AQUATIC SPECIALIST REPORT:

WAG 'N BIETJIE MTS PROJECT

Report prepared for:	Report prepared by:
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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
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
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 ASSESSMENT

This report serves as Aquatic Biodiversity and Species Specialist Assessment Report input into the required authorisations for the proposed Wag ‘n Bietjie MTS Project near De Aar, Northern Cape Province.

1. Introduction

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

The Wag ‘n Bietjie farm (Remaining extent of the farm Wag ‘n Bietjie No. 5) near De Aar in the Northern Cape currently has an environmental authorisation (EA) for solar PV facilities on the property. Approval is now being sought for a grid connection for the project as well as the Loop in Loop out powerlines and Main Transmission Substation. This report provides input in terms of the aquatic constraints within the project area and the associated aquatic ecosystem impacts for the proposed activities.

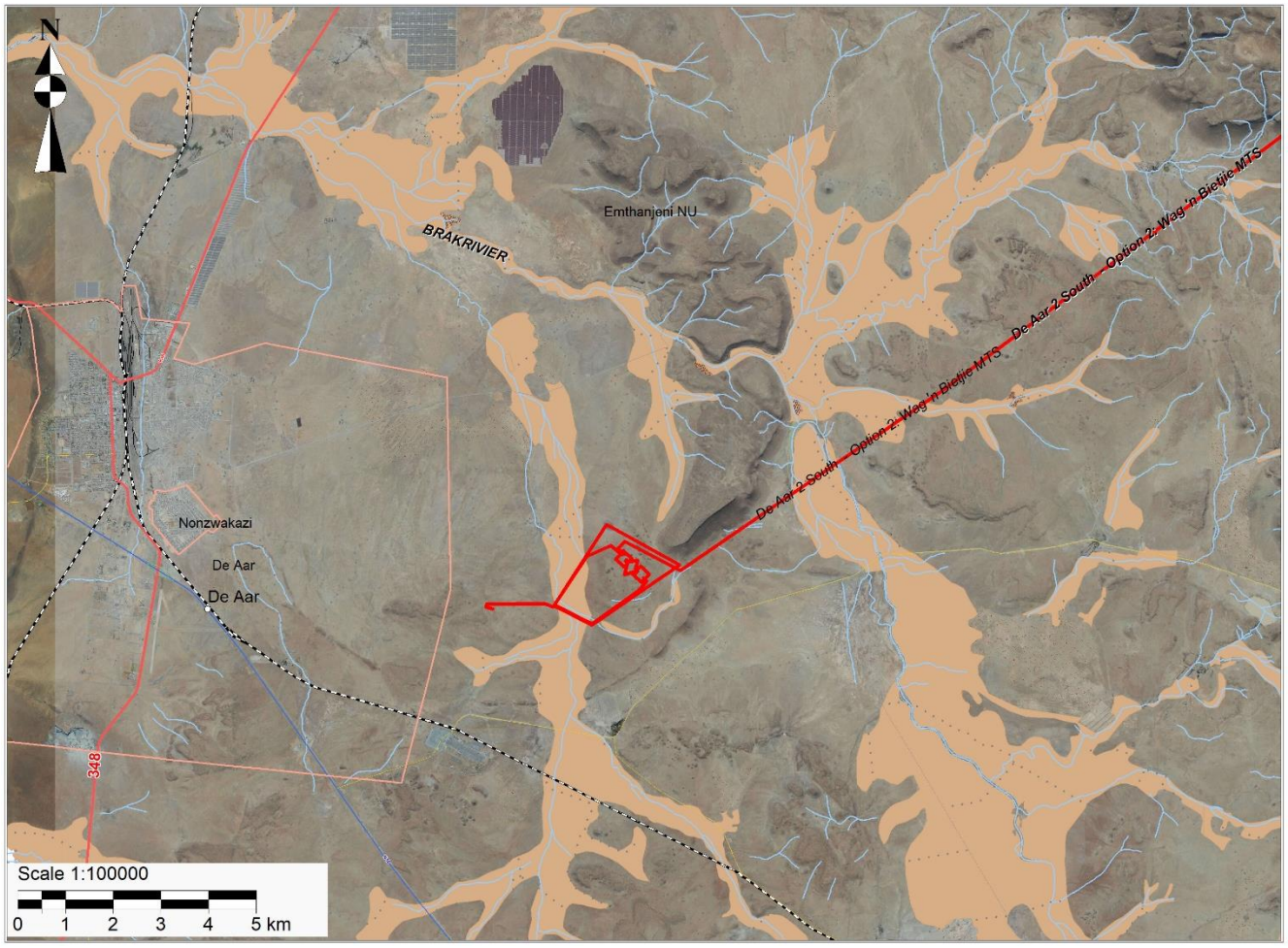

Figure 1. Locality map for the proposed project

1.2 Details of Specialist

This specialist assessment has been undertaken by Toni Belcher of BlueScience (Pty) Ltd. 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 report is as follows:

- Conduct field surveys and compile specialist studies in adherence to:
    - the gazetted Environmental Assessment Protocols of the NEMA EIA Regulations (2014, as amended), where applicable (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Aquatic Biodiversity (GG 43110 / GN 320, 20 March 2020)). This protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations (as amended); and
    - any additional relevant legislation and guidelines that may be deemed necessary.
- The Specialist must undertake a site visit to identify the level of sensitivity assigned to the project areas and to verify and confirm this sensitivity and land use as per the national Screening Tool. Provide sensitivities in KMZ or similar GIS format.
- Based on the outcome of the site sensitivity verification, the Specialist must compile an Aquatic Biodiversity Impact Assessment Report, as documented in the Assessment Protocols published on 20 March 2020, in Government Gazette 43110, GN 320, that includes:
    - Determine, describe and map the baseline environmental condition and sensitivity of the study areas. Specify setbacks or buffers and provide clear reasons for these recommendations. Also, map the extent of disturbance and transformation of the sites.
    - Provide input on the preferred infrastructure layout i.e. PV modules, on-site substations, etc. following the sensitivity analysis and layout identification.
    - The report must also describe the aquatic ecology features of the project areas, with a focus on features that are potentially impacted by the proposed projects. The description should include the major habitat forms within the study sites, giving due consideration to aquatic fauna and flora, and freshwater ecosystems, in particular natural wetlands.
    - Consider seasonal changes and long-term trends, such as due to climate change.
    - Identify any species of conservation concern (SCC) or protected species on site.
    - The assessment is to be based on existing information, national and provincial databases, and professional experience and fieldwork conducted by the Specialist, as considered necessary and in accordance with relevant legislated requirements. The assessment must also consider the maps generated by the National Screening Tool.
    - Identify and assess the potential direct, indirect and cumulative impacts of the proposed development on aquatic biodiversity and species. Impact significance must be rated both without and with mitigation and must cover the construction, operational and decommissioning phases of the project.
    - Identify and delineate wetlands that may occur on the sites, using the relevant protocols established.
    - Compile a Risk Matrix (Appendix A to GN R509 of 2016) and determine if a Water Use License (WUL) is required and if so, determine the requirements thereof.
    - Identify any additional protocols, legal and permit requirements that are relevant to this project and the implications thereof.
    - Provide recommendations with regards to potential monitoring programmes.
    - Determine mitigation and/or management measures, which could be implemented to as far as possible reduce the effect of negative impacts and enhance the effect of positive impacts. Also, identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts. This must be included in the EMPr.
- The Impact Assessment Reports must also be in adherence to any additional relevant legislation and guidelines that may be deemed necessary.

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 17 November 2021 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.

The following techniques and methodologies were utilised to undertake the assessments:

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

2.1 Information Sources

A summary of the main information sources used in this assessment are 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 Sep 2020	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 informati on	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	Spreadsheets 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 during winter, after the summer rainfall period and 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.

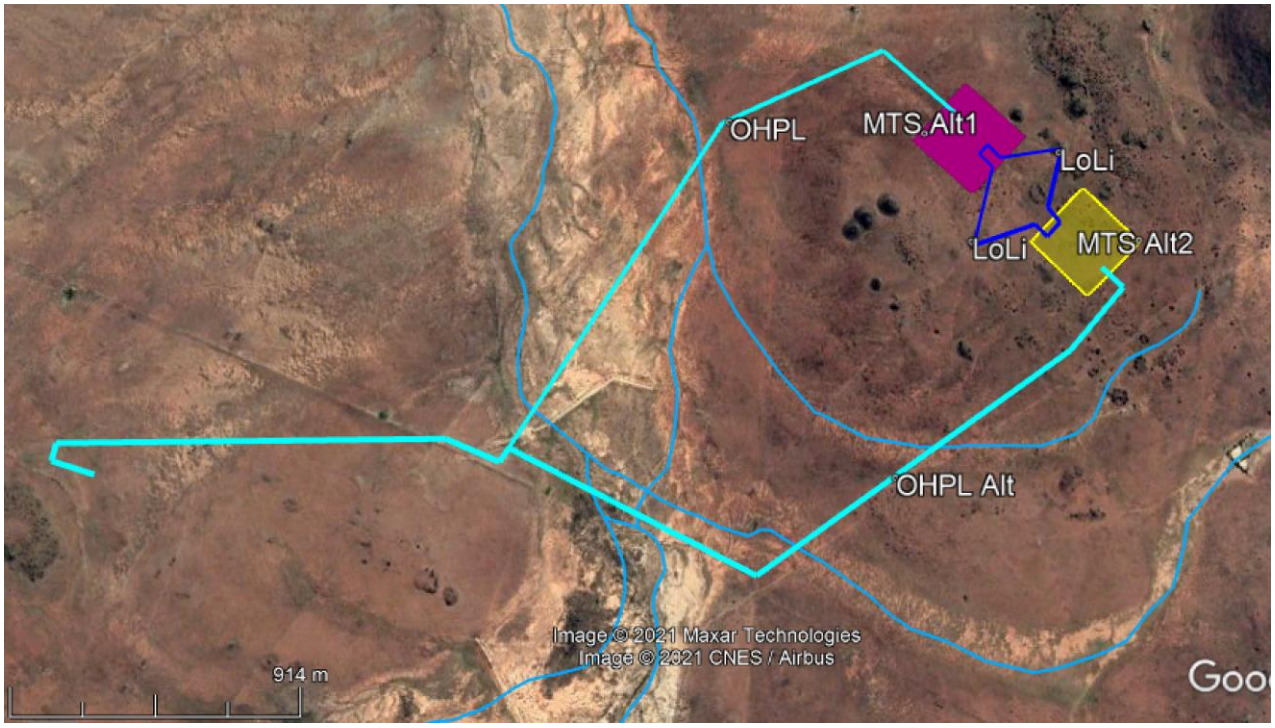

Figure 2. Proposed project elements under consideration in this specialist assessment

The proposed project is envisaged to consist of the following components

- A new 400kV Main Transmission Substation (MTS)
- An overhead powerline (OHPL) connecting Wag 'n Bietjie MTS with the adjacent Vetlaagte MTS
- Loop in Loop Out powerlines (LiLo) connecting the new MTS to an existing 400kV power line
- A 200m corridor was considered for the power lines

There are two proposed locations for the MTS and the associated OHPL and LiLo and powerlines as shown in Figure 2.

4. Baseline Environmental Description

4.1. General Description

The proposed area in which the associated infrastructure for the PV facilities under consideration is to be constructed is located in the Emthanjeni Local Municipality in the Pixley ka Seme District Municipality. The site is located approximately 10 km southeast of De Aar. Smaller towns of Britstown, Philipstown, Hanover and Richmond occur within a 65km radius of De Aar. The area surrounding De Aar includes the town, renewable energy projects that have been constructed or are under construction and farmed 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 and small hilltops 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 1250 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 Ecological Sensitivity	Low	
Location of the Wag 'n Bietjie MTS	30°40'42.9"S	Latitude
	24° 7'22.8"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.

Also, as a result of the low rainfall, 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 occurring 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 brackish with natural electrical conductivity concentrations of between 150 and 370 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* and *Juncus* spp. dominate 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 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 5km to the north of the study area with a larger tributary crossing the eastern extent of the farm, flowing in a northerly direction to join the Brak River. Associated with these larger watercourses are wide floodplains and some depression wetlands. Roads and a few dams have been constructed within the wide floodplains. Erosion control measures have been constructed along the roads due to the high erosion potential in the floodplain. Smaller watercourses and drainage features drain into the larger river corridors.

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 catchments of the tributaries of the Brak River in which the proposed Wag ‘n Bietjie MTS Project are located are mapped as Upstream Management Areas (Figure 3) that are sub-catchments in which human activities need to be managed to prevent degradation of downstream Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas. The FEPA Wetlands within the property are largely artificial wetlands associated with in-channel farm dams and impeded water formed behind erosion prevention structures and are thus not considered of high aquatic biodiversity conservation signficance. All of the above-mentioned wetlands are located more than 600m from the proposed activities and are unlikely to be impacted by the proposed project.

In the 2016 Northern Cape Critical Biodiversity Areas mapping (Figure 4), the entire area within and surrounding the site is mapped as Other Natural Areas. These are natural or semi-natural terrestrial 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, December 2021)

Figure 4. 2016 Northern Cape Critical Biodiversity Areas map for the study area (obtained from SANBI Biodiversity GIS in December 2021)

4.1.6 Aquatic Ecological Integrity

The rivers in the study area comprise unnamed 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 foothill streams within the Nama Karoo Ecoregion. The watercourses and associated wetlands and floodplains are largely natural to moderately condition due to the low level of impact in the area. The watercourses tend to be more disturbed north of De Aar and downstream of the site as a result of the disturbance currently taking place within the area surrounding the town. It is recommended that the larger watercourses, floodplains and wetlands within the site are not allowed to degrade further from their current ecological condition of largely natural to moderately modified.

The larger watercourse channels tend to be shallow and wide, often with an associated floodplain. The substrate comprises a mix of gravel, pebbles and alluvium on the rock outcrops and deeper sands in the valley floors. The associated vegetation 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* rushes (Figure 5). The smaller ephemeral streams and drainage features within the study area do not have a distinct channel or vegetation but rather comprise a wider drainage area (Figure 6).

Figure 5. View of the larger tributary in the south of the property, near Hydra Sub-station with its more significant vegetation that is dominated by *Juncus* spp.

Figure 6. The wide ephemeral drainage feature within the property that contains no distinct channel or vegetation

Impacts to the watercourses in the study area are associated with agricultural encroachment, livestock grazing, 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 wider area surrounding the site is of very high Aquatic Biodiversity Combined Sensitivity (Figure 7). The very high sensitivity is linked to the Strategic Water Source Area for groundwater that has been identified in the wider area, as mentioned in Section 4.1. The proposed project is unlikely to impact the Strategic Water Source Area.

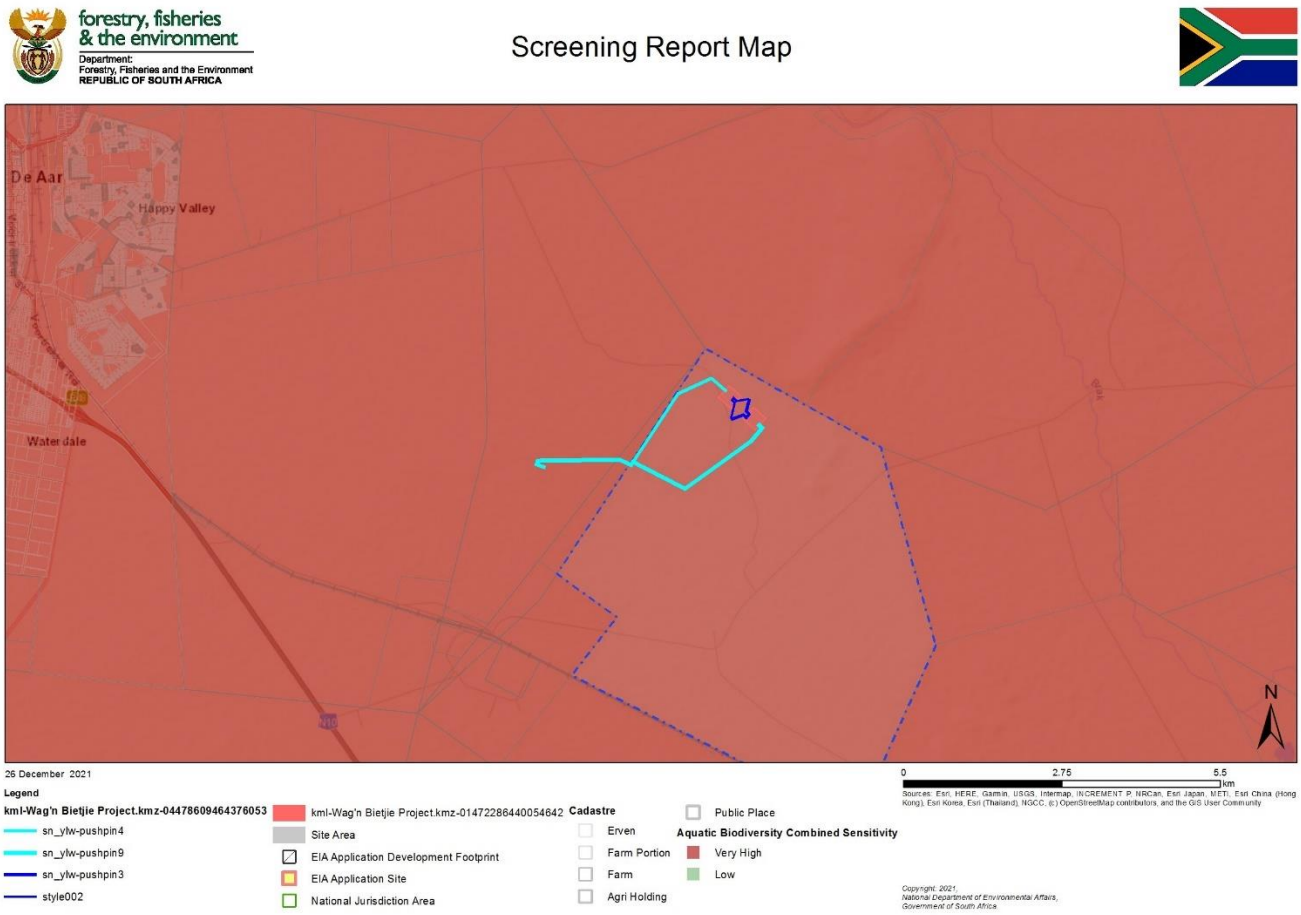

Figure 7. DFFE Screening Tool map of the site and surrounding area, for the mapped Aquatic Biodiversity Combined Sensitivity

4.2.2 Specialist Sensitivity Analysis and Verification

The aquatic constraints of the wider study area are shown below in Figure 8. The larger watercourse and its associated floodplain through the area are deemed to be of moderate aquatic ecological sensitivity. The smaller watercourses and drainage lines that should not pose an aquatic ecosystem constraint to the proposed are considered to be of low sensitivity.

The aquatic ecosystem sensitivity (moderate for the tributary of the Brak River and its floodplain and low for the smaller feeder streams, drainage lines and their floodplains) for each of the project components are discussed in more detail below.

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 tributary: at least 50 m, measured from the top of bank of the river channels
- Smaller streams and drainage features: at least 30 m for the well-defined channels and floodplains, or a corridor of 120 m wide for the poorly defined channels to allow for the movement of water along these streams;

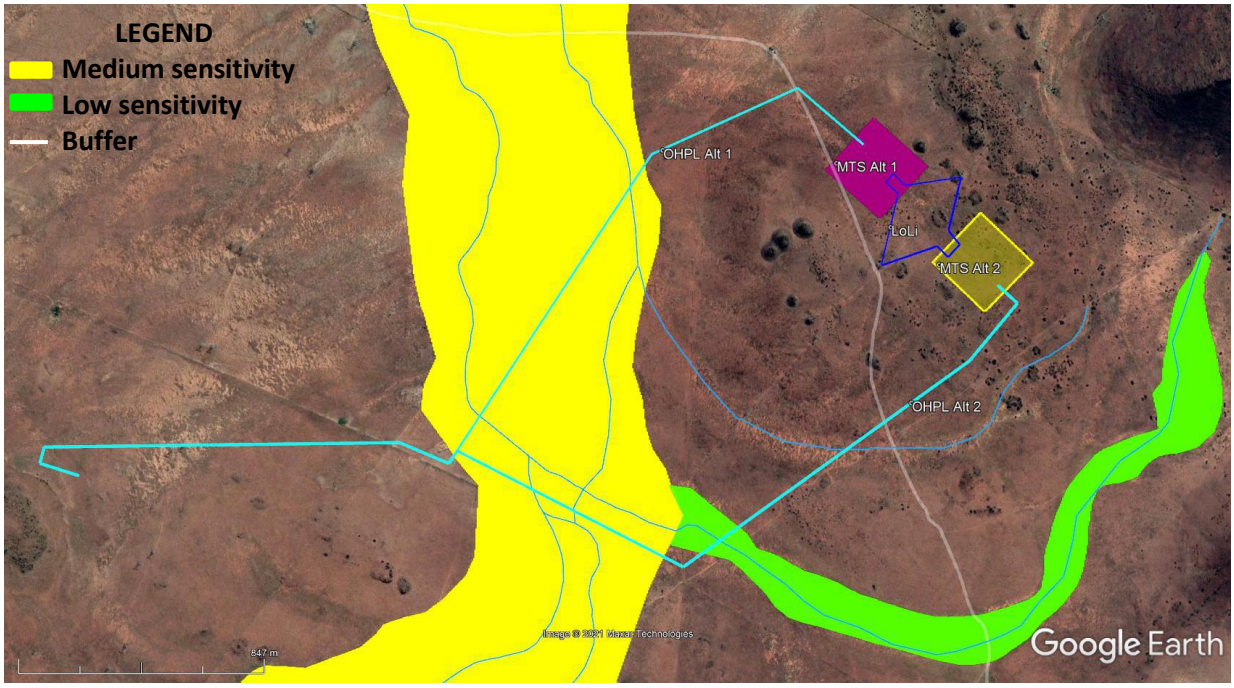

Figure 8. Google Earth image showing the mapped aquatic sensitivities

4.2.2.1 Overhead Powerline connection Alternatives to Vetlaagte MTS

The proposed OHPL (both alternatives) needs to cross the wider floodplain area of a Brak River Tributary that lies to the west of the project activities. The tributary and its associated floodplain are considered of medium ecological sensitivity. A 50 m buffer is recommended as a development setback to the floodplain area. The powerline thus needs to span a corridor of at least 750 m at its narrowest. The proposed crossing of the floodplain for Alternative 1 is approx. 1200m while for Alternative 2 it is about 870 m. A minimum of one pylon will need to be constructed within the corridor. It is recommended that the crossing be placed where there is an existing structure or alternatively the road crossing within the corridor (Figure 9).

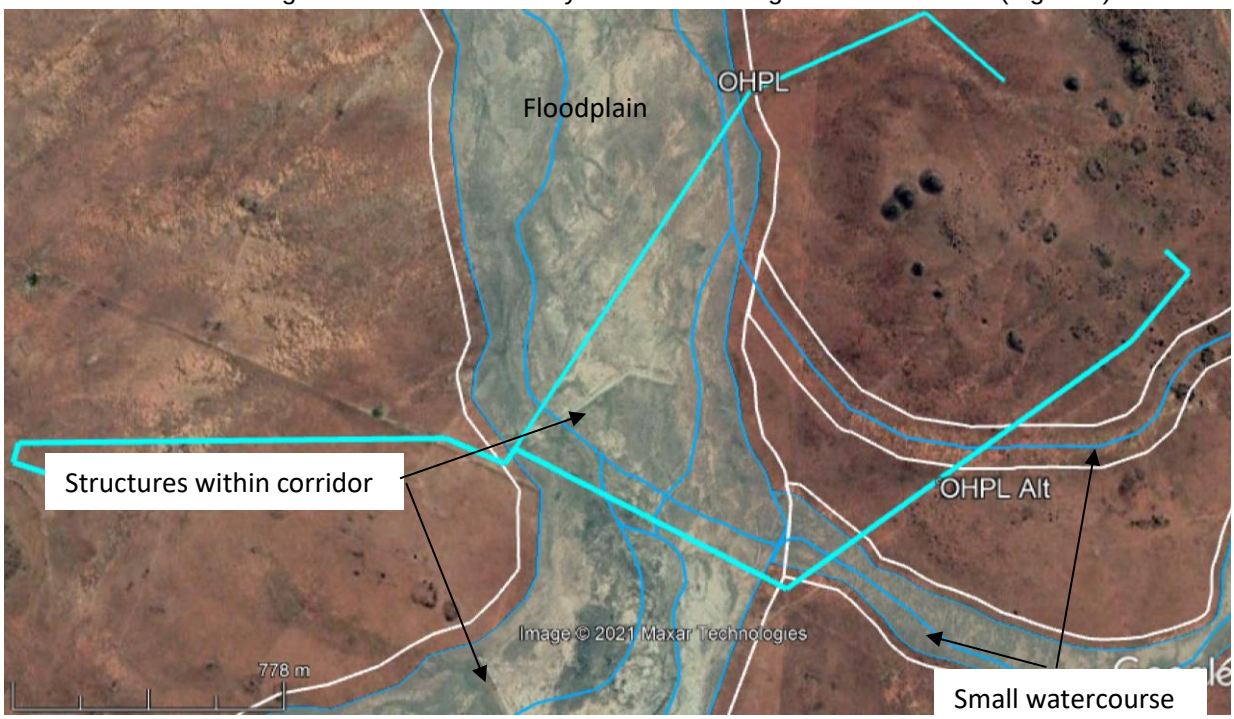

Figure 9. Google Earth image showing the delineated aquatic features and the recommended buffers

A minor watercourse of low ecological sensitivity drains the low hill in the southeastern extent of the project area that exists largely of a wider flat drainage area. The proposed OHPL for Alternative 2 will need to cross this 120 m wide corridor but should be able to span the corridor.

4.2.2.2 LILO power lines and Main Transmission Substation Alternatives

The proposed Loop-in Loop-out power lines and MTS are located outside of the wider floodplain area of a larger Brak River Tributary of medium ecological importance and sensitivity that lies to the west of the project activities (Figure 10). A 50 m buffer is recommended as a development setback to the floodplain area. The smaller tributaries and associated floodplain/drainage areas, considered of low ecological sensitivity, are located to the south of the proposed activities. Minor watercourses of low ecological sensitivity drain the low hill to the southeast of the project activities. The proposed activities will be more than 180 m away from the mapped aquatic ecosystem features and their recommended buffers and are thus unlikely to have any impact on the aquatic features.

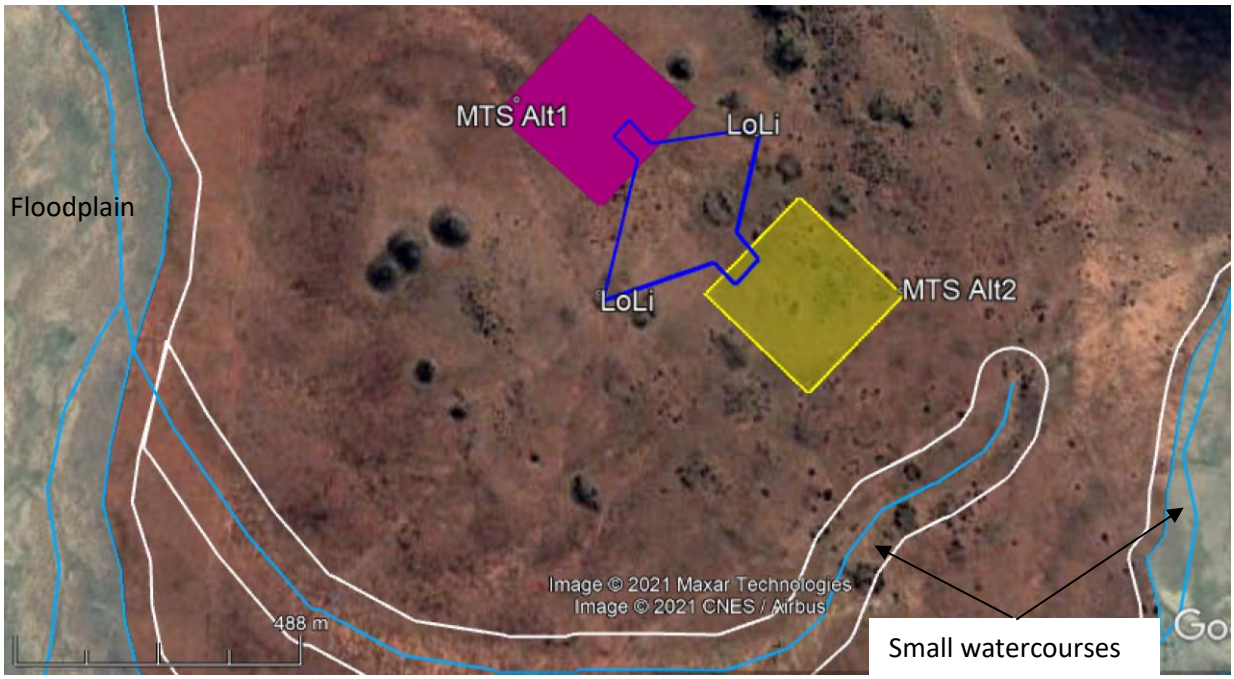

Figure 10. Google Earth image showing the aquatic constraint for LILO powerline and Sub-Station, as well as its alternative, proposed location (the pink block is Alternative 1 and the yellow block is Alternative 2).

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. The proposed activities are however unlikely to impact the SWSA.

5. Issues, Risks and Impacts

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

Construction Phase: **Direct Impacts**: Disturbance of aquatic habitat and associated biota; increased water use and water quality; **Indirect Impacts**: Hydraulic and habitat modification and growth of invasive alien riparian vegetation

Operational Phase: **Direct Impacts:** Aquatic habitat disturbance **Indirect Impacts:** Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality, erosion; and alien vegetation invasion in aquatic features
Decommissioning Phase: **Direct Impacts:** Disturbance of aquatic habitats and water quality impacts.
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. Disturbance of aquatic habitats within the watercourses with the associated impacts to sensitive aquatic biota. During construction activities within watercourses could result in the disturbance or destruction of sensitive habitats and any listed and or protected plant or animal species. The proposed activities are however placed far from any aquatic habitats and no aquatic obligate species were observed on site. 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. No Resource Quality Objectives exist for the watercourses concerned however the proposed activities are unlikely to prevent these objectives from being met.

2. Any removal of indigenous riparian and instream vegetation will reduce the ecological integrity and functionality of the watercourses. Construction works, in particular, could result in the loss of riparian vegetation that provides ecosystem services within the site. This would occur especially where new access roads are required, or road upgrades will widen any current road crossings. The impact would only be very localised at the proposed road crossings and would not impact the wider river reaches of the watercourses. With rehabilitation, this impact could be reduced to a negligible level.

3. Demand for water for construction could place stress on the existing available water resources. During construction, more water is required than during the operation phase to suppress dust and use in concrete batching. This water would be required for a 1–2-year period while construction works are ongoing. Given the limited water availability in the area, it is advised that water be obtained off-site for construction.

4. Alien vegetation infestation within the aquatic features due to disturbance. The current presence of alien vegetation on the site is limited. Sources of alien seed should be prevented from being brought onto the site with imported materials. Monitoring post-construction for the growth of alien vegetation can mitigate this potential impact.

5. Increased sedimentation and risks of contamination of surface water runoff during construction. During construction, the earthworks near watercourses will expose and mobilise soil as well as construction materials and chemicals that may end up in the water resources. Any spills during transport or while works are conducted in proximity to a watercourse also have the potential to affect the surrounding biota. Given the low rainfall in the area, if works are undertaken during the drier periods of the year, this impact would be unlikely.

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 from hardened surfaces that have the potential to result in erosion of hillslopes and watercourses. Limited hardening of surfaces will take place as a result of the proposed projects that may concentrate and convey runoff, with its associated erosion.

3. Any structures within the watercourses associated with the proposed project mustn't 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.

4. Water supply (and possibly sanitation services) may be required for the operation phase. The water could potentially be provided from groundwater without any aquatic ecosystem impacts. This aspect would need to be investigated however boreholes should not be sited within or immediately adjacent to watercourses where they would potentially be impacting the subsurface flow in the watercourses. The baseflow in the watercourse is important in maintaining aquatic vegetation and some aquatic biota. The larger flows in the watercourses are unlikely to be impacted by the proposed project.

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 or a 120m corridor) 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. The proposed activities are all some distance away from the delineated aquatic features.

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

6. Impact Assessment

The potential aquatic biodiversity impacts of the proposed activities are likely to be very low 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 Main Transmission Substation, Loop in Loop out powerlines and the OHPL will require disturbance of the surface area and removal of vegetation cover for clearing and preparation of the various project component footprints at each of the sites. The construction of some of the OHPL pylons will be within the wide floodplain of the Brak River Tributary and will have the largest potential impact for the project but if located within already disturbed areas where there is existing structures or disturbance, the potential impact would be reduced to being of low significance.

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 would likely need to be placed within the site for the construction works. There is thus also the potential for some water quality impacts associated with the batching of concrete, from hydrocarbon spills or associated with the other construction activities on the site.

The location of the substation alternatives and other works are 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 m or a 120 m wide corridor for the smaller drainage features and 50 m adjacent to the larger floodplain and Brak River Tributary and all the proposed project activities should

be maintained. The OHPL will not be able to avoid crossing the corridors and constructing at least one pylon in the floodplain. It is recommended that the crossing be placed where there is an existing structure or alternatively the road crossing within the corridor.

Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. The existing road infrastructure, particularly within the floodplain, should be utilised as far as possible to access new infrastructure to minimise the overall disturbance.

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 such as hydrocarbon spills. Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.

Table 3: Impact table for Overhead Powerline connection Alternatives to Vetlaagte MTS Construction Phase

Impact Description

- ***Disturbance of aquatic habitat; water quality impacts***

Cumulative impact description

- ***Aquatic ecosystem deterioration***

Mitigation

- The recommended buffers of at least 30 and 50 m between the delineated aquatic ecosystems and all the proposed project activities should be maintained. Any works within the aquatic features should be within existing disturbed areas.
- Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers.
- The existing road infrastructure to access new infrastructure should be utilised as far as possible to minimise the overall disturbance.
- 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 such as hydrocarbon spills.
- Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance of aquatic habitat; water quality impacts	Site	Short term	Possible	High	Low	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	~~YES~~	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	~~Medium~~	~~High~~

Table 4: Impact table for the LILO power lines and Main Transmission Substation Alternatives Construction Phase

Impact Description

- ***Disturbance of aquatic habitat; water quality impacts***

Cumulative impact description

- ***Aquatic ecosystem deterioration***

Mitigation

- The recommended buffers of at least 30 and 50 m between the delineated aquatic ecosystems and all the proposed project activities should be maintained.

- Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers.
- The existing road infrastructure to access new infrastructure should be utilised as far as possible to minimise the overall disturbance.
- 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 such as hydrocarbon spills.
- Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Disturbance of aquatic habitat; water quality impacts	Site	Short term	Unlikely	High	Low	None

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	~~YES~~	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	~~Medium~~	~~High~~

6.2 Potential Impacts during the Operational Phase

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

During the operation phase, the solar arrays will operate largely unattended and with low maintenance required for more than 20 years. The hard surfaces created by the development may lead to increased runoff, in particular on surfaces with a steeper gradient. This may lead to increased erosion and sedimentation of the downslope areas. A localised long-term impact (more than 20 years) of low intensity could be expected that would have a very low overall significance post-mitigation in terms of its impact on the identified aquatic ecosystems in the area.

The only potentially toxic or hazardous materials which would be present in relatively small amounts would be lubricating oils and hydraulic and insulating fluids. Therefore, contamination of surface or groundwater or soils is highly unlikely. There is no water consumption impact associated with the operation of the proposed PV infrastructure.

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 run-off infrastructure must be designed to mitigate both the flow and water quality 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 road 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. Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site service provider.

Table 5: Impact table for Overhead Powerline connection Alternatives to Vetlaagte MTS Operation Phase

Impact Description

- ***Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features***

Cumulative impact description

Aquatic ecosystem deterioration

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 run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping with berms, channels and swales.
- Should any erosion features develop, they should be stabilised as soon as possible.
- Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site service provider.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features	Site	Short term	Possible	High	Low	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain		~~YES~~	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	~~Medium~~	~~High~~

Table 6: Impact table for the LILO power lines and Main Transmission Substation Alternatives Operation Phase

Impact Description

- ***Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features***

Cumulative impact description

- ***Aquatic ecosystem deterioration***

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 run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping with berms, channels or swales.
- Should any erosion features develop, they should be stabilised as soon as possible.
- Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site service provider.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features	Site	Short term	Unlikely	High	Low	None

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain		~~YES~~	NO
Cumulative impact rating (*after* mitigation) If high, please explain	Low	~~Medium~~	~~High~~

6.3 Consideration of Alternatives

An alternative location is provided for the MTS that is located approximately 450m to the east of the preferred site (shown in Figure 10). This is closer to the wide corridor of the Brak River Tributary but is still about 300 m outside of the recommended 50 m buffer for the corridor. From an aquatic ecosystem perspective, there would be little difference in the potential aquatics ecosystem impacts for either site alternative and the recommended mitigation measures would remain the same.

7. Scoping Level Impact Assessment Summary

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

Table 7: Overall Impact Significance (Post Mitigation)

Phase	**Overall Impact Significance**
Construction	Low
Operational	Low
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 to which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the 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. The risk of the proposed development altering the ecological integrity of the adjacent aquatic ecosystems, if mitigated as recommended, is likely to be low such that the associated water use activities in terms of Section 21 c (impeding or diverting flow in a watercourse) or Section 21 i (changing the bed, banks, course or characteristics of a watercourse) would fall within the ambit of the General Authorisations.

A risk assessment, summarised in Table 8, 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 8. A summary of the risk assessment for the proposed development

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Construction	Construction of a limited number of pylons within already disturbed areas on the floodplain of a tributary of the Brak River	Accessing pylon site; 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	Maintenance of pylons within floodplain	Disturbance associated with accessing pylons and maintenance works; altered hydraulics at pylon	Disturbance of aquatic habitat; modified flow dynamics and soil movement	**36**	**L**

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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: 28 December 2021

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	17 November 2021
Specialist Name	Toni Belcher
Professional Registration Number	400040/10
Specialist Affiliation / Company	BlueScience (Pty) Ltd

The proposed site for the **Wag 'n Bietjie MTS Project** 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 17 November 2021. 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:

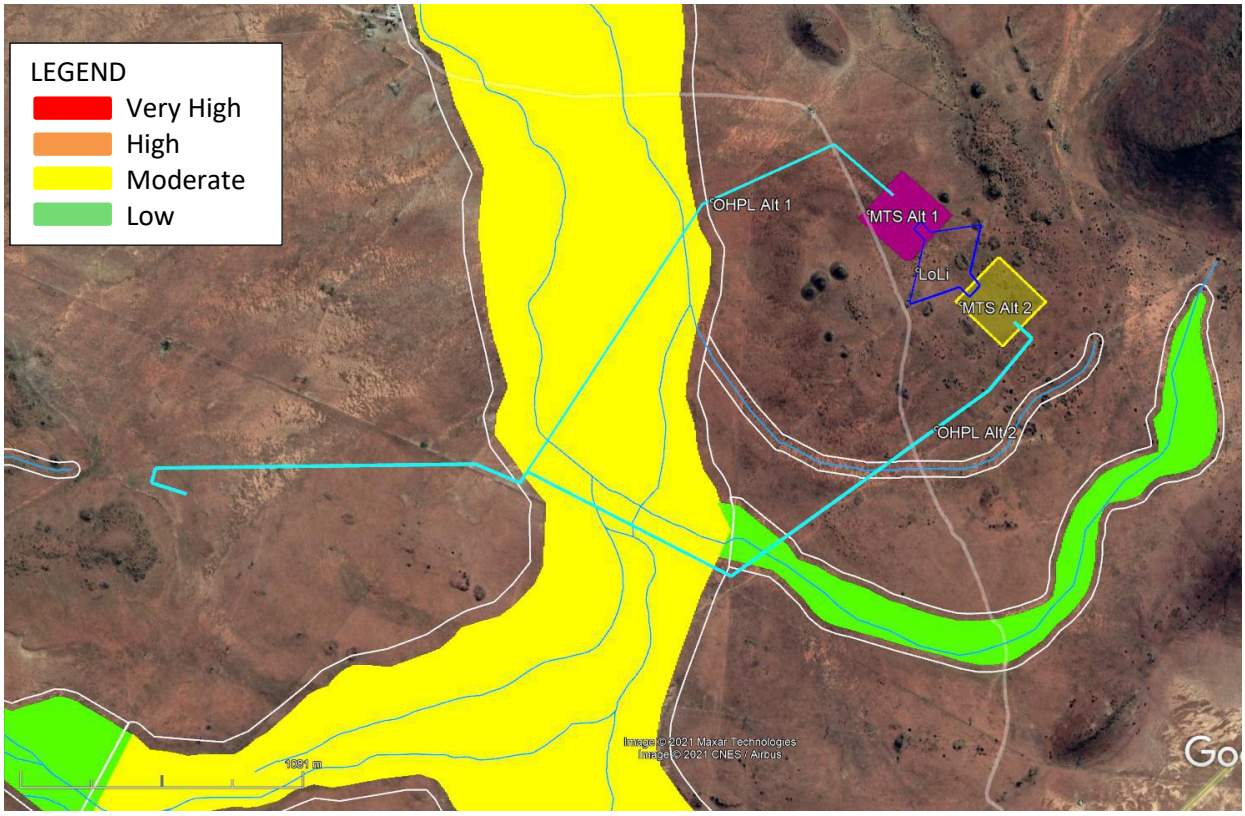
- The guideline document, "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas" document, as published by DWAF (2005) was followed for the delineation of the aquatic habitats;
- The present ecological condition of the watercourses was determined using the 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 associated with the Wag 'n Bietjie MTS Project comprise ephemeral unnamed tributaries of the Brak River. Associated with the larger tributary is a wider floodplain. Some smaller watercourses drain into the larger river corridor. The rivers can all be characterised as foothill streams within the Nama Karoo Ecoregion. The watercourses and associated floodplains are in largely natural to moderately condition due to the low level of impact in the area. It is recommended that the larger watercourse and floodplain within the site are not allowed to degrade further from their current ecological condition of largely natural to moderately modified.

Impacts to the watercourses in the study area are associated with agricultural encroachment, livestock grazing, 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.

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

Areas that occurs in the wider De Aar area. The proposed project is unlikely to impact the Strategic Water Source Area.



Google Earth image with the Aquatic Ecosystem Sensitivity mapping where the green area indicates low sensitivity and the yellow the moderate sensitivity areas

Appendix D: Impact Assessment Methodology

Impacts are evaluated and assessed in terms of the following criteria:

Extent of impact	***Explanation of extent***
Site	*Impacts limited to construction site and direct surrounding area*
Local	*Impacts affecting environmental elements within the local area / district*
Regional	*Impacts affecting environmental elements within the province*
National	*Impacts affecting environmental elements on a national level*

Duration of impact	***Explanation of duration***
Short term	*0 - 5 years. The impact is reversible in less than 5 years.*
Medium term	*5 - 15 years. The impact is reversible in less than 15 years.*
Long term	*>15 years, but where the impacts will cease if the project is decommissioned*
Permanent	*The impact will continue indefinitely and is irreversible.*

Probability of impact	***Explanation of Probability***
Unlikely	*The chance of the impact occurring is extremely low*
Possible	*The impact may occur*
Probable	*The impact will very likely occur*
Definite	*Impact will certainly occur*

Reversibility of impact	***Explanation of Reversibility Ratings***
Low	*The affected environment will not be able to recover from the impact - permanently modified*
Medium	*The affected environment will only recover from the impact with significant intervention*
High	*The affected environmental will be able to recover from the impact*

Significance of impact	***Explanation of Significance***
None	*There is no impact at all*
Low	*Impact is negligible or is of a low order and is likely to have little real effect*
Moderate	*Impact is real but not substantial*
High	*Impact is substantial*
Very high	*Impact is very high and can therefore influence the viability of the project*