combined Sensitivity near the four Mura PV facilities and access roads**

There are three freshwater biodiversity conservation mapping initiatives of relevance to the study area because the proposed development occurs in 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 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 development 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 CBAs or those with 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 study area (Mura 3) 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 listed as Critically Endangered that is associated with watercourses in the wider area is the Riverine Rabbit. It is however not likely to occur within the area as per the assessment outcomes of the Animal Compliance Statement undertaken by Simon Todd, as the habitat on site is not deemed suitable for the species.

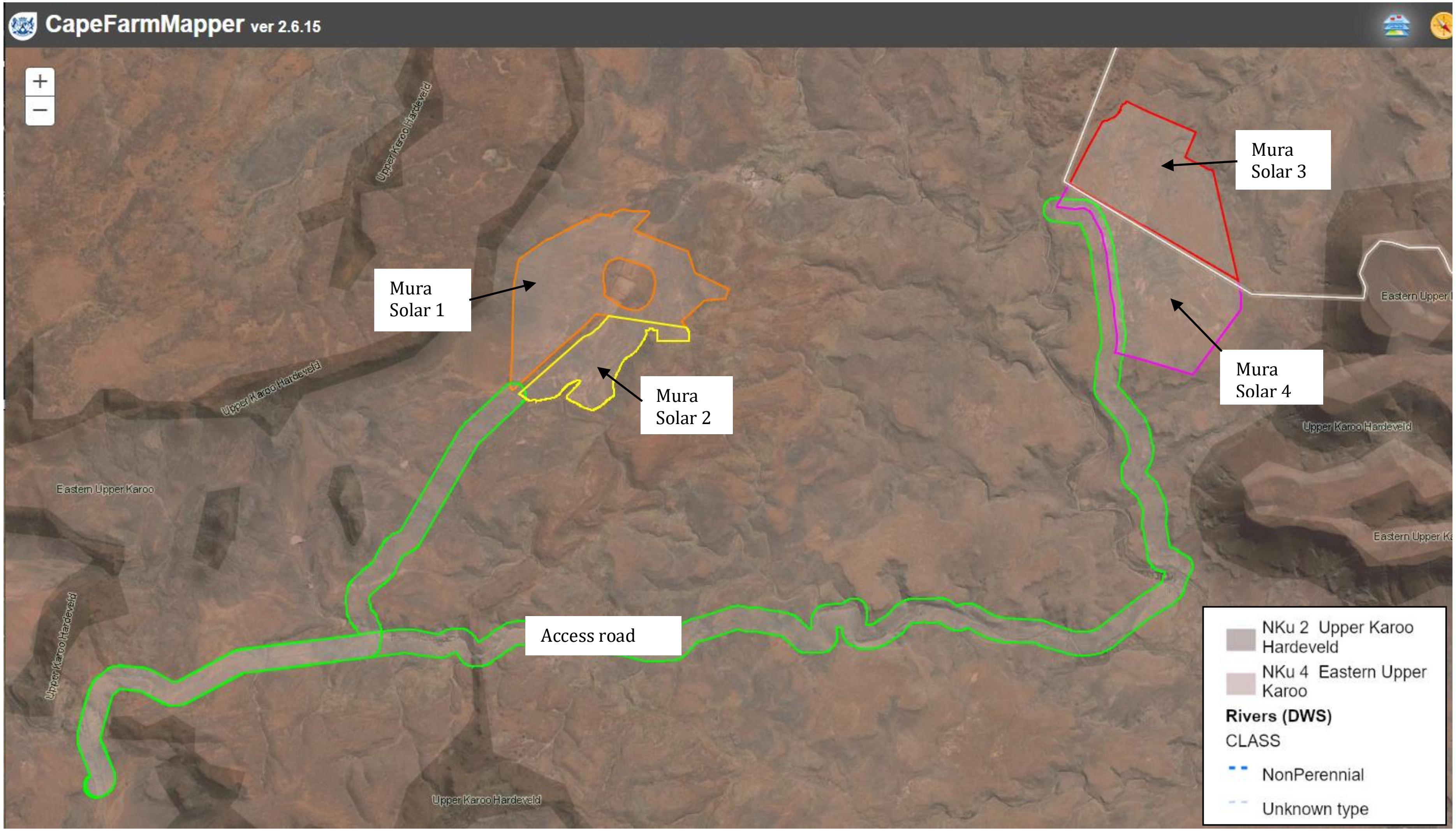


**Figure 6. National Vegetation Map (2018 VegMap) for the study area (CapeFarmMapper, 2022)**

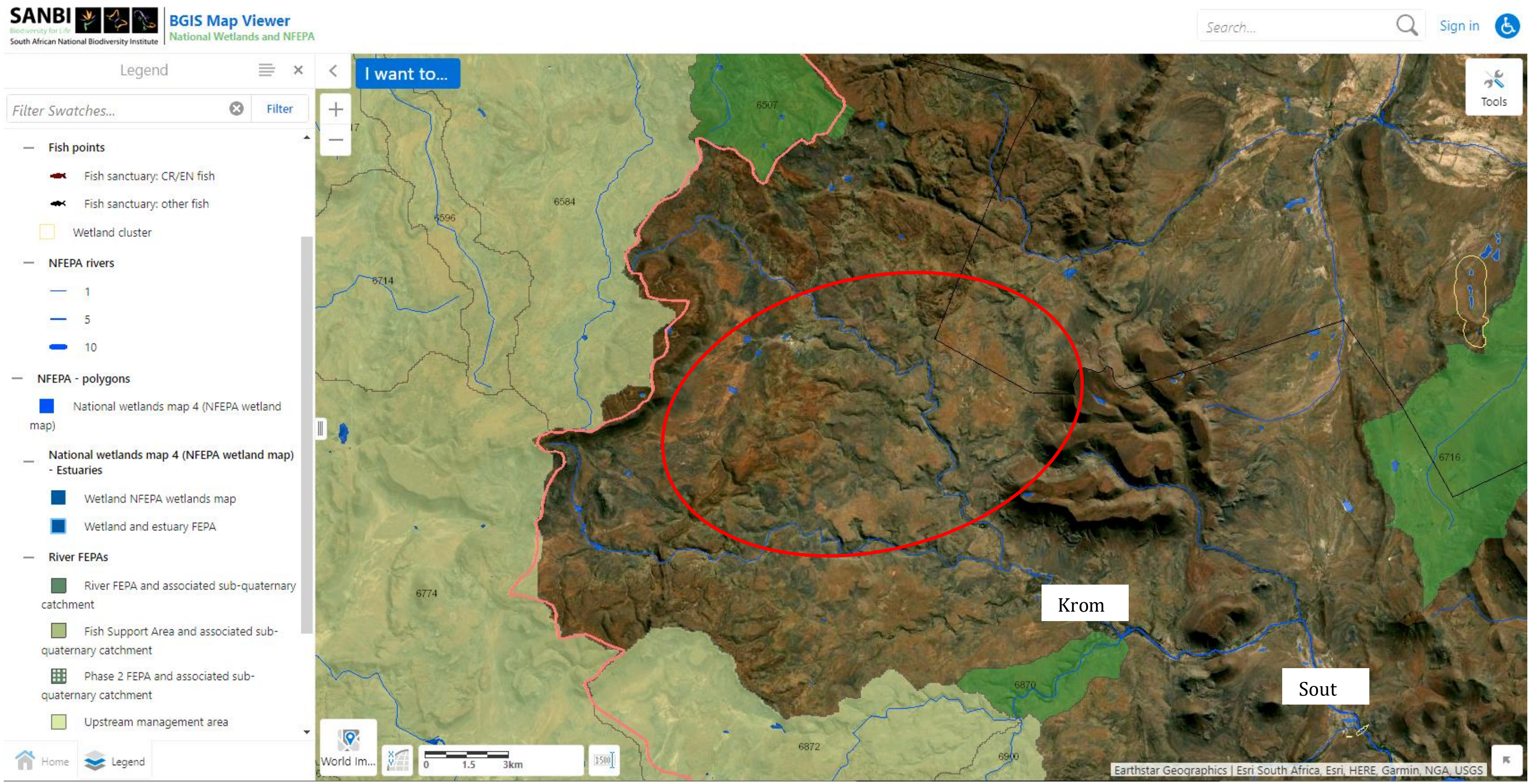


**Figure 7. National Freshwater Ecosystem Priority Areas for the study area (red oval) (SANBI Biodiversity GIS, 2022)**

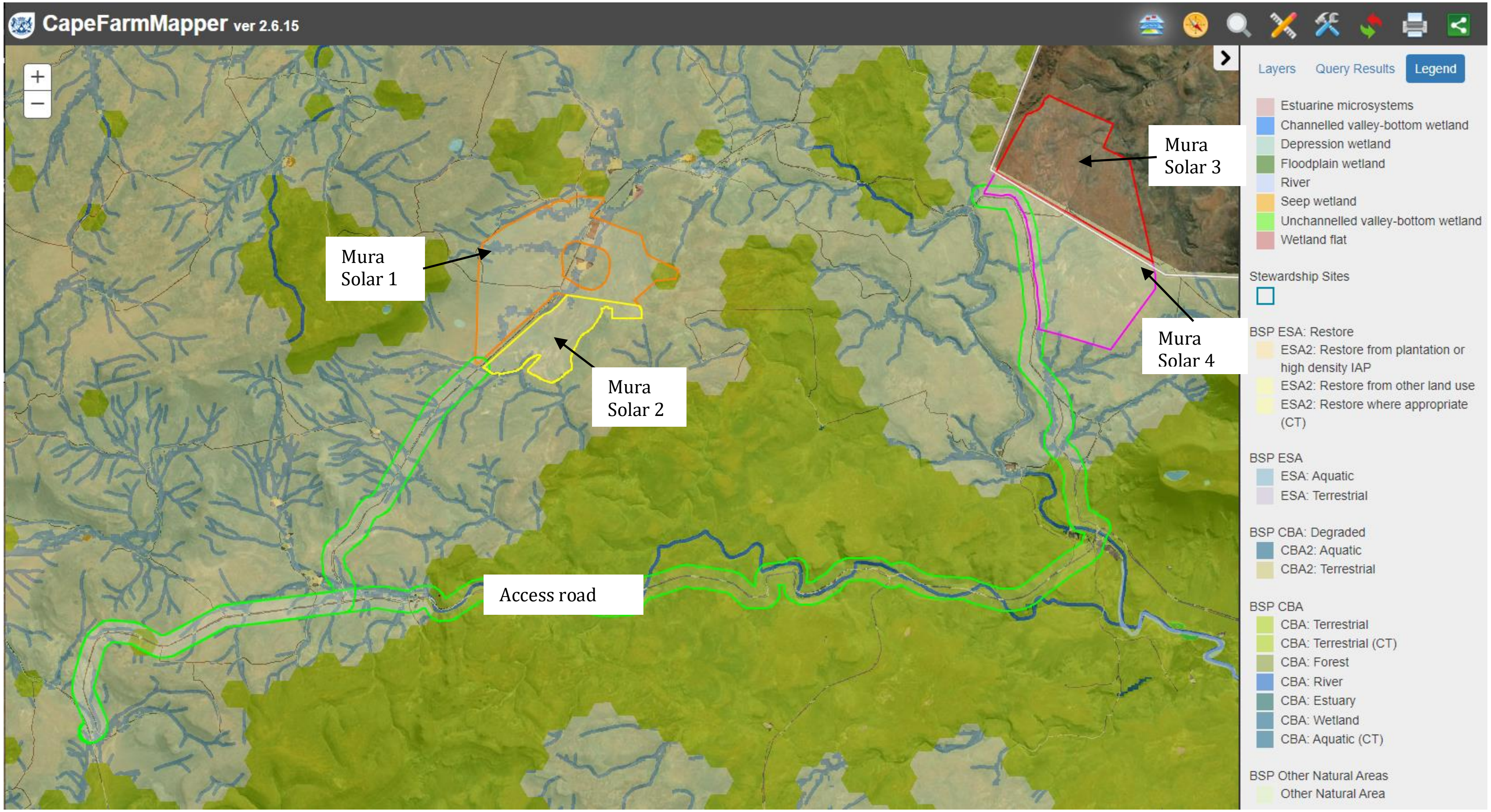


**Figure 8. The 2017 Western Cape Biodiversity Spatial Plan and National Wetland Map (version 5) for the access roads and Mura PV facilities (CapeFarmMapper, 2022)**

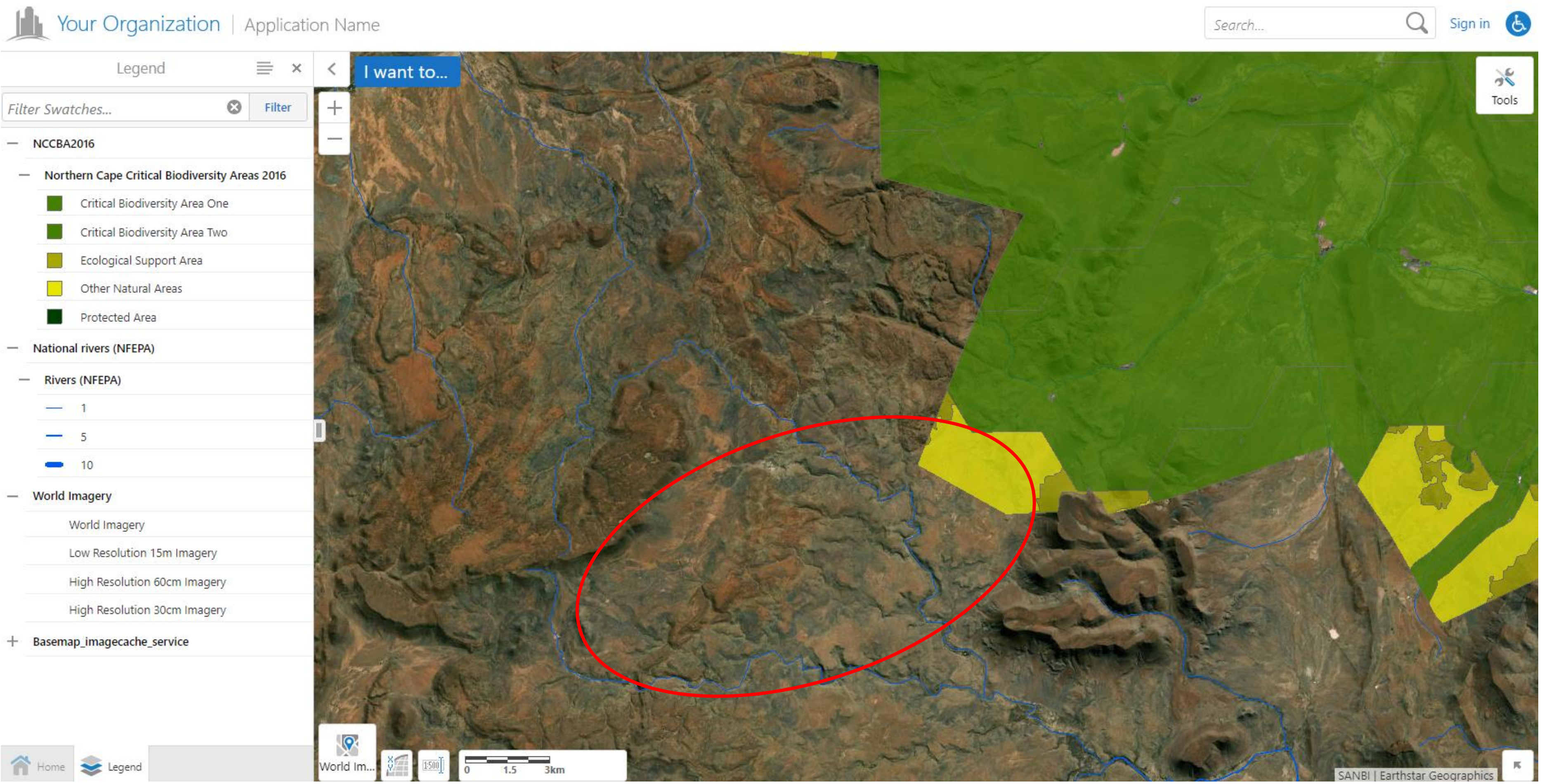


**Figure 9. The 2016 Northern Cape Critical Biodiversity Areas for the study area (red outlined area) (SANBI Biodiversity GIS, 2022)**

# 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 for 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 Development 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 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 locations**

**Figure 11. View of some of the larger Krom River (top) and the typical smaller watercourses that drain the sites (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<br>Lowlands; Hills and Mountains: Moderate and High Relief<br>Open Hills, Lowlands; Mountains: Moderate to High Relief<br>Closed Hills; Mountains: Moderate and High Relief;<br>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 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<br>>4; Unmodified, or approximates natural condition. |
| Largely natural – score=4. | CATEGORY B<br>>3 and <u><</u>4; Largely natural with few modifications, with some loss of natural habitat. |
| Moderately modified- score=3. | CATEGORY C<br>>2 and <u><</u>3; moderately modified, but with some loss of natural habitats. |
| Largely modified – score=2. | CATEGORY D<br><u><</u>2; largely modified. Large loss of natural habitat & basic ecosystem function |
| | OUTSIDE GENERALLY ACCEPTABLE RANGE |
| Seriously modified – rating=1. | CATEGORY E<br>>0 and <2; seriously modified. Extensive loss of natural habitat & basic ecosystem function. |
| Critically modified – rating=0. | CLASS F<br>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 PV Facilities are mostly located outside of the aquatic features and are unlikely to result in any significant degradation of aquatic ecosystem integrity if the recommended mitigation measures are implemented.

# 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 Mura PV Projects were 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. 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 access roads to the Mura PV Projects. 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 areas of protection recommended as a development setback for the PV Facilities that is intended to reduce the edge effect and direct impacts on the integrity and functionality of the aquatic ecosystems. The projects sites have generally avoided the high sensitivity areas, following the input received as part of the screening assessment undertaken.

In terms of the proposed layout there are some minor watercourses that occur within each of the proposed PV Facilities. These watercourses are deemed of moderate sensitivity and the potential impact of the proposed activities is likely to be of low significance that they would not pose a constraint to the proposed development if mitigated. No infrastructure or panels may be placed within these watercourses but the underground cables and limited-service tracks may be constructed through these features. Similarly, the proposed widening of the access roads are along existing roads and the watercourse crossings can be adequately mitigated so that these aquatic ecosystems would not be a constraint to the required upgrade to the existing roads. Therefore, the proposed associated widening of existing roads, construction of underground cables and limited-service tracks can be undertaken within the aquatic features and buffers if adequately mitigated.

Figure 12 indicates the aquatic sensitivity layers and their associated recommended buffers for the proposed projects. The no-go areas (red lines) are areas of high aquatic sensitivity that should be avoided for the PV facilities. The existing access roads that intersecting with the high sensitivity areas will be upgraded and is acceptable. The medium sensitivity (yellow areas) should be avoided where possible, or in the case of the new service tracks and underground cables, adequately mitigated as stipulated in this report.

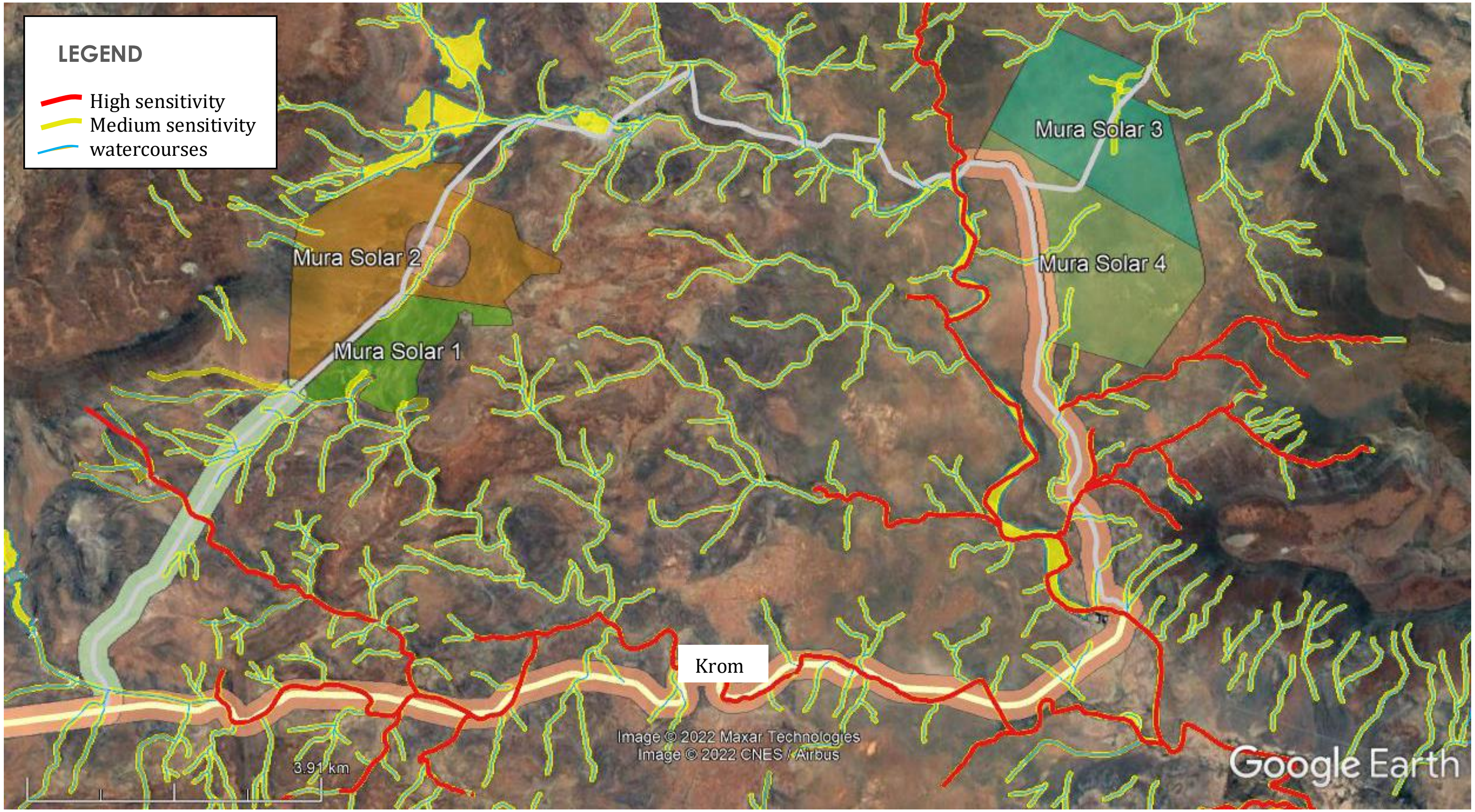


**Figure 12. Google Earth image showing the recommended aquatic buffer/setback areas and associated aquatic ecosystem sensitivity mapping for the proposed projects. The red areas are areas of high aquatic sensitivity that should be treated as no-go areas for PV development and new roads and the yellow areas are of medium sensitivity that should be avoided, or in the case of the service roads and proposed underground cables, adequately mitigated as stipulated in this report.**

# 7. IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

### *7.1. Description of Potential Aquatic Ecosystem Impacts*

The potential aquatic ecosystem impacts associated with the proposed Mura PV Projects are the same for all four Mura PV Facilities and are as follows:

| |
|---|
| increased water use and decreased water quality<br>Construction Phase:<br>Direct Impacts: Loss of riparian vegetation and aquatic habitat; ;<br>Indirect Impacts: Hydraulic and habitat modification and growth of invasive alien riparian vegetation |
| Operational Phase:<br>Direct Impacts: Aquatic habitat disturbance<br>Indirect Impacts: Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality, erosion; and alien vegetation invasion in aquatic features |
| Decommissioning Phase:<br>Direct Impacts: Disturbance of aquatic habitats and water quality impacts. |
| Cumulative impacts:<br>Indirect Impacts: Degradation of the ecological condition of aquatic ecosystems. |

Most of the potential aquatic ecosystem impacts of the proposed PV Facilities are likely to take place during the **construction phase**. These potential impacts and the associated issues identified include:

1. **Decrease in habitat integrity**. Disturbance of aquatic habitats within the watercourses with the associated impacts on sensitive aquatic biota. During construction, activities within watercourses could result in the disturbance or destruction of sensitive habitats and any listed and or protected plant or animal species. It is recommended that there is limited disturbance of the aquatic constraints areas indicated and that any disturbed areas be rehabilitated after construction activities are complete. No obligate aquatic species were observed on site. The terrestrial impact assessment considers the potential impact on terrestrial vegetation and associated biota, such as the Critically Endangered Riverine rabbit, *Bunolagus monticulari*. However, it is unlikely that construction activities would modify the aquatic habitat and biota to such an extent that the present or future desired state of the watercourses would be compromised. No Resource Quality Objectives exist for the watercourses concerned, however, the proposed activities are unlikely to prevent these objectives from being met.

2. **Decrease in aquatic ecosystem integrity (removal of aquatic vegetation)**. 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 the site. This would occur especially where new access roads are required or road upgrades will widen any current road crossings. The impact would only be very localised at the proposed road crossings and would not impact the wider river reaches of the watercourses. With rehabilitation, this impact could be reduced to a negligible level.

3. **Stress on water resource**. Demand for water for construction could place stress on the existing available water resources. During construction, more water is required than during the operational phase to suppress dust and used in concrete batching. This water would be required for a 2-year period while construction works are ongoing. The water required for the construction phase is between 30 000m$^3$ - 48000 m$^3$ per annum. A geohydrological assessment has been undertaken for the proposed development and if this assessment finds that there is suitable groundwater available, then sourcing water from boreholes can be considered. The use of boreholes should be aligned with the sustainable water yield from these boreholes and the mitigation measures proposed within the geohydrological assessment must be adhered to.

4. **Decrease in aquatic ecosystem integrity (alien vegetation infestation).** Alien vegetation infestation within the aquatic features due to disturbance. The current presence of alien vegetation on the site is limited. Sources of alien seeds 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.

5. **Decrease in water quality**. Increased sedimentation and risks of contamination of surface water runoff during construction. 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 are undertaken during the drier periods of the year, this impact would be unlikely.

During the **operational phase** of the proposed solar facilities potential impacts would include:

1. **Decrease in aquatic ecosystem integrity (on-going disturbance)**. Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to infrastructure that needs to be maintained. As for the disturbance of aquatic features described under construction impacts, the disturbance of aquatic habitat is likely to be very localised to the road crossings and would not impact the larger aquatic ecosystem.

2. **Decrease in aquatic ecosystem integrity (disturbance of cover vegetation and soil).** Modified runoff characteristics from hardened surfaces have the potential to result in erosion of hillslopes and watercourses. Limited hardening of surfaces will take place as a result of the proposed projects. Much of this is related to the increased road network and also serves to concentrate and convey runoff with its associated erosion.

3. Modified hydraulics in the watercourses as a result of any structures associated with the proposed road crossings through the watercourses. Any new structures within the watercourses associated with the proposed projects mustn't impede flow, or fragment the aquatic habitats, in the watercourses. Given the episodic flow in the watercourses, the

structures at the road crossings should consist of nothing more than low water crossings that will not impede water or sediment movement. Areas identified as being of high sensitivity should be avoided by the projects with the exception being that existing roads may be widened at and underground cables may be constructed below these features.

4. Water supply (and possibly sanitation services) is required for the operation of the facility. The water requirements during operation are much lower and could potentially be provided from groundwater without any aquatic ecosystem impacts (the water requirements for the operational phase is between 18 000m$^3$ – 28 000 m$^3$ per annum). The availability of groundwater for these projects are considered in a separate geohydrological assessment. Boreholes should not be sited within or immediately adjacent to watercourses where they would potentially be impacting the subsurface flow in the watercourses. The baseflow in the watercourse is important in maintaining aquatic vegetation and some aquatic biota. The larger flows in the watercourses are unlikely to be impacted by the proposed projects.

During the **decommissioning phase**, the potential impacts would largely be associated with an increased disturbance of aquatic habitat due to the increased activity on the site. Increased sedimentation and risks of contamination of surface water runoff may also occur.

The **cumulative impact** of the project activities together with the existing activities in the area could have the potential to reduce the integrity of the watercourses if not properly mitigated and managed. By implementing suitable buffers (35m is recommended) along the watercourses and minimising the works within the river/stream corridors, the impact of the proposed project activities would be low and unlikely to impact the integrity of the aquatic ecosystems.

No consultation process was deemed to be required during preparing this baseline freshwater specialist report.

### *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 projects are provided on the following pages.

### *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. The cumulative impact of the project activities, together with the existing activities in the area, could have the potential to 1) reduce the integrity of the watercourses and 2) overuse available groundwater, if not properly mitigated and managed. The largest potential impact to watercourses is a result of the associated new tracks and infrastructure, which can be mitigated such that its impact on the aquatic ecosystems will be of low significance.

Figure 13 shows the renewable energy projects within 30km of the proposed PV projects. These projects include 4 Hoogland wind farms (Approved EAs), 3 Nuweveld wind farms (Approved EA), Gamma Grid, Mura EGI, Soutrivier WEFs, and Taaibos WEFs. 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 as mentioned above.

Availability of water is a limiting factor in the further development of this area; however, the water requirements of these projects are the highest during the construction phase, and are the lowest during operation. It is assumed that not all 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.

***One could thus expect that the cumulative impact of the proposed project would be low, provided mitigation measures are implemented.***

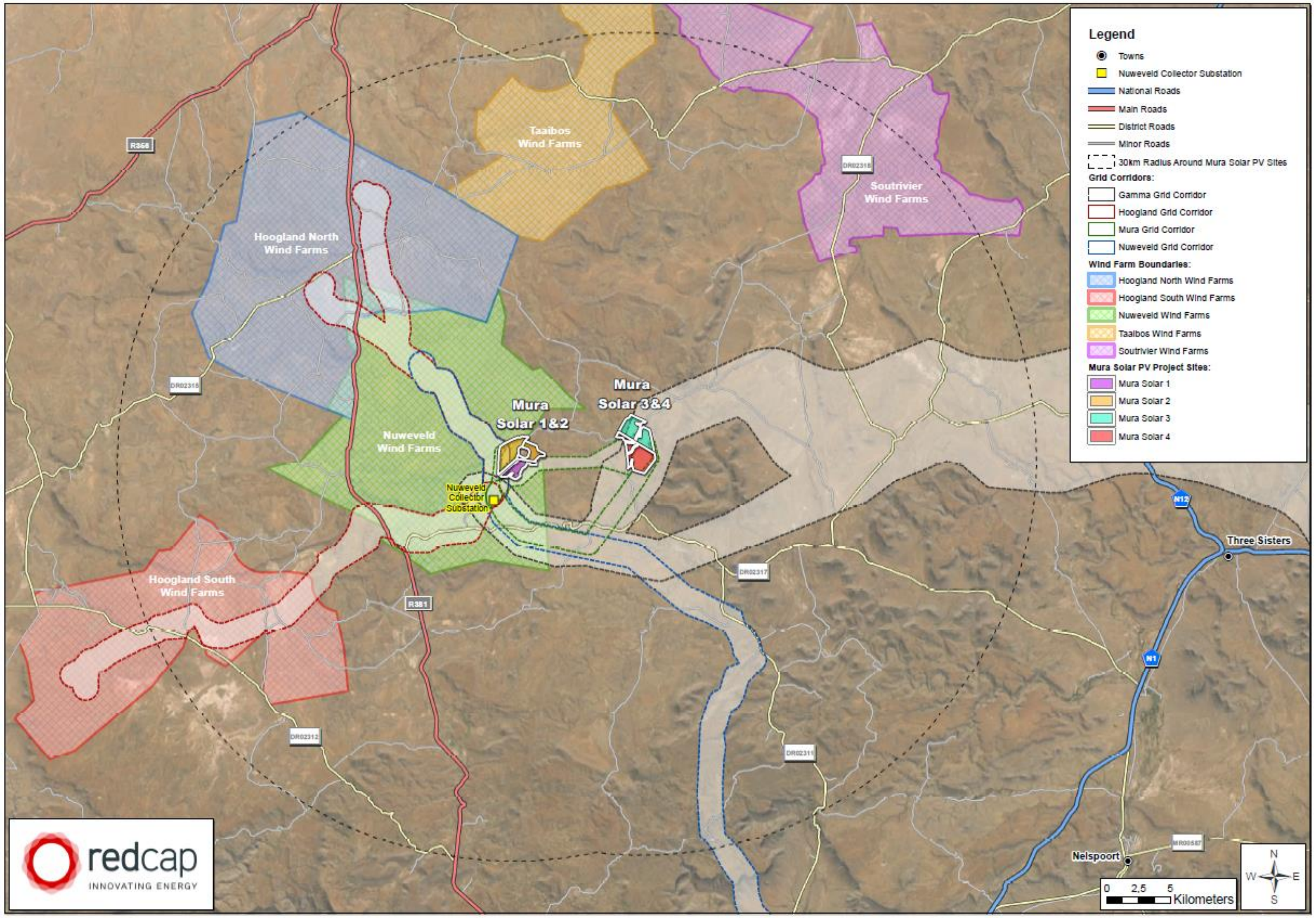


**Figure 13. Map showing the renewable energy projects within 30km of the proposed PV projects**

### *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: | Decrease in habitat integrity | Aquatic habitat modification / disturbance | Construction | Negative | moderate/high | 2 | 1 | 3 | 2 | 2 | 16 | N2 | 1 | 1 | 2 | 1 | 2 | 10 | N1 |
| | | | | | Significance | N2 - Low | | | | | | | N1 - Very Low | | | | | | |
| Impact 2: | Decrease in aquatic ecosystem 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 | | | | | | |
| Impact 3: | Stess on water resource | Abstraction of groundwater for use | 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: | Flow modification | Road crossing structures in watercourse | Construction | Negative | high | 2 | 1 | 1 | 2 | 2 | 12 | N1 | 1 | 1 | 1 | 2 | 2 | 10 | N1 |
| | | | | | Significance | N1 - Very Low | | | | | | | N1 - Very Low | | | | | | |
| Impact 5: | Decrease in aquatic ecosystem integrity | Alien vegetation infestation | Construction | Negative | moderate/high | 1 | 1 | 1 | 2 | 2 | 10 | N1 | 1 | 1 | 1 | 2 | 2 | 10 | N1 |
| | | | | | Significance | N1 - Very Low | | | | | | | N1 - Very Low | | | | | | |
| Impact 6: | Water quality impacts | Increased sedimentation and surface water contamination | Construction | Negative | high | 2 | 1 | 1 | 2 | 1 | 6 | N1 | 2 | 1 | 1 | 1 | 1 | 5 | N1 |
| | | | | | Significance | N1 - Very Low | | | | | | | N1 - Very Low | | | | | | |

**Recommended mitigation**:

- Minimise any works within aquatic ecosystems and buffers. Locate all infrastructure outside of high-sensitivity areas (except for underground cables and where existing roads will be upgraded) and limit the placement of infrastructure in areas of medium aquatic sensitivity as far as possible. Make sure that any construction materials brought onto the site are certified to be free of alien plant seed.
- Rehabilitate disturbed aquatic habitats by revegetating them with suitable local indigenous vegetation.
- Use existing disturbed areas (e.g., roads and access tracks), where possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings. To ensure that all relevant mitigation required for such water crossings is properly

taken account of by all parties involved in designing and constructing the crossing, a walk down should be conducted with the relevant specialist. Where these crossings do occur, it needs to be monitored for erosion.

- Construction site camps should be placed at least 35m away from the delineated aquatic features
- Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion. For this area, a low water crossing, concrete slab through the watercourses is preferred.
- The water should be obtained for construction purposes from an existing water allocation to the property or should be provided from a viable water source, including new yield-tested boreholes.
- Construction 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; 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.

***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 | Operational | Negative | moderate/high | 2 | 2 | 3 | 3 | 3 | 30 | N2 | 1 | 1 | 3 | 2 | 2 | 14 | N1 | |
| | | | | | Significance | N2 - 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 | moderate/high | 2 | 1 | 3 | 3 | 3 | 27 | N2 | 1 | 1 | 3 | 2 | 2 | 14 | N1 | |
| | | | | | Significance | N2 - Low | | | | | | | N1 - Very Low | | | | | | | |
| Impact 3: | Stess on water resource | Abstraction of groundwater for use | Operational | Negative | High | 2 | 2 | 1 | 2 | 2 | 14 | N1 | 2 | 2 | 1 | 2 | 2 | 14 | N1 | |
| | | | | | Significance | N1 - Very Low | | | | | | | N1 - Very Low | | | | | | | |
| Impact 4: | Flow/hydraulic modification | Road crossing structures in watercourse | Operational | Negative | Moderate/high | 2 | 1 | 3 | 2 | 2 | 16 | N2 | 1 | 1 | 1 | 2 | 1 | 5 | N1 | |

**Recommended mitigation**:

- Access project infrastructure using existing roads and access tracks established during the construction phase.
- Ensure road crossings structures are not resulting in blockage in the watercourses or erosion.
- 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.
- Stormwater management systems must be in place at the access tracks and built areas to dissipate stormwater over a broad area by covering cleared areas with suitable local indigenous vegetation or by directing and spreading stormwater with berms or channels and swales adjacent to hardened surfaces.

### *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: | Loss of aquatic habitat and biota | Increased disturbance of aquatic habitat due to the increased activity on the site | Decommissioning | 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 | Decommissioning | 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. If the layout of the PV has avoided these areas, the decommissioning of the PV would also be able to avoid aquatic habitats on the property.
- Rehabilitate disturbed areas.
- Decommission works near aquatic features should preferably be undertaken in the dry season; if necessary, sediment traps should be placed downstream of works to capture sediment; Laydown areas should be placed at least 35m away from the delineated aquatic features; Good housekeeping measures should be implemented for the decommissioning activities that are set out in the EMPr and monitored by an appointed ECO for the project.

### *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 the construction, operation and decommissioning phases**

| 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: | Loss of aquatic habitat and biota (Construction phase) | Increased disturbance of aquatic habitat due to the increased activity in the wider area | Cumulative | Negative | Moderate | 2 | 2 | 3 | 3 | 3 | 30 | N2 | 2 | 2 | 3 | 2 | 2 | 18 | N2 | |
| | | | | | Significance | N2 - Low | | | | | | | N2 - Low | | | | | | | |
| Impact 2: | Aquatic ecosystem integrity (Operation phase) | Degradation of ecological condition of aquatic ecosystems | Cumulative | Negative | Moderate | 2 | 2 | 3 | 4 | 3 | 33 | N3 | 2 | 2 | 3 | 3 | 2 | 20 | N2 | |
| | | | | | Significance | N3 - Moderate | | | | | | | N2 - Low | | | | | | | |
| Impact 3: | Loss of aquatic habitat and biota (Decommission phase) | Increased disturbance of aquatic habitat due to the increased activity in the wider area | Cumulative | Negative | Moderate | 1 | 2 | 3 | 2 | 2 | 16 | N2 | 1 | 1 | 1 | 2 | 2 | 10 | N1 | |
| | | | | | Significance | N2 - Low | | | | | | | N1 - Very Low | | | | | | | |
| Impact 4: | Stressed water resources | Increased water use in the construction and operation phases | Cumulative | Negative | Moderate | 2 | 2 | 1 | 2 | 2 | 14 | N1 | 1 | 1 | 1 | 1 | 1 | 4 | N1 | |

**Recommended mitigation**:

Construction Phase:

- Minimise works within aquatic ecosystems as far as possible. Construct in the dry season. Rehabilitate disturbed areas.
- As far as possible share the infrastructure between existing disturbed areas.
- Manage stormwater impacts.

Operation Phase:

- Monitor and manage for impacts such as alien vegetation growth and erosion. Limit disturbance and rehabilitate disturbed areas. Ensure there is sufficient stormwater management to prevent erosion along roads. Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.
- Limit and monitor water use.

Decommission Phase:

- Decommission works near aquatic features should preferably be undertaken in the dry season.
- Minimise disturbance and rehabilitate.

### *7.5. Impact Assessment Summary*

This section provides the overall impact significance findings following the implementation of the proposed mitigation measures. These impacts and the associated mitigation measures are the same for Mura 1, Mura 2, Mura 3, and Mura 4. These are shown in the table below:

**Table 19: Overall Impact Significance (Post Mitigation)**

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

### *7.6. Consideration of Alternatives*

Initially, for the Mura Solar Development five large areas were considered and assessed. The outcomes of the screening exercise indicated that only four projects within two of the original solar areas are viable from an environmental and technical perspective. Therefore, no site/layout alternatives are considered as part of this assessment. The proposed layouts have taken into consideration the aquatic ecology No-Go areas (high sensitivity areas, as per Section 6). The only project layout alternative assessed is the **'No-Go' alternative**. The 'No-Go' alternative is the option of not constructing the project where 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.

The impacts assessed in this report would be applicable to any layout alternative that avoided high-sensitivity areas (with the exception of the widening of existing roads and the construction of underground cables) identified in this report and limited the placement of infrastructure in areas of medium aquatic sensitivity as far as reasonably possible, provided that the mitigation specified in the report and in the EMPr.

### *7.7. Risk Assessment*

A risk assessment was carried out for the proposed PV Facilities and associated infrastructure. The assessment indicates the level of risk certain activities pose to freshwater resources where the outcomes are used to guide decisions regarding water use authorisation of the proposed development. A summary of the potential risks can be seen in Table 20. The risk rating classes can be seen in Table 21.

The risk assessment determined that the proposed PV development 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(c) and (i) water uses.

**Table 20: Summary risk assessment for the proposed project**

| Phases | Activity | Impact | Likelihood | Significance | Risk Rating |
|---|---|---|---|---|---|
| Construction | Construction works associated with PV | Loss of biodiversity & habitat, impeding flow & water quality impact | 12 | 51 | L |
| Operation | Operational activities associated with PV | Disturbance to aquatic habitat - Facilitation of erosion and invasion by alien plants | 12 | 48 | L |
| Decommission | Removal of PV infrastructure | Habitat disturbance and some flow and water quality impacts | 12 | 48 | 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. |

# 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 CBAs that are associated with larger rivers that contain instream wetland habitat. These larger river channels will need to be crossed by the proposed existing access roads to the Mura PV Projects. 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.

In terms of the proposed Mura solar PV locations, there are some minor watercourses that occur within each of the proposed PV Facilities. These watercourses are deemed of moderate sensitivity and the potential impact of the proposed activities is likely to be of low significance that they would not pose a constraint to the proposed development if mitigated. Similarly, the proposed access road is along existing roads and the watercourse crossings can be adequately mitigated so that these aquatic ecosystems would not be a constraint to the required upgrade to the existing roads.

**Overall Impact Significance (Post Mitigation):**

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

Recommended mitigation measures:

<u>Construction Phase</u>:

- Minimise any works within aquatic ecosystems and buffers. Locate all infrastructure outside of high-sensitivity areas (except for underground cables and where existing roads will be upgraded) and limit the placement of infrastructure in areas of medium aquatic sensitivity as far as possible. Make sure that any construction materials brought onto the site are certified to be free of alien plant seed.
- Rehabilitate disturbed aquatic habitats by revegetating them with suitable local indigenous vegetation.
- Use existing disturbed areas (e.g., roads and access tracks), where possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings. To ensure that all relevant mitigation required for such water crossings is properly taken account of by all parties involved in designing and constructing the crossing, a walk

down should be conducted with the relevant specialist. Where these crossings do occur, it needs to be monitored for erosion.

- .
- Construction site camps should be placed at least 35m away from the delineated aquatic features
- Ensure road crossings structures do not result in blockages of the watercourses or erosion. For this area, a low water crossing, concrete slab through the watercourses is preferred.
- The water for construction should be obtained from an existing water allocation to the property or should be provided from a viable water source, including new boreholes.
- Construction 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; 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.

<u>Operation Phase</u>:

- Access project infrastructure using existing roads and access tracks established during the construction phase.
- Ensure road crossings structures are not resulting in blockage in the watercourses or erosion.
- 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.
- Stormwater management measures must be in place along the access tracks and built areas to dissipate stormwater and prevent erosion. Cleared areas should be revegetated with suitable indigenous vegetation to assist with dissipation of runoff and encourage infiltration.

<u>Decommissioning Phase</u>:

- Minimise works within aquatic ecosystems as far as possible. If the layout of the PV has avoided these areas, the decommissioning of the PV would also be able to avoid aquatic habitats on the property.
- Rehabilitate disturbed areas.
- Decommission works near aquatic features should preferably be undertaken in the dry season; if necessary, sediment traps should be placed downstream of works to capture sediment; Laydown areas should be placed at least 35m away from the delineated aquatic features; Good housekeeping measures should be implemented for the decommissioning activities that are set out in the EMPr and monitored by an appointed ECO for the project.

Specific recommendations to be included in the EA are:

- The water for construction and operation of the PV facilities should be provided from a viable water source.

- No infrastructure or panels may be placed within the high sensitivity watercourses but the underground cables and limited-service tracks may be constructed through these features, as well as existing access roads widened.
- Use existing disturbed areas (e.g., roads and access tracks), where possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings. To ensure that all relevant mitigation required for such water crossings is properly taken account of by all parties involved in designing and constructing the crossing, a walk down should be conducted with the relevant specialist. Where these crossings do occur, it needs to be monitored for erosion.
- Construction 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.
- 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 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(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)**<br>The degree of alteration of the affected environmental receptor | **Very low** | **Low** | **Medium** | **High** | **Very high** |
| **Impact Extent (E)**<br>The geographical extent of the impact on a given environmental receptor | **Site:**<br>Site only | **Local:**<br>Inside activity area | **Regional:**<br>Outside activity area | **National:**<br>National scope or level | **International:** Across borders or boundaries |
| **Impact Reversibility (R)**<br>The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change | **Reversible:**<br>Recovery without rehabilitation | | **Recoverable:**<br>Recovery with rehabilitation | | **Irreversible:**<br>Not possible despite action |
| **Impact Duration (D)**<br>The length of permanence of the impact on the environmental receptor | **Immediate:**<br>On impact | **Short term:**<br>0-5 years | **Medium term:**<br>5-15 years | **Long term:**<br>Project life | **Permanent:**<br>Indefinite |
| **Probability of Occurrence (P)**<br>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-<br>a) details of-<br>i. the specialist who prepared the report; and<br>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-<br>i. (as to) whether the proposed activity, activities or portions thereof should be authorised;<br>(iA) regarding the acceptability of the proposed activity or activities; and<br>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. | |