AQUATIC SPECIALIST IMPACT ASSESSMENT REPORT:

PROPOSED PAARDE VALLEY PV2 GRID CONNECTION

TO VETLAAGTE MAIN TRANSMISSION SUBSTATION (MTS)

Report prepared for: Holland and Associates Environmental Consultants P O Box 31108, Tokai, 7966, Mobile 0834645246 e -mail: info@hollandandassociates.net	Report prepared by: Ms Toni Belcher 53 Dummer Street, Somerset West, 7130 Tel: 082 883 8055 Email: toni@bluescience.co.za

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List of Abbreviations

BA	Basic Assessment
CBA	Critical Biodiversity Area
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DWA(F)	Department of Water Affairs (and Forestry)
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EI&ES	Ecological Importance and Ecological Sensitivity
EMPr	Environmental Management Program
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
GA	General Authorisation
GG	Government Gazette
GIS	Global Information System
GN	Government Notice
ha	hectare
HI	Habitat Integrity
IUCN	International Union for Conservation of Nature
kW	kilowatt
MMP	Maintenance Management Plan
MTS	Main Transmission Substation
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
SANBI	South African National Biodiversity Institute
SEA	Strategic Environmental Assessment
SCC	Species of Conservation Concern
SWSA	Strategic Water Source Area
WMA	Water Management Area
WUL	Water Use License
WULA	Water Use License Application

Glossary

Definitions	
Aquifer	A geological formation that has structures or textures that hold water or permit appreciable water movement through them.
Catchment	The area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through a 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.
Drainage feature	A minor channel down which surface water naturally concentrates and flows that is poorly defined and usually does not contain any distinctive riparian and aquatic vegetation or habitat.
Ecological Importance and Sensitivity	The rating of any given wetland or river reaches 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.
Pans or Depression wetlands	A basin-shaped area with a closed elevation contour that allows for the accumulation of surface water. It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.
Perennial / Non-perennial rivers	Perennial rivers are those rivers that exhibit a continuous flow of water throughout the year except during extreme drought conditions. Non-perennial rivers are those rivers that have no flow for at least a part of the year. These rivers are seasonal.
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 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.
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 to contribute to the biodiversity goals of the country.

AQUATIC BIODIVERSITY AND SPECIES SPECIALIST IMPACT ASSESSMENT

This report serves as Aquatic Biodiversity and Species Specialist Impact Assessment Report input into the required authorisations for the proposed Paarde Valley PV2 Grid Connection to the proposed Vetlaagte Main Transmission Substation (MTS) near De Aar, Northern Cape Province.

1. Introduction

1.1 Scope, Purpose and Objectives of this Specialist Input to the Basic Assessment Report

Paarde Valley PV2 Grid Connection entails the construction of an approximate 12.7km, 132kV power line that will connect the authorised Paarde Valley PV2 Solar Energy Facility Project (Paade Valley PV2) to the Vetlaagte MTS. This report provides input in terms of the aquatic constraints within the project area and the associated aquatic ecosystem impacts for the proposed activities.

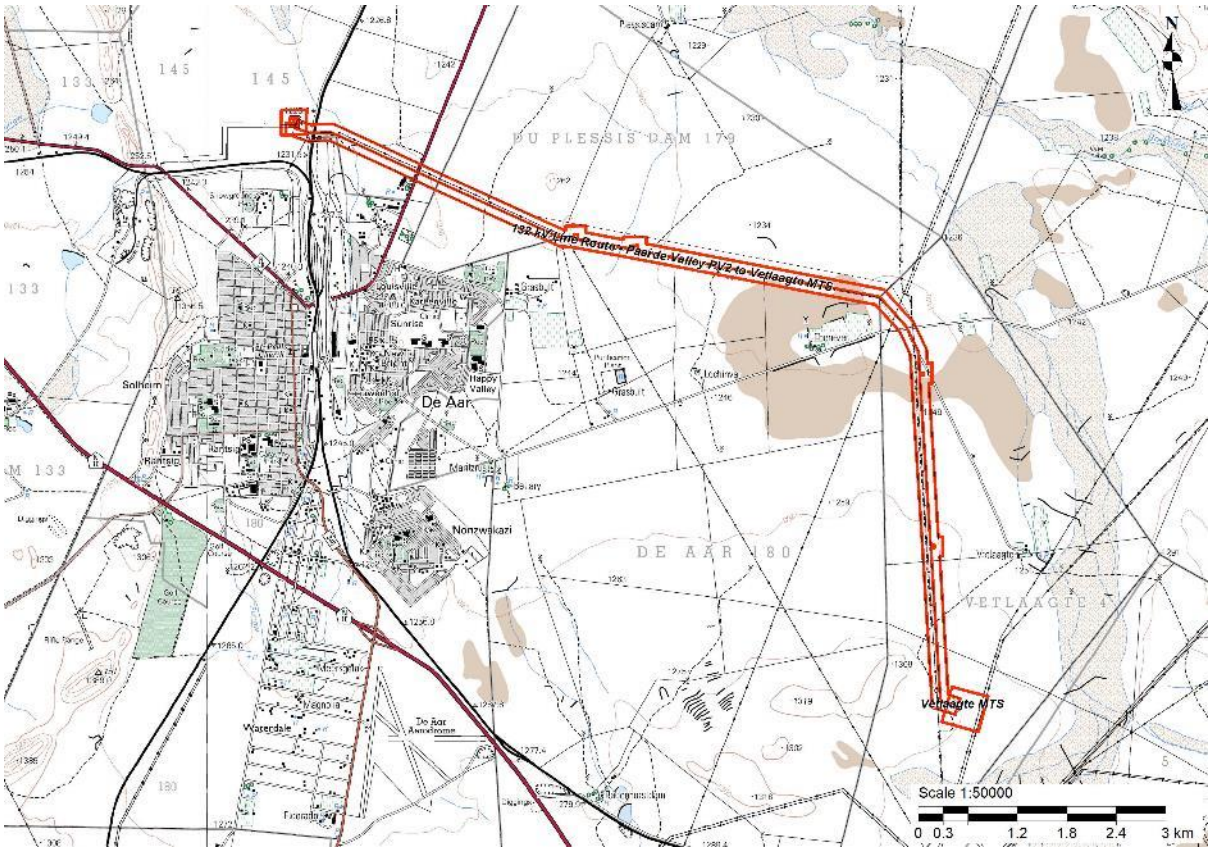


Figure 1. Locality map for the proposed project

1.2 Details of Specialist

This specialist assessment has been undertaken by Toni Belcher. She is registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 400040/10 in the fields of Ecological Science and Environmental Science. A curriculum vitae is included in Appendix A of this specialist assessment.

In addition, a signed specialist statement of independence is included in Appendix B of this specialist assessment.

1.3 Terms of Reference

The scope of works for this specialist impact assessment report is as follows:

- Undertake a site inspection of the study area and produce a Site Sensitivity Verification Report (which can be included within your report) that confirms or disputes the sensitivity identified in the National Web-based Screening Tool for aquatic biodiversity and indicate if a Compliance Statement or a Full Specialist Impact Assessment report will be required.
- Conduct the necessary fieldwork and compile a specialist impact assessment report or Compliance Statement for each, in line with the relevant gazetted protocol for aquatic biodiversity, and include a checklist of content requirements relevant to the specialist report, within your report;
- Should a specialist impact assessment report be required, the report must comply with the requirements detailed in Section 2.7 of the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity. This includes, inter alia:
    - Indicate and confirm the presence of surface water present on and or adjacent to the site (including but not limited to perennial rivers, non-perennial rivers, permanent wetland(s), seasonal wetland(s) and artificial wetland(s)), and where relevant provide a description of each (including confirmation as to whether such surface water would be classified as a "watercourse", as defined in the EIA Regulations (2014) and NWA). Watercourses must be illustrated on an aerial photograph or suitable map;
    - An overview of the ecological status of the watercourses that would potentially be affected by the proposed activities;
    - Comments on any rare or endangered aquatic species or habitats encountered or likely to be present in the affected areas should also be identified;
    - The conservation status and value of the area as identified by the relevant biodiversity plans, bioregional planning documents, Environmental Management Frameworks, etc.;
    - Confirm whether the proposed development and its alternatives will have an impact on CBAs or ESAs. If the proposed project will impact CBA's or ESA's, please explain and include a description of how the proposed development will influence the quantitative values (hectares/percentage) of the categories on the CBA/ESA map.
    - The components and activities of the project have the potential to affect aquatic resources within the local and regional study area during the construction and operational phases;
    - A description of the direct, indirect, residual (if any), and cumulative impacts (both before and after mitigation) and an assessment of the significance of the impacts (for the proposed project and "No Go" alternative) (on a nominal scale of Neutral, Negligible, Very Low, Low, Medium, High) by evaluating: (a) nature of the impacts (positive/ negative), (b) extent of the impacts (zero/ site specific/local/ regional/ national), (c) magnitude of the impacts (Zero/ Very Low/ Low/ Medium/High), (d) duration of the impacts (none/ short/ medium/ long term) and (e) probability of occurrence of the impacts (none/ unlikely/ possible/ probable/ definite). In addition, (f) the level of confidence in findings relating to potential impacts, (g) reversibility of potential impacts (i.e. the degree to which the impact can be reversed (Zero/ Low/Medium/ High)); and (h) the degree to which the impact may cause irreplaceable loss of resources (Zero/ Low/ Medium/ High).
    - An indication of the degree to which the impacts can be mitigated (Low/ Medium/ High), a description of the measures to mitigate any impacts, and an indication of whether or not the measures (if implemented) would change the significance of the impact, for the construction, operational and decommissioning (if relevant) phases of the project;
    - An indication of the degree to which the impact can be avoided (Low/ Medium/ High) and the degree to which the impact can be managed (Low/ Medium/ High).
    - If required, compile a Maintenance Management Plan (MMP), as contemplated in terms of the NEMA EIA Regulations (2014), as amended, for the relevant project components.
    - In terms of the aquatic environment, identify all relevant legislation, permits, standards or licensing requirements that would apply to the proposed project.

- The presence of or proximity of the proposed sites to a protected area(s) identified in terms of NEMPAA and proximity to a Biosphere Reserve (where relevant).
- The assessment must take into account and address public comments received during the Public Participation Process (PPP) relating to your area of expertise.
- The report must include an impact summary table outlining the findings of the assessment in terms of the above-mentioned assessment criteria using the Impact Assessment Methodology and Table Template provided.
- If any specific environmental sensitivities relevant to your field of expertise are present on the site which require specific impact management outcomes and impact management actions, not included in the 'Generic EMPr for the development and expansion of substation infrastructure for the transmission and distribution of electricity', then the report must include those impact management outcomes and impact management actions presented in the format of the pre-approved generic EMPr template.

- Should a specialist compliance statement be required, the statement must comply with the requirements detailed in Section 3 of the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity.

2. Approach and Methodology

Input into 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 assessment of the freshwater features on the various farm portions that comprise the study area. The site was visited on 3 and 4 March 2022 to verify the aquatic features occurring on the site. No additional site visits are deemed necessary. The field visit comprised of delineation, characterisation and integrity assessments of the aquatic habitats within the site. Mapping of the freshwater features was undertaken using a GPS Tracker and mapped in PlanetGIS and Google Earth Professional.

2.1 Information Sources

A summary of the main information sources used in this assessment is provided in Table 1 below:

Table 1. Information Sources for the Aquatic Biodiversity Assessment

Data / Information	Source	Date	Type	Description
Satellite imagery	Google Earth	May 2002 to Jan 2022	Spatial	Recent history of aerial imagery for the site
Northern Cape Biodiversity Sector Plan (NCBSP)	Northern Cape Department of Economic Development, Environmental Affairs and Tourism	2016	Report & Spatial	Spatial conservation planning units and associated management recommendations for the Northern Cape province
National Biodiversity Assessment	South African National Biodiversity Institute (SANBI)	2018	Report and Spatial	Latest assessment of South African biodiversity and ecosystems, including wetlands and rivers.
National Vegetation Map	SANBI	2018	Report and Spatial	Latest national vegetation type mapping
South African Atlas of Climatology and Agrohydrology	R.E. Schulze	2012	Spatial	Climate data

Aquifer classification and Groundwater Resource Assessment information	Department of Water and Sanitation	2005, 2012 and 2013	Spatial	Mapping of aquifer class, type, yields, susceptibility and Vulnerability as well as depths, recharge and quality
National Soil types	ENPAT		Spatial	Mapping of soil types
National Freshwater Ecosystem Priority Areas (FEPA)	CSIR	2011	Report and spatial	Mapping of areas of aquatic ecosystem conservation importance
National River Present Ecological Status, Ecological Importance and Ecological Sensitivity	DWA	2012	Spreadsheet and spatial	River reach assessments of ecological importance, sensitivity and condition
National Wetland Map 5	CSIR and SANBI - South African National Biodiversity Assessment 2018	2018	Spatial	Mapping of wetland habitats

2.2 Assumptions, Knowledge Gaps 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.

Very limited aquatic features occur within the site and surrounding area. No baseline long-term monitoring was undertaken as part of this assessment. There is also very little existing information available for the aquatic features within the study area. Data was utilised for adjacent aquatic ecosystems where available. The nature of the proposed activities however also allows them to be placed some distance from any mapped aquatic features such that the 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 roads and powerlines 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. No further fieldwork will be required. The ground-truthing of aquatic features was undertaken when the use of vegetation as an indicator was possible. As it was not possible to cover the entire site in a high level of detail, extrapolation of the areas ground-truthed to those not covered was done using the latest available aerial imagery for the site.

3. Description of Project Aspects relevant to Aquatic Biodiversity

In terms of the potential aquatic ecosystem impacts of the proposed development, it is typically the footprint of the development and its associated infrastructure, placed in or adjacent to aquatic features, that may alter the aquatic habitat, have water quality impacts or modify the runoff in the aquatic ecosystems within the area. The proposed project is shown in Figure 2.

The proposed project is envisaged to consist of the following components:

- 132kV double circuit overhead **power line** of ±12.7km to connect the Paarde Valley PV2 Switching Station with the Vetlaagte MTS. Servitude width of approximately 31m. Assessment width of a 200m corridor. On average, there will be 4 to 5 towers per km, so the route will consist of approximately 40

towers. A self-supporting monopole structure (maximum base of 5 m in diameter) or lattice towers (total footprint of 15m x 15m) are under consideration;

- **Switching Station** adjacent to the IPP collector substations on Paarde Valley PV2 of ±1 hectare in size (100m x 100m combined), and a feeder bay at the Vetlaagte MTS with a capacity of 132 kV, as this needs to be handed over to Eskom with the grid connection self-build works once constructed;
- A 8 m wide **access compacted gravel road** to access the Eskom switching station from the nearest road (± 2.34 km in length);
- ± 6m wide OHPL access road will be constructed as a twin track along the line route for construction and maintenance purposes – *this road will be inside the servitude*
- A laydown area of ±4 hectares

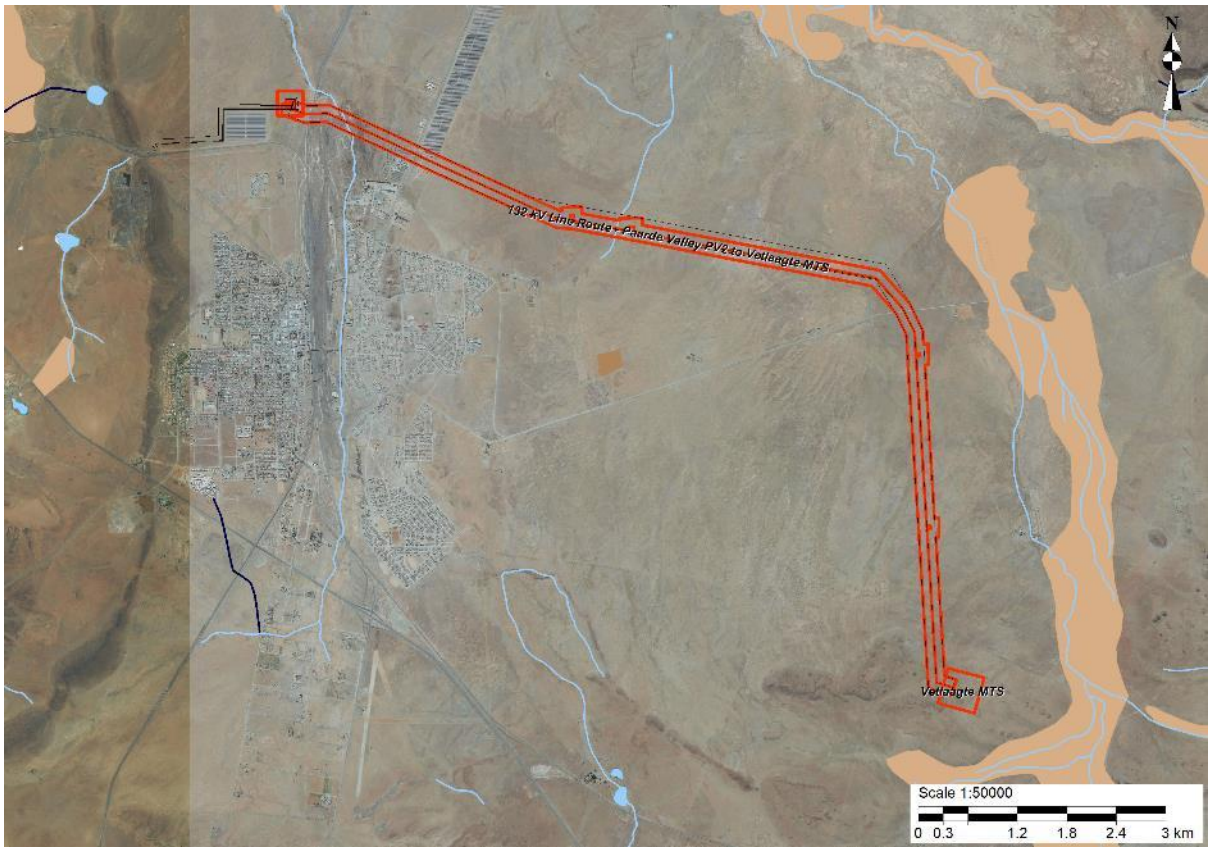


Figure 2. Proposed project elements under consideration in this specialist assessment

4. Baseline Environmental Description

4.1. General Description

The proposed area in which the proposed grid connection, switching station and access road under consideration are to be constructed is located in the Emthanjeni Local Municipality in the Pixley ka Seme District Municipality. The site is located to the north and east of De Aar. The area surrounding De Aar includes the town, renewable energy projects that have been constructed or are under construction and farming areas that are mostly used for livestock grazing. Several Eskom powerlines and substations occur in the area of which the Hydra Substation is the most significant.

The majority of the landscape consists of flat to slightly undulating plains with shallow valleys that are drained by tributaries of the Brak River, a northward-flowing tributary of the Lower Orange River. Occasional low hills occur in the wider study area. The elevation of the study area ranges from approximately 1230 to

1300 m.a.s.l. Table 2 provides an overview and summary of the water resource information for the study area.

Table 2: Key water resources information for the proposed project development area

Descriptor	Name / details	Notes
Water Management Area (WMA)	Lower Orange WMA	
Catchment Area	Brak River	Tributary of the Lower Orange River
Quaternary Catchment	D62D	
Present Ecological state	Largely natural (B Category)	DWS (2012) assessment for the Brak River
Ecological Importance and Sensitivity	Low	
Location of the proposed Paarde Valley PV2 Switching Station	30°37'31.9"S	Latitude
	24° 0'39.4"E	Longitude
Location of the Vetlaagte MTS	30°41'20.9"S	Latitude
	24° 5'42.1"E	Longitude

4.1.1 Geology and soils

The geology of the study area can be described as being underlain by flat-lying sedimentary rocks of the Karoo Supergroup, which have been intruded by innumerable sills and dykes of dolerite. The overlying soils are variable from shallow to deep, red-yellow apedal, freely draining soils to very shallow Glenrosa and Mispah forms. The soils in the study site are primarily red soils of a restricted soil depth, excessive drainage, high erodibility and low fertility. Calcrete soils are also prevalent as a result of the climatic conditions and underlying parent material.

4.1.2 Climate, Hydrology and Geohydrology

At De Aar, the summers are hot; the winters are short, cold, and windy; and it is dry and mostly clear year-round. Average temperatures vary from 16 ^{o}C in June/July to 32 ^{o}C in January and February. The wet season occurs from mid-November to mid-April with February, tending to be the wettest month and July the driest month. The mean annual rainfall for the area is 282 mm. The site is not in a Strategic Water Source Area for surface water. Due to the climatic conditions of the area, the smaller watercourses and the wetland areas that occur in the area are ephemeral (non-perennial), only containing water for short periods, immediately following local rainfall events. A dominant feature of the larger rivers is the alluvial floodplains that are characterised by multiple channels that are interchangeably used during higher flow events. These sandy floodplains tend to have mostly bare beds, with vegetation occurring in clumps along the bed and more densely along the banks. The ephemeral watercourses are highly dependent on groundwater discharge.

The area has been mapped as a Strategic Water Source Area for groundwater (De Aar Region). A major fractured aquifer occurs within the area. The water table typically occurs at depths of about 8 m below ground level and the yield of the aquifer is less than 2 liters a second. Both the surface and groundwater quality tend to be slightly brackish with natural electrical conductivity concentrations of between 70 and 150 mS/m. The estimated groundwater recharge in the area is 12.3 mm/a. The aquifer is of medium susceptibility and vulnerability.

4.1.3 Vegetation

The study area lies near the eastern edge of the Nama Karoo biome and is mapped according to the national vegetation types (Mucina and Rutherford, 2006, updated in 2009, 2012 and 2018) as being of the vegetation type Northern Upper Karoo which is considered to be least threatened. The vegetation cover is generally dominated by sparse dwarf karroid scrub and tufted grass with bare patches of sand in between. Portions of the area are in a disturbed condition, most likely as a result of livestock grazing. Along the Brak

River and its larger tributaries, the common reed *Phragmites australis* dominates with very little discernible riparian vegetation. The ephemeral streams have no visible aquatic vegetation.

4.1.4 Aquatic Habitats and Biota

The aquatic features within the wider study area comprise ephemeral unnamed tributaries of the Brak River. The Brak River is a seasonal tributary within the Lower Orange River System. The river flows approximately 3 km to the north of the study area with a larger tributary crossing the eastern extent of the study area, flowing in a northerly direction to join the Brak River. A second, smaller tributary of the Brak River is the Sandsloot River which flows through the town of De Aar and transects the Paarde Valley farm. Several smaller ephemeral watercourses and drainage lines drain into these larger river corridors from the surrounding higher lying areas. Associated with the larger watercourses are wider floodplains wetlands. Small, shallow instream dams have been constructed within these watercourses in the area that tends to be dominated by *Typha capensis* bulrush or *Phragmites australis* reeds. There are also artificial wetland areas on the northeastern portion of the Paarde Valley farm as a result of the overflow from the De Aar Wastewater Treatment Works.

The ephemeral streams and floodplains provide aquatic habitat to a diverse array of faunal species that are adapted to the brief periods of inundation to carry out much of their life phases. Amphibians such as the Karoo Dainty Frog, *Cacosternum karooicum* and Karoo Toad, *Vandijkophrynus gariepensis* use the inundated pools to breed in. Other biota that use the temporary wet habitats comprise migratory birds and many invertebrates such as water fleas (*Daphnia* spp.) and tadpole shrimps (*Triops* spp.). Connectivity between aquatic ecosystems and the surrounding terrestrial landscape is essential for supporting the fauna of these ecosystems.

4.1.5 Aquatic Biodiversity Sensitivity and Conservation Importance

The sub-catchment of the tributaries of the Brak River in which the eastern portion of the proposed Paarde Valley PV2 Grid Connection Project is located is mapped as an Upstream Management Area, while the western portion lies within a FEPA River sub-catchment associated with the larger Brak River and Sandsloot Tributary (Figure 3). Upstream Management Areas are sub-catchments in which human activities need to be managed to prevent the degradation of downstream Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas while FEPA River Catchments need to be maintained in a good ecological condition. There is one FEPA Wetland mapped to the southwest of the proposed grid connection route (Figure 4). This feature was determined during the field assessment as an off-channel farm dam/reservoir that is not considered of any aquatic biodiversity conservation significance. Some natural valley bottom and riverine wetland habitat have been mapped further to the north and east of the proposed route that is associated with the Brak River Tributary. The wetlands are located some distance from the proposed activities and are unlikely to be impacted by the proposed project.

In the 2016 Northern Cape Critical Biodiversity Areas mapping (Figure 5), the eastern portion of the study area is mapped as Other Natural Areas, while the western extent is within a Critical Biodiversity Area (terrestrial). The Other Natural Areas are natural or semi-natural areas that are not required to meet biodiversity targets or support natural ecological processes.

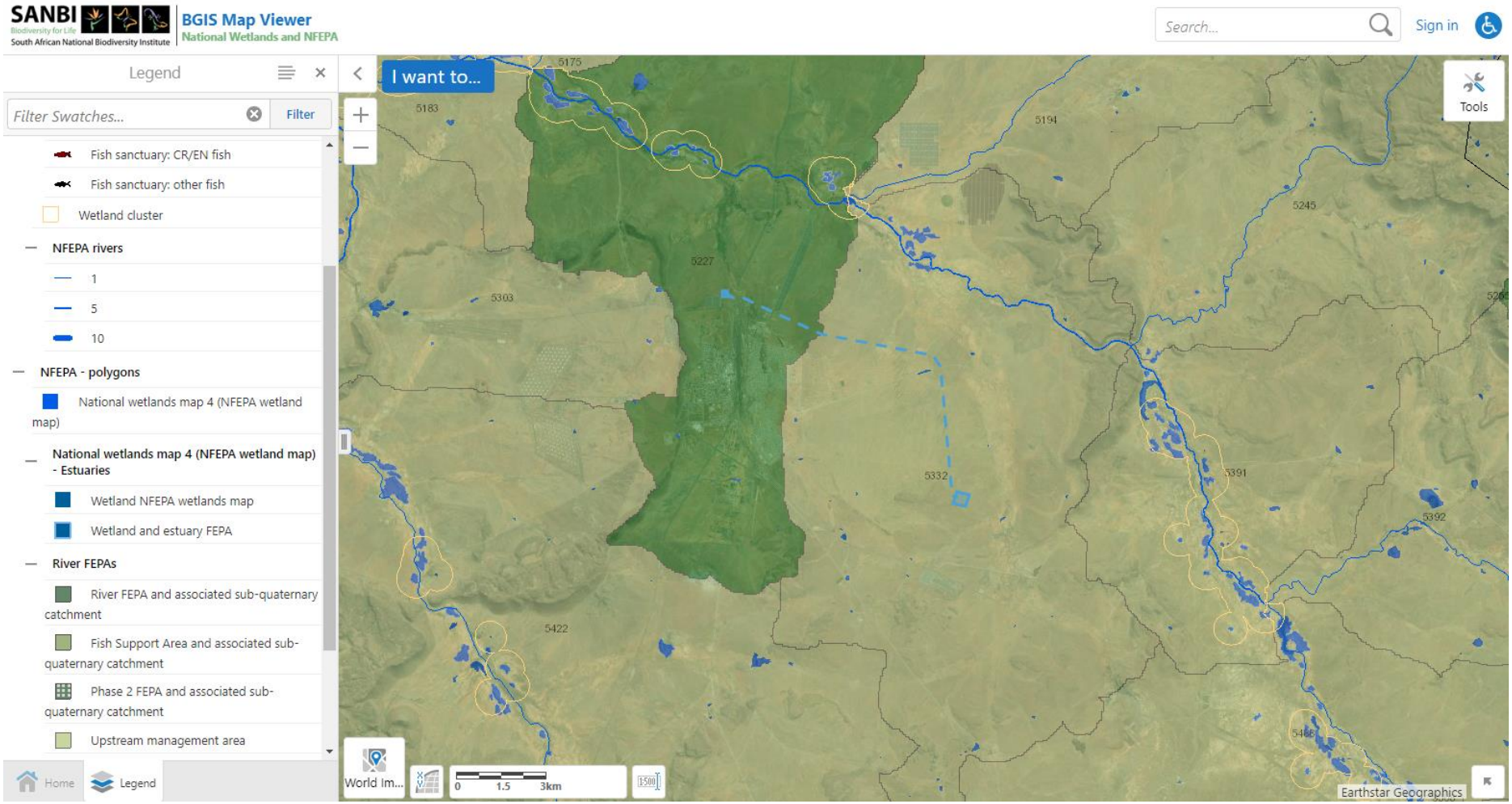


Figure 3. Freshwater Ecosystem Priority Areas within the wider study area (2011 CSIR National Freshwater Ecosystem Priority Areas, obtained from SANBI Biodiversity GIS, May 2022)

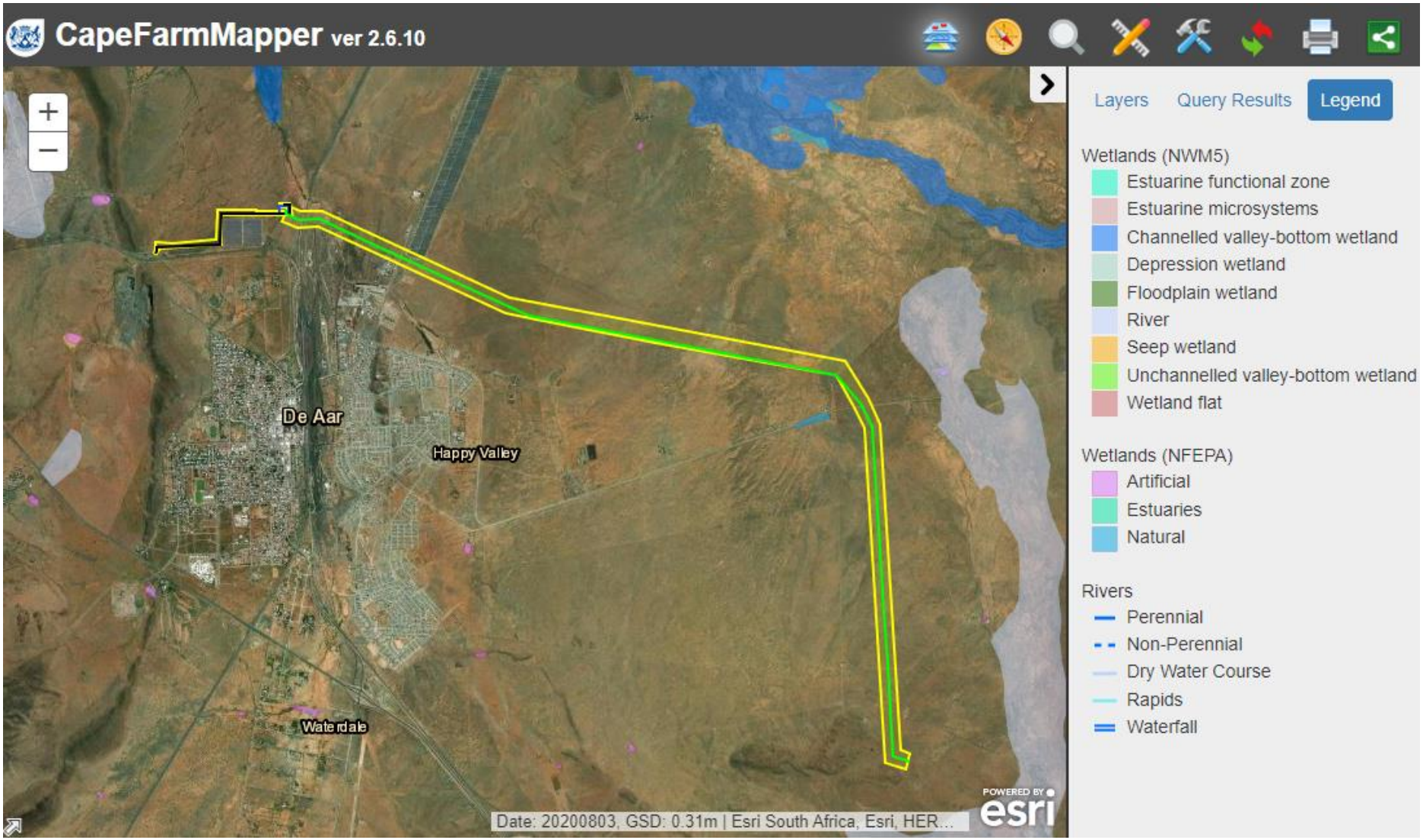


Figure 4. NFEPA Wetland and National Wetland Map 5 mapping for the proposed project and surrounding area (Cape Farm Mapper, May 2022)

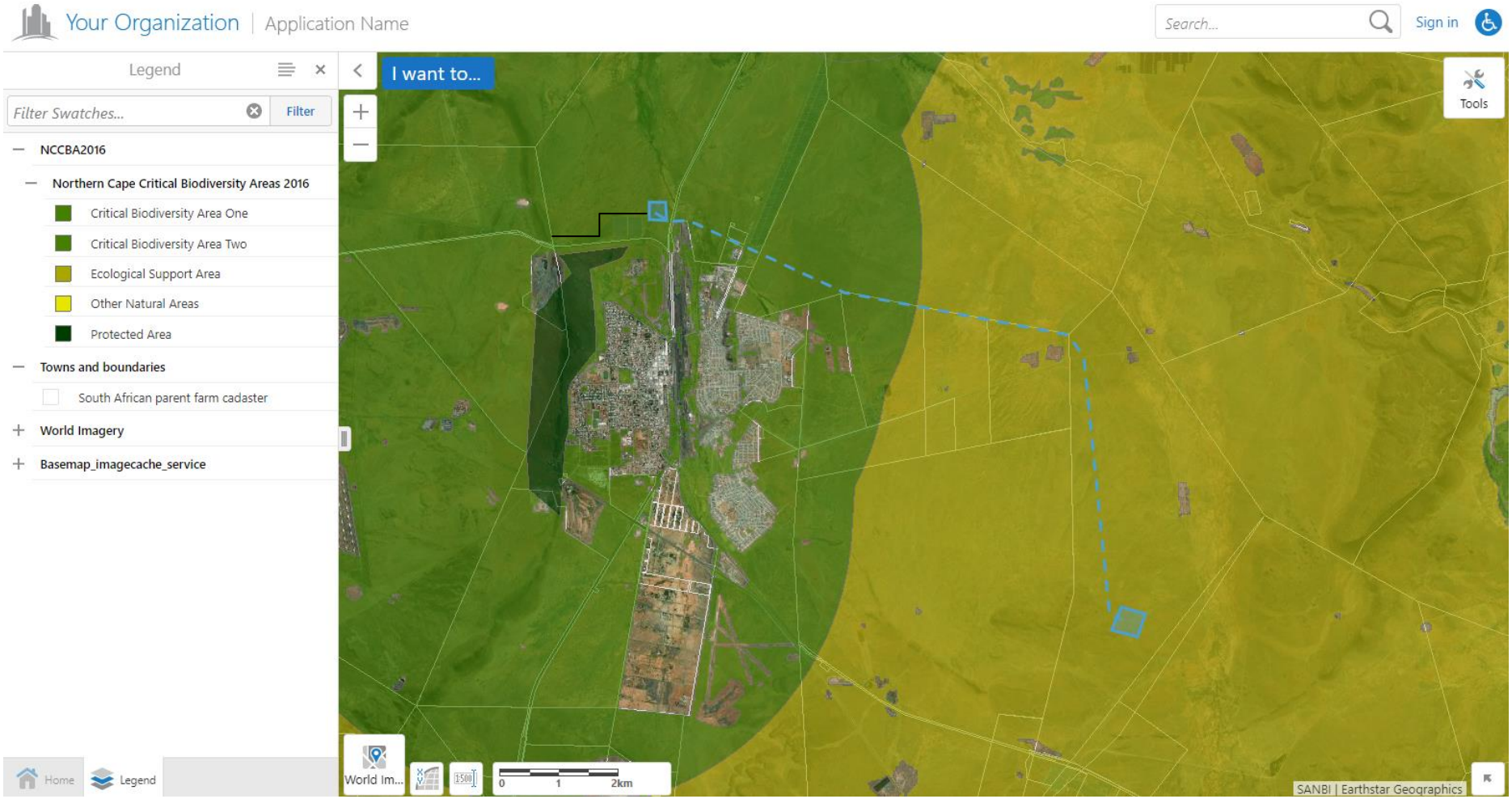


Figure 5. 2016 Northern Cape Critical Biodiversity Areas map for the study area (obtained from SANBI Biodiversity GIS in May 2022)

4.1.6 Aquatic Ecological Integrity

The rivers in the wider study area comprise tributaries of the Brak River, a tributary of the Lower Orange River System that joins the river near Prieska. The larger watercourses all mostly drain in a northwesterly direction. The rivers can all be characterised as non-perennial, foothill streams within the Nama Karoo Ecoregion. Most of the watercourses and associated wetlands and floodplains in the area surrounding De Aar are in a largely natural to moderately modified ecological condition due to the low level of impact in the area. The watercourses within the immediate area of De Aar are more degraded as a result of the disturbance currently taking place within and around the town. The Sandsloot Tributary, in particular, drains through the town and is the recipient of treated wastewater from the town. A more detailed assessment of the ecological integrity of the aquatic features in the wider area is attached as Appendix D.

The vegetation associated with the ephemeral streams usually has a distinct zone that is comprised of grass species with some shrubs (*Lycium cinereum. Stipagrostis spp., Rhigozum trichotomum* and *Galenia africana*). Instream vegetation is dominated by *Juncus kraussii* rushes (Figure 6). The smaller ephemeral streams and drainage features do not have distinct vegetation (Figure 7). The Sandsloot that receives stormwater and treated wastewater discharges from the town contains a wetland area dominated by *Phragmites* reeds. Invasive alien mesquite (*Prosopis glandulosa*) occurs along the watercourse.

Figure 6. View of the larger tributary in the south-east of the proposed project, near Hydra Sub-station with its more significant vegetation that is dominated by *Juncus kraussii*

Figure 7. View of the Sandsloot Stream, north of De Aar, near the proposed powerline crossing over the watercourse

Figure 8. View of one of the smaller ephemeral watercourses within the property that contains no distinct riparian or instream vegetation

Impacts on the watercourses in the study area are associated with agricultural encroachment, livestock grazing, and road and powerline construction. The ephemeral aquatic ecosystems are particularly vulnerable to changes in hydrology as they are specifically adapted to the sporadic flow conditions that naturally occur. Contaminants and sediment are not regularly flushed from these streams.

4.2. Identification of Environmental Sensitivities

4.2.1 Sensitivities identified by the National Web-Based Environmental Screening Tool

The Screening Tool has indicated that the catchment of the Brak River Tributary at the site is mapped as being of very high Aquatic Biodiversity Combined Sensitivity (Figure 9). The very high sensitivity is linked to the Strategic Water Source Area for groundwater that has been identified in the wider area as well as the larger Brak River FEPA Sub-catchment, as mentioned in Section 4.1. The proposed project is unlikely to impact the Strategic Water Source Area (SWSA). The potential impact on the rivers and wetlands in the study area is considered further in this assessment.

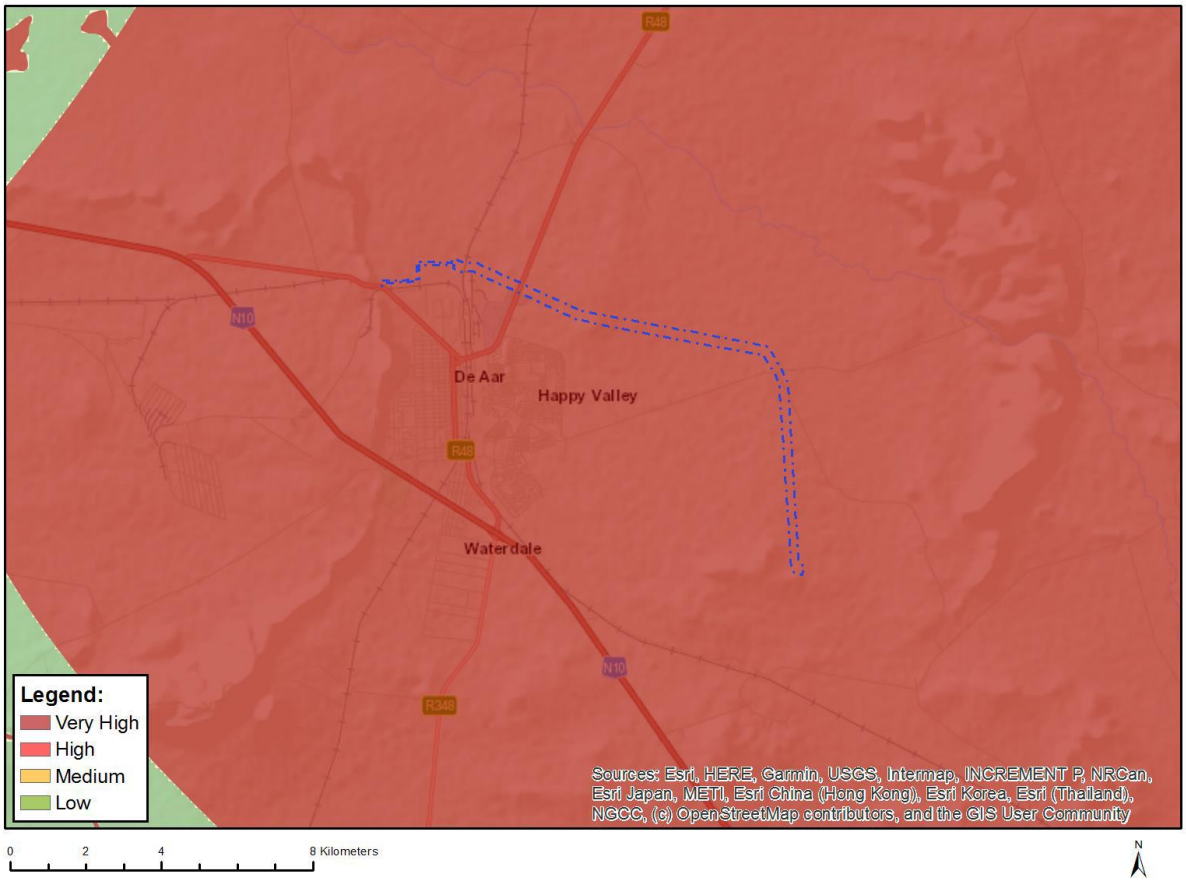


Figure 9. DFFE Screening Tool map of the site and surrounding area, for the mapped Aquatic Biodiversity Combined Sensitivity

4.2.2 Specialist Sensitivity Analysis and Verification

The Brak River, its larger tributaries and the associated floodplain through the area, are deemed to be of moderate aquatic ecological sensitivity, while the smaller watercourses and drainage lines are considered to be of low sensitivity. More detailed aquatic ecological assessments are included in Appendix D.

Based on the present ecological condition (largely natural to moderately modified) and ecological importance and sensitivity, as well as the recommended ecological condition of the watercourses (largely natural to moderately modified), buffers have been recommended 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 as follows:

- The larger floodplain areas: at least 50m, measured from the top of bank of the river channels; and
- Smaller streams and drainage features: at least 30m from the centre of these streams.

The aquatic sensitivity mapping and recommended buffers are shown in Figure 10.

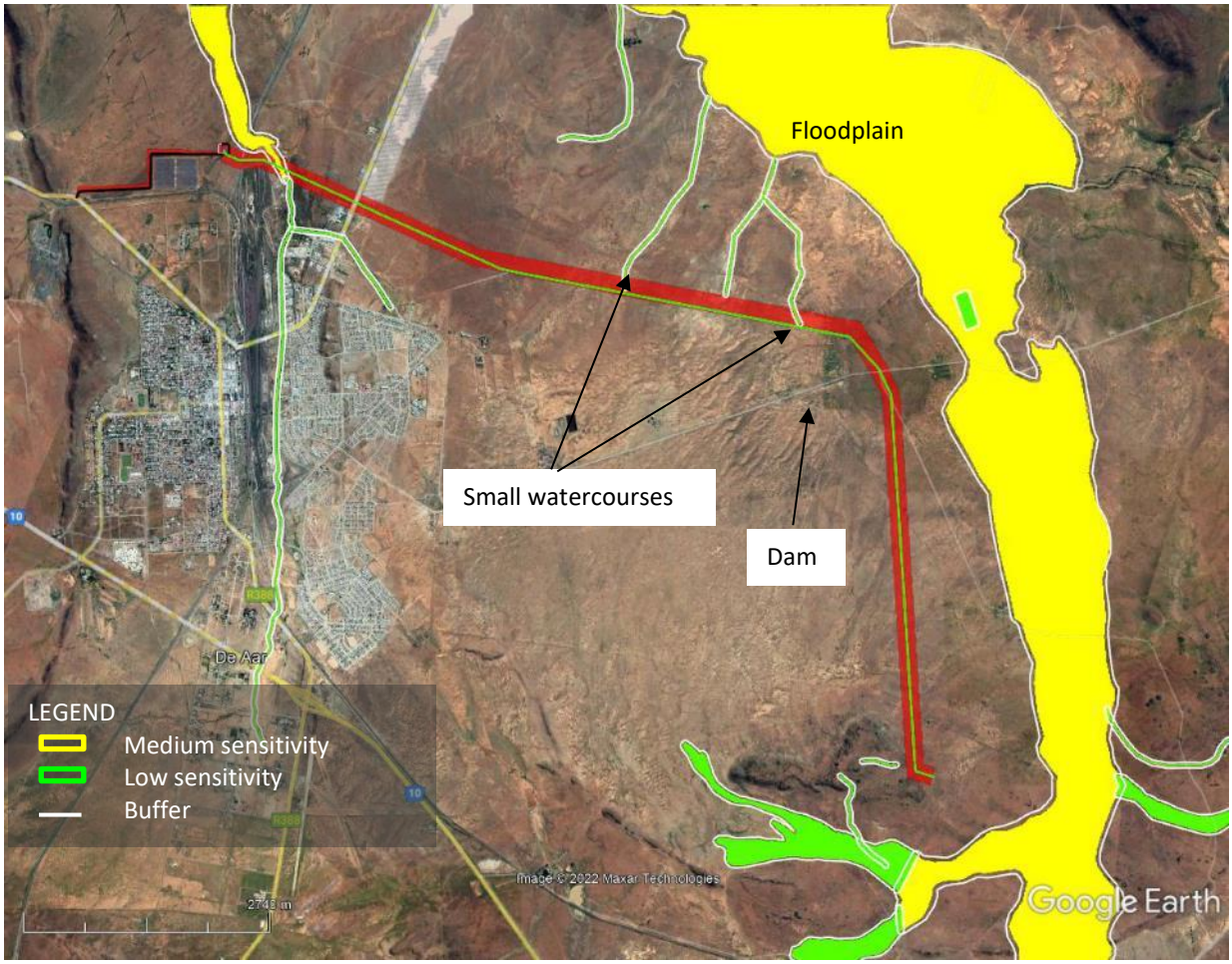


Figure 10. Google Earth image showing the mapped aquatic features and their sensitivities. The white lines indicate the recommended buffers.

The proposed grid connection,switching station and access road for the Paarde Valley PV2 are located outside of the wider floodplain area of a Brak River Tributary that lies to the east of the project activities. The tributary and its associated floodplain are considered of medium ecological sensitivity.

The Sandsloot Tributary of the Brak River and its associated floodplain area is located immediately to the east of Paarde Valley PV2 and will need to be crossed by the proposed powerline. The proposed Paarde Valley PV2 switching station and powerline access road are also located immediately adjacent to the watercourse and floodplain while the access road to the switching station is located outside of any delineated aquatic features. A 50m buffer is recommended as a development setback to the floodplain area. It is recommended that the switching station be placed outside of the recommended buffer as well as outside of the 1 in 100-year floodline for the river. The Sandsloot Tributary, associated floodplain and recommended buffer at the proposed powerline crossing would require a minimum of a 160m wide ecological corridor. The proposed powerline would be able to span this corridor such that the associated pylons could be located outside of the 1 in 100 year floodline and the recommended buffers. The proposed twin tracked service road following line route would be along an existing farm road and would not impact further on the watercourses provided no structures are placed within the watercourses that would impede the low flow in the watercourse (permeable material should preferably used in this area if necessary).

Some minor watercourses of low ecological sensitivity occur near the route that is of low sensitivity and has poorly defined channels and little associated aquatic habitat and biota. The proposed activities are thus unlikely to have any impact on the aquatic features and will also be able to easily be spanned by the powerline. There is an existing farm track along this portion of the route that already crosses these ephemeral

features that would be utilised for the access road and would not have any potential aquatic ecosystem impacts as discussed above..

A small dam has been constructed to the west of the proposed route that is mapped as a FEPA wetland and has some associated artificial wetland habitat. Considering that the habitat is artificial, associated with a constructed dam and along a gravel farm access road, no aquatic ecosystem of any significance is likely to be associated with the proposed activity at the dam.

4.2.3 Sensitivity Analysis Summary Statement

This assessment has found the larger aquatic features on-site to be of moderate sensitivity and the smaller features to be of low sensitivity. The **Very high** Aquatic Biodiversity Combined Sensitivity mapping of the screening tool differs as it is linked to the SWSA for groundwater and with a larger FEPA River Sub-catchment for the Brak River. The proposed activities are, however unlikely to impact the SWSA or the ecological integrity of the FEPA River.

5. Issues, Risks and Impacts

The potential impacts identified during this basic freshwater assessment are as follows:

Construction Phase: **Direct Impacts**: Aquatic habitat and associated biota disturbance, water quality impacts **Indirect Impacts**: Habitat modification and growth of invasive alien riparian vegetation
*Operational Phase***:** **Direct Impacts:** Aquatic habitat disturbance **Indirect Impacts:** Modification of surface runoff, erosion; and alien vegetation invasion in aquatic features
*Decommissioning Phase***:** **Direct Impacts:** Disturbance of aquatic habitats
*Cumulative impacts***:** **Indirect Impacts:** Degradation of the ecological condition of aquatic ecosystems.

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

1. Construction activities could result in the disturbance of aquatic habitats and biota. The proposed activities are however placed far from any aquatic habitats. The construction activities would thus be unlikely to modify aquatic habitat and biota to such an extent that the present or future desired state of the watercourses would be compromised.

2. During construction, the earthworks expose and mobilise soil while construction materials and chemicals may contaminate water resources. Given the low rainfall in the area and the distance of the works from watercourses, this impact would be unlikely, particularly if undertaken in the dry season.

During the operational phase, potential impacts would include:

1. 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 unlikely.

2. Modified runoff characteristics particularly along the access roads have the potential to result in erosion. Limited hardening of surfaces will take place as a result of the proposed project that may concentrate and convey runoff, with its associated erosion. Any structures within the watercourses associated with the proposed project must not impede flow 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.

3. The current presence of alien vegetation on the site is limited. Sources of alien seed should be prevented from being brought onto the site with imported materials. Monitoring post-construction for the growth of alien vegetation can mitigate this potential impact. It is recommended that an alien invasive management plan be compiled to control growth of invasive plant species along the powerline route.

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 (50m for the larger streams and 30m for the smaller watercourses is recommended for the placement of pylons associated with the overhead powerline) 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 while preparing this freshwater specialist report.

6. Impact Assessment

The potential aquatic biodiversity impacts of the proposed activities are likely to be negligible in terms of any potential impact to aquatic habitat, biota, water quality, or flow for all phases of the proposed development.

6.1 Potential Impacts during the Construction Phase

Degradation of the ecological condition of aquatic ecosystems and water quality impacts

Construction Phase: Construction of the switching station, access road and the powerline connection with servitude road, for Paarde Valley PV2 will require disturbance of the surface area and removal of vegetation cover for clearing and preparation of the various project component footprints. Only a limited amount of water is utilised during construction for the batching of cement for the construction activities. Concrete foundations will need to be constructed. A construction camp with a temporary laydown area and the concrete batching plant is proposed to be placed will be within the authorised laydown areas for Paarde valley PV2 where there is unlikely to be any aquatic ecosystem impacts as the location of the proposed works is located sufficiently far from the delineated aquatic features that they do not pose any significant risk to the aquatic features.

Proposed mitigation:
The recommended buffers of at least 30 and 50 m between the delineated aquatic ecosystems and proposed development the proposed project activities should be maintained. That is with the exception of the servitude road that will make use of an existing farm road. During the construction phase, site management must be undertaken at the laydown and construction sites. This should specifically address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities.

Table 3: Impact table for proposed developmenty Construction Phase

	Proposed project		**"No go"**	
	Without Mitigation	**With mitigation**	**Without Mitigation**	**With mitigation**
Nature	Negative	Negative	Neutral	-
Extent	Site (1)	Site (1)	Zero	-
Magnitude	Low (1)	Low (1)	Zero	-
Duration	Short term (1)	Short term (1)	Zero	-
Consequence	Negligibly detrimental (-3)	Negligibly detrimental (-3)	Zero	-

Significance	**Negligible (-9)**	**Negligible (-6)**	Zero	-
Probability	Probable (3)	Possible (2)	Zero	-
Confidence	High	High	High	-
Reversibility	Medium	High	High	-
Irreplaceable loss of resources	Low	Zero	Zero	-
Cumulative Impact	**Medium**	**Low**	Zero	-
Degree impact can be avoided	High		High	
Degree impact can be managed	High		High	
Degree impact can be mitigated	High		High	

6.2 Potential Impacts during the Operational Phase

Degradation of the ecological condition of aquatic ecosystems; modification of surface water runoff; erosion; and alien vegetation invasion in aquatic features

During the operation phase, change to the runoff characteristics along the access and servitude roads and in the developed areas may lead to increased erosion and sedimentation of the adjacent areas. An impact of very low to negligible significance post-mitigation may occur in terms of its impact on aquatic ecosystems in the area.

Proposed mitigation:
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 runoff from the project infrastructure and access roads (both the servitude and access roads) must be designed to mitigate the flow impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping of the the servitude and access roads with berms or channels and swales adjacent to hardened surfaces where necessary. Should any erosion features develop, they should be stabilised as soon as possible.

Table 4: Impact table for Grid connection and Switching Station – PV2 Operation Phase

	Proposed project		**"No go"**	
	Without Mitigation	**With mitigation**	**Without Mitigation**	**With mitigation**
Nature	Negative	Negative	Negative	Negative
Extent	Site (1)	Site (1)	Site (1)	Site (1)
Magnitude	Low (1)	Low (1)	Low (1)	Low (1)
Duration	Short term (1)	Short term (1)	Short term (1)	Short term (1)
Consequence	Negligibly detrimental (-3)	Negligibly detrimental (-3)	Negligibly detrimental (-3)	Negligibly detrimental (-3)
Significance	**Negligible (-6)**	**Negligible (-3)**	**Negligible (-6)**	**Negligible (-3)**
Probability	Possible (2)	Unlikely (1)	Possible (2)	Possible (2)
Confidence	High	High	High	High
Reversibility	Medium	High	High	High
Irreplaceable loss of resources	Low	Zero	Low	Low
Cumulative Impact	**Medium**	**Low**	**Medium**	**Low**
Degree impact can be avoided	High			
Degree impact can be managed	High			
Degree impact can be mitigated	High			

6.3 Consideration of Alternatives

Two alternative routes was provided. Both the proposed routes and a No-go alternative have potential aquatic ecosystem impacts of negligible significance.

The alternative technologies under consideration include Steel lattice or Monopole structures in line with Eskom required specifications". Considering the negligible potential aquatic ecosystem impact, either of the proposed structures would have similar impacts provided they are located outside of the recommended buffer areas.

7. Impact Assessment Summary

The overall impact significance of the proposed activities is provided in the table below for the lifespan of the project.

Table 5: Overall Impact Significance (Post Mitigation)

Phase	**Overall Impact Significance**
Construction	Negligible
Operational	Negligible
Cumulative Impact	**Overall Impact Significance**
Cumulative - Construction	Low
Cumulative - Operational	Low

8. Legislative and Authorisation Requirements

The main legislation associated with the protection of aquatic ecosystems and water resources over and above the National Environmental Management Act, Act 107 of 1998, is the National Water Act, 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 redefined by the Act as national resources which cannot be owned by any individual and rights which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the Department of Water and Sanitation (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 a Water Use Licence (WUL). There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

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). 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, summarised in Table 6, has been undertaken to inform the water use authorisation process. Considering the scope of works proposed and the fact that there will be minimal works undertaken within the delineated aquatic features within the site, the risk of altering the ecological status of the adjacent aquatic features is considered to be low. It is thus recommended that the proposed activities fall within the ambit of the General Authorisations for Section 21(c) and (i) water use activities.

Table 6. A summary of the risk assessment for the proposed development

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Construction	Construction of powerline and access roads through watercourses and floodplain areas	Accessing pylon sites; Limited clearing of vegetation and movement of soil and construction of foundations for the pylons	Disturbance of aquatic habitat and water quality impacts	46	L
Operation	Accessing and maintenance of powerline near aquatic features	Disturbance associated with accessing pylons and maintenance works	Disturbance of aquatic habitat; modified flow dynamics and soil movement	**36**	**L**

9. Conclusions and Recommendations

The Brak River, its larger tributaries and the associated floodplain occur within the wider area suyrrounding the proposed development activities. The watercourses are deemed to be of moderate aquatic ecological sensitivity, while the smaller watercourses and drainage lines are considered to be of low sensitivity. 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 as follows:

- The larger floodplain areas: at least 50m, measured from the top of bank of the river channels; and
- Smaller streams and drainage features: at least 30m from the centre of these streams.

The proposed grid connection,switching station and access road for the Paarde Valley PV2 are located outside of the wider floodplain area of a Brak River Tributary that lies to the east of the project activities. The tributary and its associated floodplain are considered of medium ecological sensitivity.

The Sandsloot Tributary of the Brak River and its associated floodplain area is located immediately to the east of Paarde Valley PV2 and will need to be crossed by the proposed powerline. The proposed Paarde Valley PV2 switching station and powerline access road are also located immediately adjacent to the watercourse and floodplain while the access road to the switching station is located outside of any delineated aquatic features. A 50m buffer is recommended as a development setback to the floodplain area. It is recommended that the switching station be placed outside of the recommended buffer as well as outside of the 1 in 100-year floodline for the river.

The Sandsloot Tributary, associated floodplain and recommended buffer at the proposed powerline crossing would require a minimum of a 160m wide ecological corridor. The proposed powerline would be able to span this corridor such that the associated pylons could be located outside of the 1 in 100 year floodline and the recommended buffers. The proposed twin tracked service road following line route would be along an existing farm road and would not impact further on the watercourses provided no structures are placed within the

watercourses that would impede the low flow in the watercourse (permeable material should preferably used in this area if necessary).

The proposed activities are thus unlikely to have any impact on the aquatic features and will also be able to easily be spanned by the powerline. Proposed mitigation measures are as follows:

- The recommended buffers of at least 30 and 50 m between the delineated aquatic ecosystems and proposed development the proposed project activities should be maintained. That is with the exception of the servitude road that will make use of an existing farm road.
- During the construction phase, site management must be undertaken at the laydown and construction sites. This should specifically address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities.
- 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. It is recommended that the alien invasive management measures in the EMPr to control growth of invasive plant species along the powerline route are implemented.
- Stormwater runoff from the project infrastructure and access roads (both the servitude and access roads) must be designed to mitigate the flow impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping of the the servitude and access roads with berms or channels and swales adjacent to hardened surfaces where necessary.
- Should any erosion features develop, they should be stabilised as soon as possible.

Considering the scope of works proposed and the fact that there will be minimal works undertaken within the delineated aquatic features within the site, the risk of altering the ecological status of the adjacent aquatic features is considered to be low. It is thus recommended that the proposed activities fall within the ambit of the General Authorisations for Section 21(c) and (i) water use activities.

There is thus, for an aquatic ecological perspective, no reason why the proposed activities cannot be approved.

The Impact Management Outcomes Table of the generic EMPr for the project is provided on the following page.

Impact management outcome: Potential impact on aquatic ecosystems of the proposed infrastructure						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Pre-Construction, Construction & Decommissioning Phase						
Minimise disturbance of aquatic habitats during construction and decommissioning.	Project Manager/ECO	The recommended buffers of at least 30 and 50 m between the delineated aquatic ecosystems and proposed development the proposed project activities should be clearly demarcated and treated as no-go areas during construction. That is with the exception of the servitude road that will make use of an existing farm road.	Pre-construction, construction & decommissioning phase	ECO	Before commencement and during construction phase	Records of monitoring and adherence to implementations methods and mitigation measures
Prevent water quality and sedimentation impacts	Project Manager/ECO	During the construction phase, site management must be undertaken at the laydown and construction sites. This should specifically address on-site stormwater management and prevention of pollution measures from any potential pollution sources during construction activities.	Construction & decommissioning phase	ECO	During construction phase	Records of monitoring and adherence to implementations methods and mitigation measures
Prevent invasion of site with alien plant species	Project Manager/ECO	Invasive alien plant growth should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants.	Pre-construction, construction & decommissioning phase	ECO	During construction phase	Records of monitoring and adherence to implementations methods and mitigation measures
Prevent erosion of aquatic features within the site	Project Manager/ECO	Monitor for erosion of aquatic features and adjacent areas during construction. Stormwater	Construction & decommissioning phase	ECO	During construction phase	Records of monitoring and adherence to

		runoff from the project infrastructure and access roads (both the servitude and access roads) must be designed to mitigate the flow impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping of the the servitude and access roads with berms or channels and swales adjacent to hardened surfaces where necessary. Should any erosion features develop, they should be stabilised as soon as possible.				implementations methods and mitigation measures
Operational Phase						
Reduce the cumulative habitat loss within aquatic ecosystems and impacts on broad-scale ecological processes such as fragmentation.	Project Manager/ECO	1) All disturbed areas that are not used such as excess road widths, should be rehabilitated after construction to reduce the overall footprint of the development. 3) All erosion and alien management measures must be effectively implemented at the site.	Operational phase	ECO	Ongoing	Removal of the hardened infrastructure and rehabilitation as per the mitigation measures recommended.

10. References

ADU. 2016. *Summary Data of the Frogs of South Africa, Lesotho and Swaziland*

CapeFarmMapper 2021. Version 2.6.2. [Online]. Available: https://gis.elsenburg.com/apps/cfm/

Department of Water Affairs and Forestry. (1998). *National Water Act*. Act 36. South Africa.

Department of Water Affairs and Forestry. (1999a). *Resource Directed Measures for Protection of Water Resources. Volume 4: Wetland Ecosystems Version 1.0*. Resource Directed Measures for Protection of Water Resources, Pretoria, South Africa.

Department of Water Affairs and Forestry. (2005a). *A practical field procedure for identification and delineation of wetland and riparian areas.* DWAF, Pretoria.

Department of Water Affairs and Forestry. (2009). Government Gazette No. 32805. *Impeding or Diverting the Flow of Water in a Watercourse [Section 21(c)] and Altering the Bed, Banks, Course or Characteristics of a Watercourse* [Section 21(i)]. Pp66-71, Pretoria.

Driver, Nel, Snaddon, Murray, Roux, Hill. (2011). *Implementation Manual for Freshwater Ecosystem Priority Areas*. Draft Report for the Water Research Commission.

Holness, S. and Oosthuysen, E. (2016). Critical Biodiversity Areas of the Northern Cape: Technical Report.

IUCN. 2021. *IUCN Red List of Threatened Species. Version 2020.3* [Online]. Available: www.iucnredlist.org.

Middleton, B.J., Midgley, D.C and Pitman, W.V., (1990). *Surface Water Resources of South Africa*. WRC Report No 298/1.2/94.

Mucina, L. and Rutherford, M. C. (eds.) (2004) *Vegetation map of South Africa, Lesotho and Swaziland*. Strlitzia 18. South African National Biodiversity Institute, Pretoria.

SANBI (2009). *Further Development of a Proposed National Wetland Classification System for South Africa*. Primary Project Report. Prepared by the Freshwater Consulting Group (FCG) for the South African National Biodiversity Institute (SANBI).

SANBI Biodiversity GIS 2021 [Online} Available: http://bgis.sanbi.org/MapViewer

Van Ginkel, C. E., Glen, R. P., Gordon-Gray, K. D., Cilliers, C. J., Muasya, M. and P. P. van Deventer (2011) *Easy identification of some South African wetland plants.* WRC Report No TT 479/10

WRC. (2011). *Atlas for Freshwater Ecosystem Priority Areas* – Maps to support sustainable development of water resources (WRC Report No. TT 500/11).

Appendix A - Specialist Expertise

TONI BELCHER

Full Name	Antonia Belcher
Cell Number	083 883 8055
Email	toni@bluescience.co.za
Address	53 Dummer St, Somerset West, 7130
Profession	Aquatic Ecologist and Environmental Management (P. Sci. Nat. 400040/10)
Years in Profession	31+ years

Toni Belcher worked for the Department of Water Affairs and Forestry for more than 17 years. During this period, she worked for the Directorate Water Quality Management, the Institute for Water Quality Studies and the Western Cape Regional Office and has built up a wide skills base on water resource management and water resource quality for rivers, estuaries and the coastal marine environment. Since leaving the Department in 2007, she has been working in her private capacity and was co-owner of BlueScience (Pty) Ltd, working in the field of water resource management and has been involved in more than 500 aquatic ecosystem assessments for environmental impact assessment and water use authorisation purposes. In 2006 she was awarded a Woman in Water award for Environmental Education and was a runner up for the Woman in Water prize for Water Research.

Professional Qualifications:

1984 Matriculation Lawson Brown High School
1987 B.Sc. – Mathematics, Applied Mathematics University of Port Elizabeth
1989 B.Sc. (Hons) – Oceanography University of Port Elizabeth
1998 M.Sc. – Environmental Management (*cum laude*) Potchefstroom University

Key Skills:

Areas of specialisation: Aquatic ecosystem assessments, Monitoring and evaluation of water resources, Water resource legislation and authorisations, River classification and Resource Quality Objectives, River Reserve determination and implementation, Water Quality Assessments, Biomonitoring, River and Wetland Rehabilitation Plans, Catchment management, River maintenance management, Water education.

Summary of Experience:

1987 – 1988 Part-time field researcher, Department of Oceanography, University of Port Elizabeth
1989 – 1990 Mathematics tutor and administrator, Master Maths, Randburg and Braamfontein Colleges, Johannesburg
1991 – 1995 Water Pollution Control Officer, Water Quality Management, Department of Water Affairs, Pretoria
1995 – 1999 Hydrologist and Assistant Director, Institute for Water Quality Studies, Department of Water Affairs and Forestry, Pretoria
1999 – 2007 Assistant and Deputy Director, Water Resource Protection, Western Cape Regional Office, Department of Water Affairs, Cape Town
2007 – 2012 Self-employed
2013 – 2020 Senior Aquatic Specialist and part owner, BlueScience
2020 – present Self employed, Associate of BlueScience

Appendix B - Specialist Statement of Independence

I, Antonia Belcher, declare that –

- I act as the independent specialist in this application;
- I will 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;
- 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 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;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist: 

Name of Company: BlueScience (Pty) Ltd

Date: 31 May 2022

Appendix C: 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 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	3 and 4 March 2022
Specialist Name	Toni Belcher
Professional Registration Number	400040/10
Specialist Affiliation / Company	-

The proposed site for the **Paarde Valley PV2 Grid Connection** near De Aar in the Northern Cape Province, was assessed in terms of its aquatic biodiversity sensitivity using a desktop analysis using available aquatic ecosystem mapping, aerial imagery and a site visit, undertaken on 3 and 4 March 2022. A literature survey was also undertaken to determine any aquatic biodiversity sensitivities that may occur in the surrounding area.

The field visit comprised of delineation, characterisation and integrity assessments of the aquatic habitats within the site. 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 the assessments:

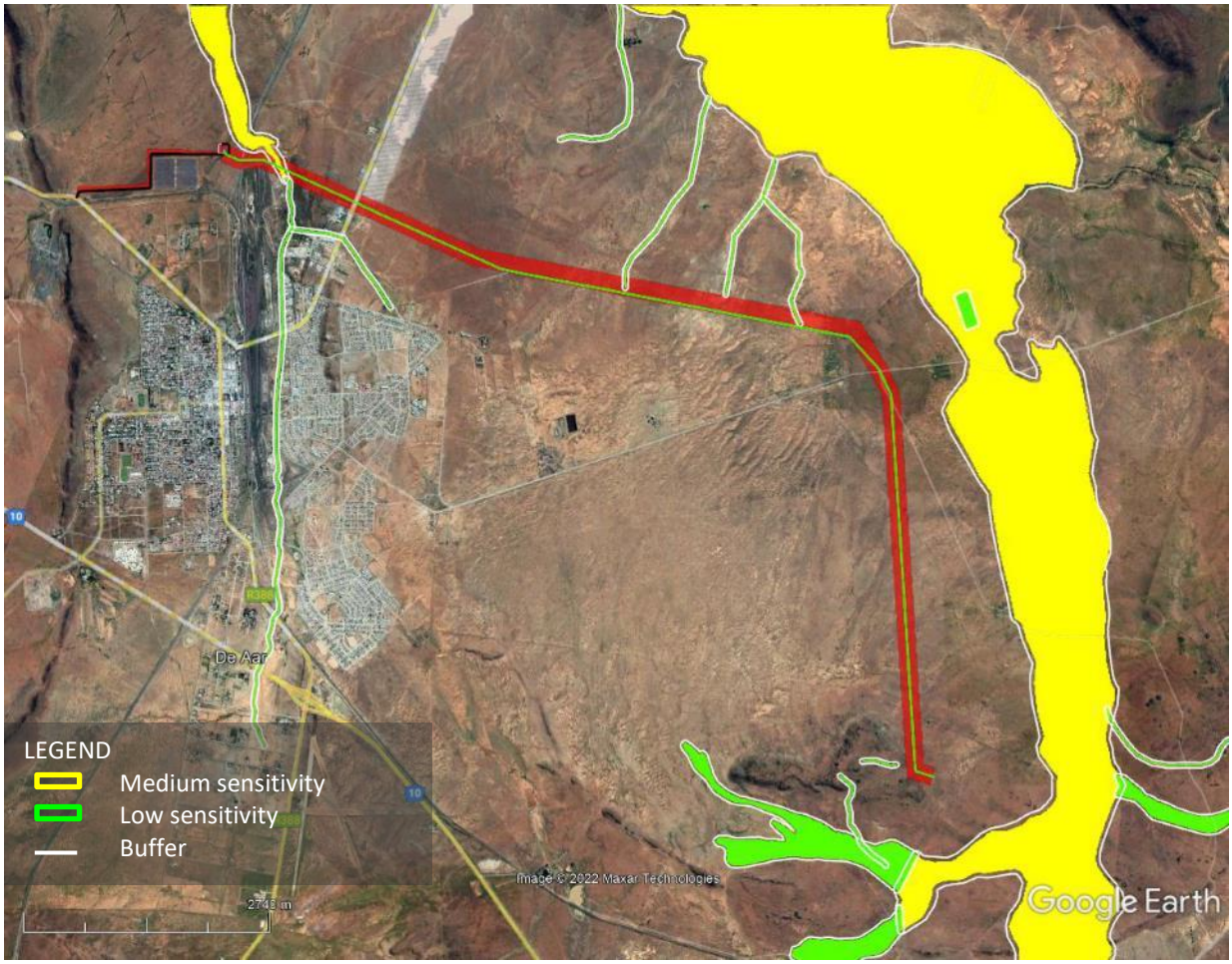
- The guideline document, "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas" document, as published by DWAF (2005), was followed for the delineation of the aquatic habitats;
- The present ecological condition of the watercourses was determined using the national River Health Programme and Wet-Health methodologies;
- The ecological importance and ecological sensitivity (EI&ES) assessment of the watercourses were conducted according to the guidelines as developed by DWAF (1999); and
- Recommendations are made concerning the adoption of buffer zones within the site were based on watercourse functioning and site characteristics as well as the DWS buffer tool.

The aquatic features within the wider study area comprise ephemeral unnamed tributaries of the Brak River. The river flows approximately 3 km to the north of the study area with a larger tributary crossing the eastern extent of the study area. A second, smaller tributary of the Brak River is the Sandsloot River which flows though the town of De Aar and transects the Paarde Valley farm. Several smaller ephemeral watercourses and drainage lines drain into these larger river corridors from the surrounding higher lying areas. Associated with the larger watercourses are wider floodplains wetlands. Small, shallow instream dams have been constructed within these watercourses in the area that tends to be dominated by *Typha capensis* bulrush or *Phragmites australis* reeds. There are also artificial wetland areas on the northeastern portion of the Paarde Valley farm as a result of the overflow from the De Aar Wastewater Treatment Works.

The Brak River, its larger tributaries and the associated floodplain through the area are deemed to be of moderate aquatic ecological sensitivity, while the smaller watercourses and drainage lines are considered to be of low sensitivity.

The Screening Tool has indicated that the catchment of the Brak River Tributary at the site is mapped as being of very high Aquatic Biodiversity Combined Sensitivity. The very high sensitivity is linked to the Strategic

Water Source Area for groundwater that has been identified in the wider area as well as the larger Brak River FEPA Sub-catchment. The proposed activities are however unlikely to impact the SWSA or the ecological integrity of the FEPA River.



Google Earth image with the Aquatic Ecosystem Sensitivity mapping where the green area indicates low sensitivity and the yellow the moderate sensitivity areas. The white lines indicate the recommended buffers.

Appendix D: Aquatic Ecosystem Assessment

The Index for Habitat Integrity (IHI) and a Site Characterisation were used to provide information on the ecological condition of the Brak River, its tributaries and the wetland areas within the study area.

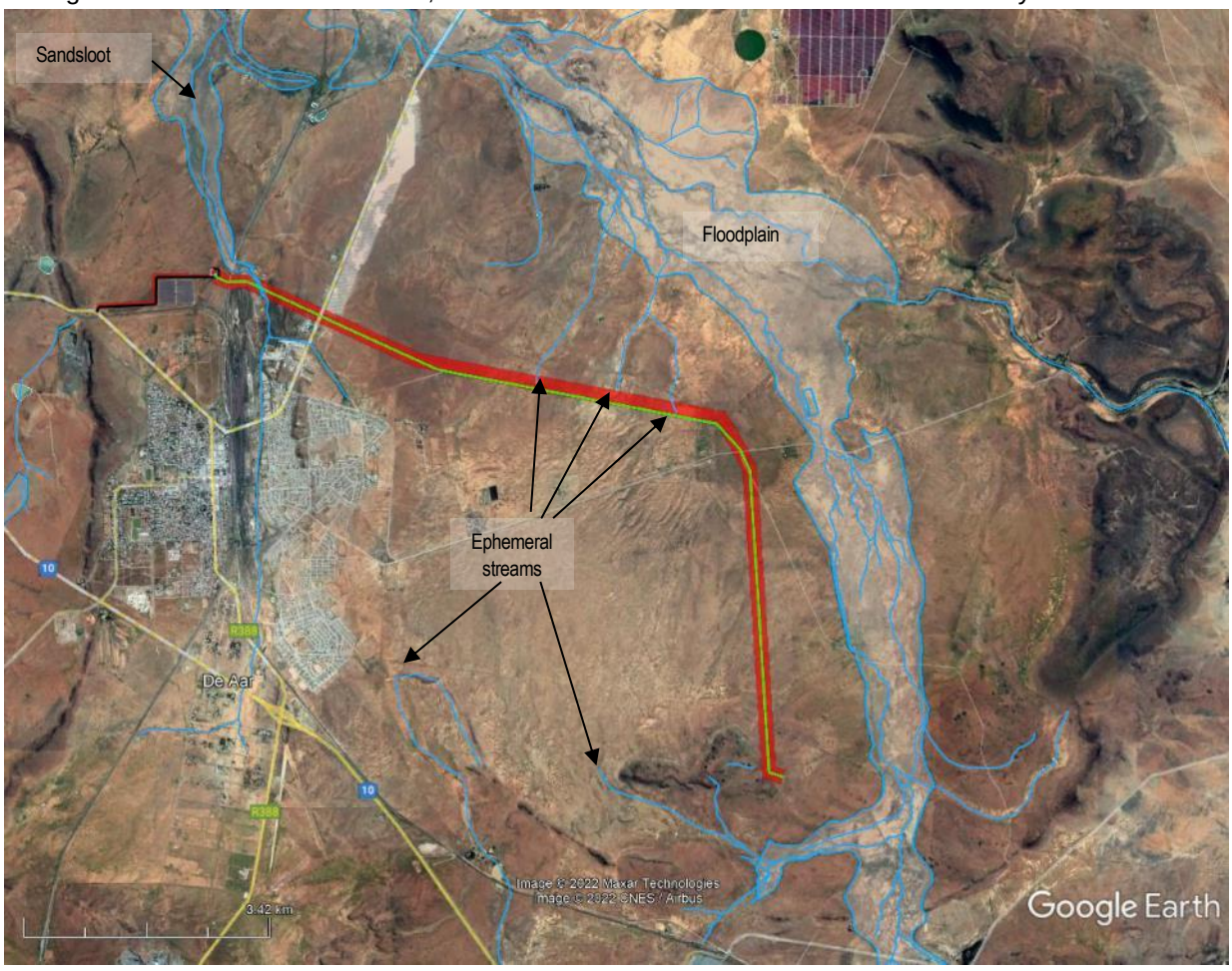


Figure D1. Water features in the study area

River Assessment

a. River classification

In order to assess the condition and ecological importance and sensitivity of the rivers in the study area, it is necessary to understand how the rivers might have appeared under unimpacted conditions. This is achieved through classifying rivers according to their ecological characteristics, in order that it 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 condition 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 condition 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 are groups of rivers within South Africa, which share similar physiography, climate, geology, soils and potential natural vegetation. For the purposes of this study, the ecoregional classification presented

in Department of Water Affairs and Forestry in 1999, which divides the country's rivers into ecoregions, was used. The river assessed lies within the Nama Karoo Ecoregion, with the characteristics as described in Table D1.

Table D1. Characteristics of the Nama Karoo Ecoregion (Dominant Types In Bold)

Main Attributes	Description
Terrain Morphology: Broad division	Plains; Low Relief**; Plains Moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief;** Open Hills, Lowlands; Mountains; Moderate to High Relief; Closed Hills; Mountains; Moderate and High Relief
Vegetation types	Eastern Mixed Nama Karoo; Upper Nama Karoo; **Bushmanland Nama Karoo;** Orange River Nama Karoo
Altitude (m a.m.s.l)	300-1700
MAP (mm)	0 to 500
Rainfall seasonality	Late to very late summer to Winter
Mean annual temp. (°C)	12 to 20
Median annual simulated runoff (mm) for quaternary catchment	<5 to 60

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 these are a major factor in the determination of the distribution of the biota. From the Site Characterisation assessments, the geomorphological and physical characteristics of the river and its tributaries can be classified as shown in Table D2.

Table D2. Geomorphological and Physical features of the Brak River and its tributaries

River	Brak	Sandsloot	Ephemeral tributaries
Geomorphological Zone	Foothill rivers in the Upper Karoo Geomorphic Province		
Lateral mobility	Unconfined		
Channel form	Simple		Complex
Channel pattern	Single thread: low sinuosity		Multiple thread: low sinuosity
Channel type	Mixed (alluvium with bedrock)		Silt/clayey with pebbles
Channel modification	Moderate to low modification (farming and some alien vegetation encroachment)	Moderate to high modification (farming activities and urban runoff)	Moderate modification (trampling and grazing, instream impoundments)
Hydrological type	Seasonal to ephemeral		ephemeral
Ecoregion	Nama Karoo		
DWA catchment	D62D		
Vegetation type	Northern Upper Karoo shrubland		
Rainfall region	Autumn		

The Brak River has a predominantly sandy/silty substrate. The river drains shrubland vegetation in an area with a very low rainfall. As a result, the river water is saline and turbid and seasonally flowing. At the time of the field assessment, the river consisted of isolated pools and was not suited to an assessment of water quality or aquatic biota present.

b. Index of Habitat Integrity

The evaluation of Index of Habitat Integrity (IHI) provides a measure of the degree to which a river has been modified from its natural state. This assessment was undertaken for the Brak River and its tributaries (Tables

D3 and D4). 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 degradation of a river. The severity of each impact is ranked using a scale from 0 (no impact) to 25 (critical impact). The assessment includes evaluation of the impacts of two components of the rivers, 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.

Brak River:

The Brak River is relatively wide (more than 10 metres) with incised banks. Vegetation cover spanned the width of the channel comprising predominantly of common reed (*Phragmites australis*). The land adjacent to the Brak River consisted mainly of shrub species. A distinct riparian zone was not discernible. The habitat integrity of the Brak River was assessed during the site visit. The results from the assessment are shown in Table 3.

Table D3. Index of Habitat Integrity Assessment results and criteria assessed in the Brak River

Instream Criteria		*Score*	**Riparian Zone Criteria**		*Score*
Water abstraction	14	**6**	Water abstraction	13	**6**
Flow modification	13	**7**	Inundation	11	**4**
Bed modification	13	**7**	Flow modification	12	**7**
Channel modification	13	**5**	Water quality	13	**10**
Water quality	14	**10**	Indigenous vegetation removal	13	**7**
Inundation	10	**4**	Exotic vegetation encroachment	12	**9**
Exotic macrophytes	9	**0**	Bank erosion	14	**11**
Exotic fauna	8	**0**	Channel modification	12	**5**
Solid waste disposal	6	**4**			
Category		**B/C**	**Category**		**C/D**

The instream habitat of the Brak River is still largely natural to moderately modified while the riparian habitat is more impacted (moderately to largely modified) as a result of surrounding farming activities.

Sandsloot River:

The Sandsloot River at Paarde Valley has a largely natural habitat with minimal habitat disturbance activities. Much of the impacts result from activities in the urban areas upstream. The results from the habitat integrity assessment are shown in Table D4.

Table D4. Index of Habitat Integrity Assessment results and criteria assessed in the Sandsloot

Instream Criteria	Weight	Score	**Riparian Zone Criteria**	Weight	Score
Water abstraction	14	**4**	Water abstraction	13	**4**
Flow modification	13	**8**	Inundation	11	**3**
Bed modification	13	**9**	Flow modification	12	**8**
Channel modification	13	**4**	Water quality	13	**14**
Water quality	14	**14**	Indigenous vegetation removal	13	**5**
Inundation	10	**3**	Exotic vegetation encroachment	12	**6**
Exotic macrophytes	9	**0**	Bank erosion	14	**7**
Exotic fauna	8	**0**	Channel modification	12	**4**
Solid waste disposal	6	**9**			
Category		C	*Category*		**C**

Both the riparian and instream habitat integrity of the Sandsloot stream within Paarde Valley Farm are considered to be in a moderately modified state, mostly as a result of the upstream activities in De Aar.

Ephemeral Streams:

The ephemeral streams at the site are largely natural to moderately modified with the modification of the habitat occurring as a result of the surrounding farming activities (livestock grazing). The results from the habitat integrity assessment are shown in Table D5.

Table D5. Index of Habitat Integrity Assessment results and criteria assessed of ephemeral tributaries

Instream Criteria	Weight	**Score**	**Riparian Zone Criteria**	Weight	**Score**
Water abstraction	14	5	Water abstraction	13	6
Flow modification	13	8	Inundations	11	5
Bed modification	13	8	Flow modification	12	8
Channel modification	13	6	Water quality	13	4
Water quality	14	4	Indigenous vegetation removal	13	7
Inundation	10	6	Exotic vegetation encroachment	12	3
Exotic macrophytes	9	0	Bank erosion	14	4
Exotic fauna	8	0	Channel modification	12	6
Solid waste disposal	6	1			
Category		B/C	*Category*		**C**

c. Ecological Importance and Sensitivity (EIS)

EIS (Table D6) considers a number of biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale (Table D7). The median of the resultant score is calculated to derive the EIS category (Table D8).

Table D6. Ecological importance and sensitivity categories (DWAF, 1999)

EISC	General description	Range of median
Very high	Quaternaries/delineations considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations that are not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table D7. Definition of the four-point scale used to assess biotic and habitat determinants presumed to indicate either 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 (i.e. SA Red Data Books)

Table D8. Results of the EIS assessment for the Brak River and tributary the Sandsloot within the study area

Biotic Determinants	Brak River	Sandsloot	Ephemeral tributaries
Rare and endangered biota	1	1	0
Unique biota	1	0	0
Intolerant biota	1	1	0
Species/taxon richness	1	1.5	1
Aquatic Habitat Determinants			
Diversity of aquatic habitat types or features	1.5	1.5	1
Refuge value of habitat type	1.5	1.5	0
Sensitivity of habitat to flow changes	2	1.5	1
Sensitivity of flow related water quality changes	1.5	1	1
Migration route/corridor for instream and riparian biota	2	1.5	1
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	0	0	0
EIS CATEGORY	Moderate	Moderate/Low	Low

The rivers are all considered to be of a moderate to low Ecological Importance and Sensitivity.

Appendix E: Impact Assessment Methodology

For each impact, the **nature** (positive/negative), **extent** (spatial scale), **magnitude/intensity** (intensity scale), **duration** (time scale), **consequence** (calculated numerically) and **probability** of occurrence is ranked and described. These criteria would be used to ascertain the **significance** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The tables below show the rankings of these variables and defines each of the rating categories.

Table E1: Assessment criteria for the evaluation of impacts

CRITERIA	RANK	DESCRIPTION
Nature	Positive (+)	The environment will be positively affected.
	Negative (-)	The environment will be negatively affected.
Extent or spatial influence of impact	National (4)	Beyond provincial boundaries, but within national boundaries.
	Regional (3)	Beyond a 10 km radius of the proposed activities, but within provincial boundaries.
	Local (2)	Within a 10 km radius of the proposed activities.
	Site specific (1)	On site or within 100 m of the proposed activities.
	Zero (0)	Zero extent.
Magnitude/ intensity of impact (at the indicated spatial scale)	High (3)	Natural and/ or social functions and/ or processes are *severely* altered.
	Medium (2)	Natural and/ or social functions and/ or processes are *notably* altered.
	Low (1)	Natural and/ or social functions and/ or processes are *slightly* altered.
	Zero (0)	Natural and/ or social functions and/ or processes remain *unaltered.*
Duration of impact	Long Term (3)	More than 10 years, but impact ceases after the operational phase.
	Medium Term (2)	Between 3 – 10 years.
	Short Term (1)	Construction period (up to 3 years).
	None (0)	Zero duration.
Consequence (Nature x (Extent + Magnitude/ Intensity + Duration))	Extremely beneficial/ detrimental (10 – 11) (+/-)	The impact is *extremely* beneficial/ detrimental.
	Highly beneficial/ detrimental (8 – 9) (+/-)	The impact is *highly* beneficial/ detrimental.
	Moderately beneficial/ detrimental (6 – 7) (+/-)	The impact is *moderately* beneficial/ detrimental.
	Slightly beneficial/ detrimental (4 – 5) (+/-)	The impact is *slightly* beneficial/ detrimental.
	Negligibly beneficial/ detrimental (1 – 3) (+/-)	The impact is *negligibly* beneficial/ detrimental.
	Zero consequence (0) (+/-)	The impact has zero consequence.
Probability of occurrence	Definite (4)	Estimated at a greater than 95% chance of the impact occurring.
	Probable (3)	Estimated 50 – 95% chance of the impact occurring.
	Possible (2)	Estimated 6 – 49% chance of the impact occurring.
	Unlikely (1)	Estimated less than 5% chance of the impact occurring.
	None (0)	Estimated no chance of impact occurring.

The **significance** of an impact is derived by taking into account the **consequence** (nature of the impact and

its extent, magnitude/intensity and duration) of the impact and the **probability** of this impact occurring through the use of the following formula: **Significance Score = Consequence x Probability**

The means of arriving at a significance rating is explained in Table E2.

Table E2: Definition of significance ratings

SIGNIFICANCE SCORE	SIGNIFICANCE RATINGS	
32 – 40	High (+)	High (-)
25 – 31	Medium (+)	Medium (-)
19 – 24	Low (+)	Low (-)
10 – 18	Very-Low (+)	Very-Low (-)
1 – 9	Negligible	

Once the significance of an impact has been determined, the **confidence** in the assessment of the impact, as well as the degree of **reversibility** of the impact and **irreplaceable loss of resources** would be determined using the rating systems outlined in Tables E3, E4 and E5 respectively. Lastly, the **cumulative impact** is ranked and described as outlined in Table E6.

Table E3: Definition of confidence ratings

CONFIDENCE	CRITERIA
High	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Medium	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Low	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table E4: Degree of reversibility

REVERSABILITY OF IMPACT	CRITERIA
High	High potential for reversibility.
Medium	Medium potential for reversibility.
Low	Low potential for reversibility.
Zero	Zero potential for reversibility.

Table E5: Degree of irreplaceability

IRREPLACEABLE LOSS OF RESOURCES	CRITERIA
High	Definite loss of irreplaceable resources.
Medium	Medium potential for loss of irreplaceable resources.
Low	Low potential for loss of irreplaceable resources.
Zero	Zero potential for loss of irreplaceable resources.

Table E6: Cumulative Impact on the environment

CUMULATIVE IMPACTS	CRITERIA
High	The activity is one of *several* similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the geographical, physical, biological, social, economic and cultural aspects of the environment.
Medium	The activity is one of a *few* similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the geographical, physical, biological, social, economic and cultural aspects of the environment.
Low	The activity is localised and might have a negligible cumulative impact.
Zero	No cumulative impact on the environment.

Appendix F: Location of content prescribed by NEMA for Specialist Reports: Procedures for Assessment and Minimum Criteria for Reporting, GN 320 Dated 20 March 2020

Minimum Requirements for Aquatic Biodiversity Specialist Assessment as per Protocol for the Specialist Assessment of Environmental Impacts on Aquatic Biodiversity (GN 320 of 20 March 2020)		
Protocol ref	Aquatic Biodiversity Specialist Assessment	Section / Page
2.3.	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	Section 4 and Appendix D
2.3.1.	a description of the aquatic biodiversity and ecosystems on the site, including;	Section 4.1.4
2.3.1. (a)	aquatic ecosystem types; and	
2.3.1. (b)	presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns;	
2.3.2.	the threat status of the ecosystem and species as identified by the screening too1[1];	Section 4.1.5
2.3.3.	an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and	Section 4.1.5
2.3.4.	a description of the ecological importance and sensitivity of the aquatic ecosystem including:	Section 4.1.6 and Appendix D
2.3.4. (a)	the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and	Section 4.1.6
2.3.4. (b)	the historic ecological condition (reference) as well as present ecological state of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater).	Section 4.1.6
2.4.	The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	Section 6.3
2.5.	Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:	Section 5 and 6
2.5.1.	is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Section 6
2.5.2.	is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present?	
2.5.3.	how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include:	
2.5.3. (a)	impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);	
2.5.3. (b)	will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement,	

[1] These ecosystems include the National Environmental Management Biodiversity Act. 2004(Act No. 10 of 2004) listed ecosystems.

Minimum Requirements for Aquatic Biodiversity Specialist Assessment as per Protocol for the Specialist Assessment of Environmental Impacts on Aquatic Biodiversity (GN 320 of 20 March 2020)		
Protocol ref	Aquatic Biodiversity Specialist Assessment	Section / Page
	meandering river mouth or estuary, flooding or sedimentation patterns);	
2.5.3. (c)	what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and	
2.5.3. (d)	to what extent will the risks associated with water uses and related activities change;	Section 5
2.5.4.	how will the proposed development impact on the functioning of the aquatic feature? This must include:	Section 6
2.5.4. (a)	base flows (e.g. too little or too much water in terms of characteristics and requirements of the system);	
2.5.4. (b)	quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river);	
2.5.4. (c)	change in the hydrogeomorphic typing of the aquatic ecosystem (e.g,change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland);	
2.5.4. (d)	quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);	
2.5.4. (e)	fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	
2.5.4. (f)	the loss or degradation of all or part of any unique or important features, associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.);	
2.5.5.	how will the proposed development impact on key ecosystems regulating, and supporting services especially:	Section 6
2.5.5. (a)	flood attenuation;	
2.5.5. (b)	streamflow regulation;	
2.5.5. (c)	sediment trapping;	
2.5.5. (d)	phosphate assimilation;	
2.5.5. (e)	nitrate assimilation;	
2.5.5. (f)	toxicant assimilation;	
2.5.5. (g)	erosion control; and	
2.5.5. (h)	carbon storage?	
2.5.6.	how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	
2.6.	In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to:	Not applicable
2.6. (a)	size of the estuary;	
2.6. (b)	availability of sediment;	
2.6. (c)	wave action in the mouth;	
2.6. (d)	protection of the mouth;	
2.6. (e)	beach slope;	
2.6. (f)	volume of mean annual runoff; and	
2.6. (g)	extent of saline intrusion (especially relevant to permanently open systems),	

Minimum Content Requirements for Aquatic Biodiversity Specialist Reports as per Protocol for the Specialist Assessment of Environmental Impacts on Aquatic Biodiversity (GN 320 of 20 March 2020)		
Aquatic Biodiversity Specialist Assessment Report		
Protocol ref	Content requirement	Section / Page
2.7.1.	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix A
2.7.2.	a signed statement of independence by the specialist;	Appendix B
2.7.3.	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2
2.7.4.	the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant;	Section 2
2.7.5.	a description of the assumptions made, any uncertainties or gaps in knowledge or data;	Section 2
2.7.6.	the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant;	Section 4.2
2.7.7.	additional environmental impacts expected from the proposed development;	Section 5
2.7.8.	any direct, indirect and cumulative impacts of the proposed development on site;	
2.7.9.	the degree to which impacts and risks can be mitigated;	
2.7.10.	the degree to which the impacts and risks can be reversed;	
2.7.11.	the degree to which the impacts and risks can cause loss of irreplaceable, resources;	
2.7.12.	a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies;	Section 4.2
2.7.13	proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr);	Section 9
2.7.14.	a motivation must be provided if there were development footprints identified as per paragraph 2.4 above that were identified as having a 'low" aquatic biodiversity sensitivity and that were not considered appropriate;	-
2.7.15.	a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and	Section 9
2.7.16.	any conditions to which this statement is subjected.	