



SCIENTIFIC AQUATIC SERVICES

AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

**FOR THE PROPOSED SOLAR PLANT FACILITY
FOR BLACK ROCK MINE, NEAR HOTAZEL,
NORTHERN CAPE PROVINCE.**

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EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) (Pty) Ltd. was appointed by Environmental Science Associated (Pty) Ltd (the Environmental Assessment Practitioner (EAP) on the project) to prepare an aquatic biodiversity compliance statement. This aquatic biodiversity compliance statement was prepared as part of the requirements for the Environmental Authorisation process, for the proposed Black Rock Solar Plant Facility, near Hotazel, Northern Cape Province. The Black Rock Solar Project consists of the Overhead Powerline (OHPL), Access Road, Proposed Substation and two solar project areas (e.g., western and eastern) collectively the layout will be referred to as the “study area”.

Following on from desk-based investigation of possible freshwater features in the study area and investigation area (defined as a 500 m radius around the study area, in line with GN 509 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended), a field assessment was undertaken between the 31st of October and 4th of November 2022 to verify the presence of freshwater features associated with the study area. It was confirmed that only the Ga-mogara river freshwater ecosystem traverses the OHPL, but no other freshwater ecosystems occur in the study and investigation area of the solar facility.

The Department of Forestry, Fisheries and Environment (DFFE) National Web-based Environmental Screening Tool (2020), provides the criteria for the assessment and reporting of impacts on aquatic/freshwater biodiversity for activities requiring EA. The DFFE Web-based Environmental Screening Tool has designated the majority of the study area as being of low aquatic biodiversity sensitivity. Accordingly, an Aquatic Biodiversity Compliance Statement has been compiled.

Based on the outcome of the DWS approved Risk Assessment Matrix and provided that all mitigation measures in this report are adhered to throughout the life of the proposed development, in particular that the supporting structures are placed outside the freshwater ecosystem boundaries, the activities associated with the construction and operation of the proposed OHPL pose a “Low” risk significance to the freshwater ecosystems within the study and investigation areas and no risk to the solar facility and associated infrastructure, as no freshwater ecosystems were present within the investigation area of the solar facility. All mitigation measures as stipulated in Section 6 and Appendix F of this report, must be implemented to prevent any edge effects and cumulative impacts from occurring on the freshwater ecosystems within the study and investigation areas.



GLOSSARY OF TERMS

Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Alluvial Material / deposits	Sedimentary deposits resulting from the action of rivers, including those deposited within river channels, floodplains, etc.
Anaerobic	The absence of molecular oxygen.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flow into a river, wetland, lake, and ocean or contributes to the groundwater system.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation, and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Hydromorphy	A process of gleying and mottling resulting from intermittent or permanent presence of free water in soil. Results in hydromorphic soils.
Landtype	Distinct areas defined as part of the Land Type Survey of South Africa based on a unique combination of soil pattern, macroclimate and terrain form.
Reach	A longitudinal stretch of a river, wetland or watercourse
Riparian Area /Zone	The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas
Temporary zone of wetness:	The outer zone of a wetland characterised by saturation within 50 cm of the surface for less than three months of the year.
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional contexts, such as geology, climate, and soil, which may, in turn, influence the ecological characteristics and functioning of wetlands.



ACRONYMS

°C	Degrees Celsius.
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
CSIR	Council of Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and Environment
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Program
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
HGM	Hydrogeomorphic
m	Meter
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NBA	National Biodiversity Assessment
NWA	National Water Act
PES	Present Ecological State
REC	Recommended Ecological Category
RMO	Resource Management Objective
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services
subWMA	Sub-Water Management Area
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas



DOCUMENT GUIDE

Table 1 below provides the specialist report requirements for the assessment and reporting of impacts to the aquatic biodiversity in terms of Government Notice 320 as promulgated in Government Gazette 43110 of 20 March 2020 in line with the Department of Environmental Affairs screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA). It is important to note that the aquatic biodiversity theme replaces Appendix 6 of NEMA.

Table A: Specialist report requirements for the assessment and reporting of impacts to the aquatic biodiversity

No.	Requirements	Section in Report
3.1	The compliance statement must be prepared by a suitably qualified specialist registered with the SACNASP, with expertise in the field of aquatic sciences.	Appendix G
3.2	The compliance statement must:	-
3.2.1	be applicable to the preferred site and the proposed development footprint;	Section 1, 2, 6
3.2.2	confirm that the site is of "low" sensitivity for aquatic biodiversity; and	Section 4
3.2.3	indicate whether or not the proposed development will have an impact on the aquatic features.	Section 8
3.3	The compliance statement must contain, as a minimum, the following information:	-
3.3.1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix G
3.3.2	a signed statement of independence by the specialist;	Appendix G
3.3.3	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 3, 6
3.3.4	a baseline profile description of biodiversity and ecosystems of the site;	Section 5
3.3.5	the methodology used to verify the sensitivities of the aquatic biodiversity features on the site including the equipment and modelling used where relevant;	Section 3
3.3.6	in the case of a linear activity, confirmation from the aquatic biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;	N/A
3.3.7	where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	N/A
3.3.8	a description of the assumptions made as well as any uncertainties or gaps in knowledge or data; and	Section 1
3.3.9	any conditions to which this statement is subjected.	Section 8
3.4	A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP to ensure this requirement is met.



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1. INTRODUCTION AND BACKGROUND SETTING

Scientific Aquatic Services (SAS) (Pty) Ltd. was appointed by Environmental Science Associated (Pty) Ltd (the Environmental Assessment Practitioner (EAP) on the project) to prepare an aquatic biodiversity assessment. This aquatic biodiversity compliance statement was prepared as part of the requirements for the Environmental Authorisation process, for the proposed Black Rock Solar Plant Facility, near Hotazel, Northern Cape Province. The Black Rock Solar Project consists of the Overhead Powerline (OHPL), Access Road, Proposed Substation and two solar project areas (i.e., western and eastern). Collectively the layout will be referred to as the “study area”.

The study area is located on the Remaining Extent of Farm Kipling 271, approximately 1.5 km north west from the nearest Hotazel infrastructure, and approximately 2.5km from centre to centre from the Hotazel town. The study area falls within the jurisdiction of the John Taolo Gaetsewe District Municipality, and the Joe Morolong Local Municipality. The extent and layout of the study area is illustrated in Figures 1 – 3.

A 500 m “zone of investigation” around the study area, (in accordance with General Notice (GN) 509 of 2016 (as it relates to the National Water Act (Act No. 36 of 1998) as amended), was generated to determine potential risks to possible freshwater ecosystems associated with the study area. This will henceforth be referred to as the “investigation area” (Figures 1 and 2).

1.1 Assumptions and limitations

The following assumptions and limitations are applicable to this verification report:

- It is assumed that all third-party information used (e.g., GIS data and satellite imagery) is correct at the time of generating this report;
- The survey was restricted to a single site visit (mid-summer), but due to the characteristics of the study area, undertaking additional surveys for the purposes of this compliance statement is not considered necessary; and
- Access to the study area was not restricted and data collected during the field survey is deemed adequate for the purposes of this report.
- This aquatic compliance statement has been prepared for the proposed OHPL and Solar facility and associated infrastructure.



2. PROJECT DESCRIPTION

The proponent Assmang (Pty) Ltd mines manganese ore in the Black Rock area of the Kalahari, in the Northern Cape Province. The ore is mined from the Kalahari Manganese field. The Black Rock Mine (BRM) are approximately 60 km north-west of the town of Kuruman, near the town of Hotazel. Escience Associates (Pty) Ltd, referred to as EScience from here on, has been appointed to assist BRM with environmental permitting requirements for a proposed Solar Photovoltaics (PV) Facility, and associated infrastructure.

The proposed facility will provide power to BRM's operations and will have a maximum generating capacity of 100 MW. The project will be built in phases with the first phase being 44 MW, which will include:

- A solar PV plant;
- Two substations and electrical distribution infrastructure; and
- Battery storage facilities.

Future phases will be scheduled as applicable after completion and commissioning of the first phase.

The proposed solar facility is to be located on the Remaining Extent of Farm Kipling 271 and will have a development footprint of approximately 450 ha in extent, with additional infrastructure for distributing the electricity to the BRM's operations. This infrastructure will tie in to BRM's existing infrastructure. BRM is the owner of all the properties on which the proposed project will occur. Although overhead distribution will span the Ga-Mogara River, there will be no physical construction or activities within the flood plain of the river or a 32 m buffer measured from the edge of the river. The climate, relief, the size of the affected property, and the availability of land for the development, are favourable for the establishment of a solar facility.

3. ASSESSMENT APPROACH

- The desktop assessment, as presented in Section 5, reports on the findings from the relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA], 2011 database; The National Wetland Map 5 (2018) and the Northern Cape Critical Biodiversity Areas Database (2016)) which was undertaken to aid in identifying freshwater ecosystems;



- The national web based Environmental Screening Tool (DEA, 2020) was utilised to screen the study area and investigation area for any environmental sensitivity, with specific focus on aquatic biodiversity sensitivities. The results are presented in Section 4;
- Section 5 reports on the results of the desktop survey, whilst Section 6 reports on the outcome of the site investigation; and
- Section 7 provides a summary of the applicable legislative conditions that may be applicable.

3.1 Freshwater Definition

The NWA is aimed at the protection of the country's water resources, defined in the Act as:

“a watercourse, surface water, estuary or aquifer”

According to the NWA a watercourse means:

- (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 may, by notice in the Gazette, declare a watercourse.*

A 'Watercourse' as per the definition of the NWA, is referred to in this report as a "freshwater ecosystem"

The NWA further provides definitions of wetland and riparian habitats as follows:

Wetland habitat is "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."

Another widely used definition of wetlands is the one used under the **Ramsar Convention**; wetlands are defined as:

“areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres”

However, the presence / absence of hydric soils is the primary determining factor used to define a freshwater feature as a wetland.



This determining factor has been utilised in this assessment. Wetland soils can be termed hydric or hydromorphic soils. **Hydric soils** are defined by the United States Department of Agriculture's Natural Resources Conservation Service as being:

“soils that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part”.

These anaerobic conditions would typically support the growth of hydrophytic vegetation (vegetation adapted to grow in soils that are saturated and starved of oxygen) and are typified by the presence of redoximorphic features.

Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent area.

3.2 Freshwater Ecosystem Site Verification

Verification of potential freshwater ecosystems took place according to the method presented in the “Updated manual for the identification and delineation of wetland and riparian resources” (DWAF, 2008). The foundation of the method is based on the fact that freshwater features have several distinguishing factors including the following:

- Landscape position;
- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils;
- Vegetation adapted to saturated soils; and
- The presence of alluvial soils in stream systems.

A field assessment was undertaken between the 31st of October and the 4th of November 2022 (mid-summer) during which the presence of any riparian or wetland characteristics as defined by DWAF (2008) and by the NWA, was investigated (please refer to Section 6 of this report).



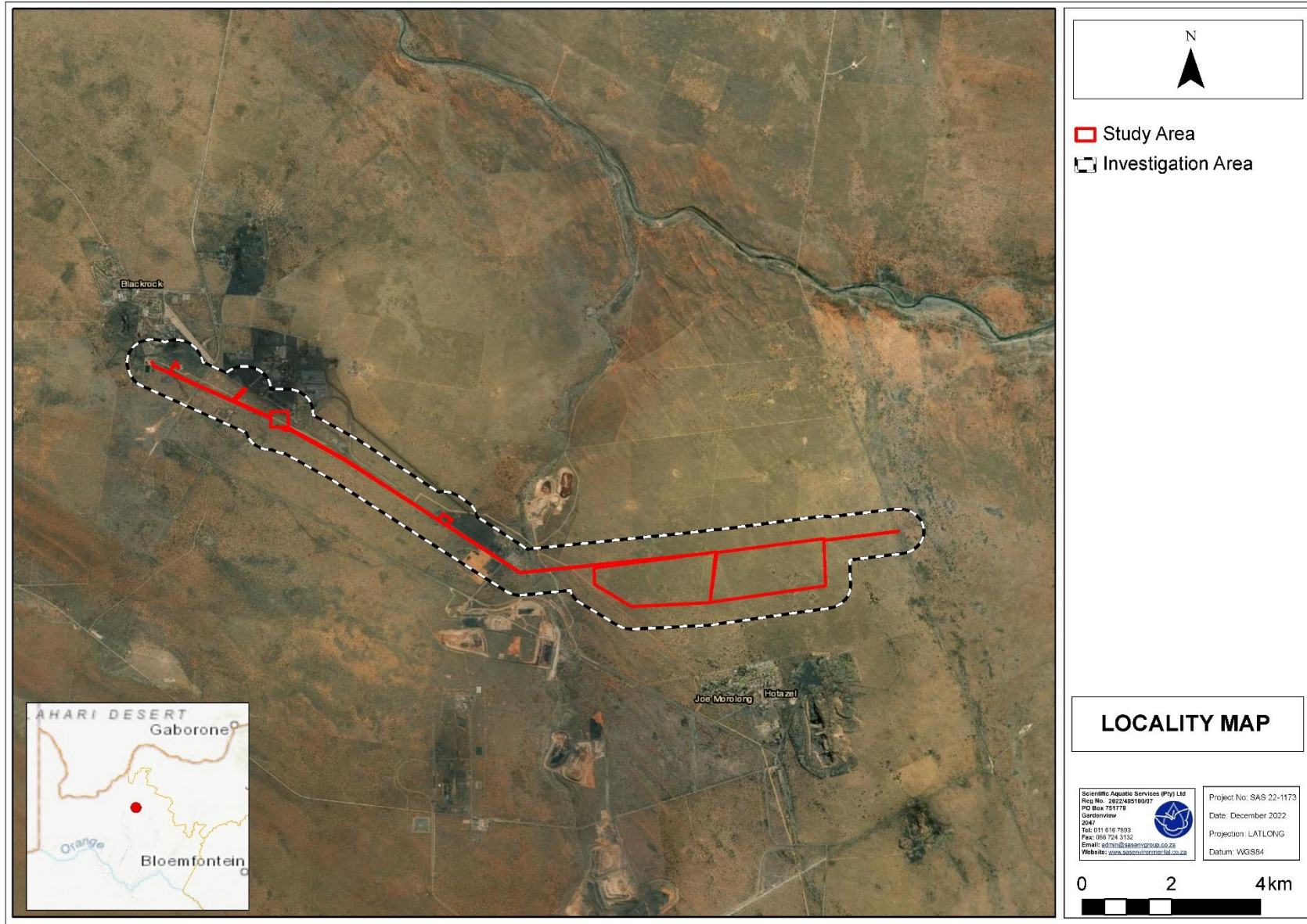


Figure 1: Digital satellite image depicting the study and investigation area in relation to the surrounding area.



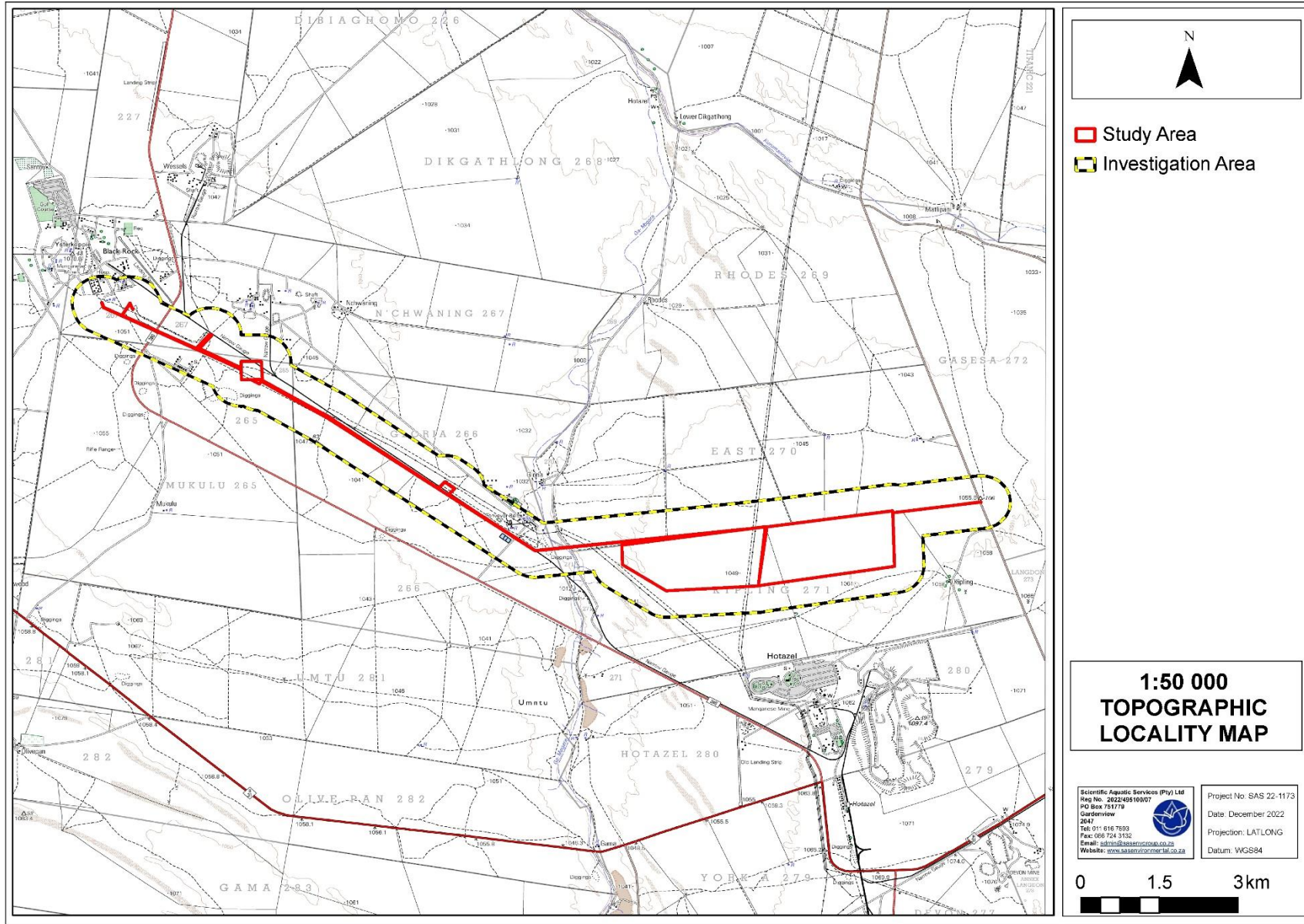


Figure 2: Location of the study and investigation area depicted on a 1:50 000 topographical map, in relation to surrounding area.



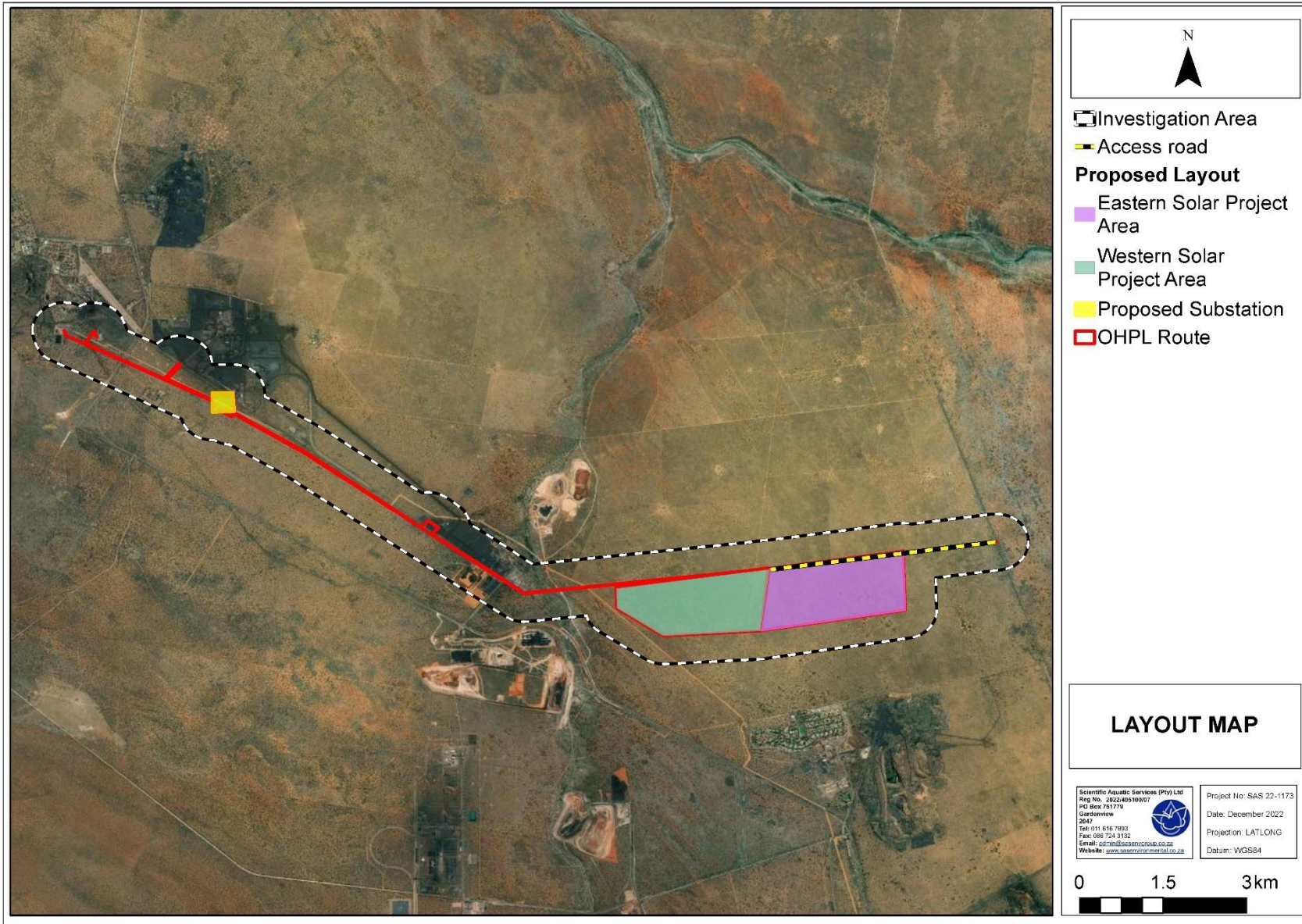


Figure 3: Layout of the proposed infrastructure in relation to the surrounding areas.



4. APPLICATION OF THE DEPARTMENT OF FORESTRY, FISHERIES AND ENVIRONMENT (DFFE) WEB-BASED ENVIRONMENTAL SCREENING TOOL

The protocol for the assessment of freshwater and aquatic biodiversity prepared in support of the Department of Forestry, Fisheries and Environment (DFFE) (previously the Department of Environmental Affairs (DEA)) National Web-based Environmental Screening Tool (2020), provides the criteria for the assessment and reporting of impacts on aquatic/freshwater biodiversity for activities requiring Environmental Authorisation (EA). For the aquatic biodiversity (freshwater) theme, the requirements are for sites which support various levels of biodiversity. The relevant aquatic / freshwater biodiversity theme in the National Web-based Environmental Screening Tool (2020) has been provided by the South African National Biodiversity Institute (SANBI). Based on the sensitivity rating, a suitably qualified specialist must prepare the relevant report or opinion memorandum which is to be submitted as part of the EA application.

As part of the process of the background information gathering, the DFFE Screening Tool was applied to the study and investigation areas. According to the guidelines, an applicant intending to undertake an activity on a site identified as being of “very high sensitivity” for an aquatic biodiversity theme must submit an Aquatic Biodiversity Impact Assessment, or if the area is identified as being of “low sensitivity” then an Aquatic Biodiversity Compliance Statement must be compiled and submitted to the competent authority. It is noted, however, that if during a site survey undertaken by a suitably qualified freshwater ecologist, the sensitivity is determined to be different from that assigned by the screening tool (i.e. that a high risk to the regional aquatic biodiversity or freshwater ecosystems in the area is likely even though it is assigned as a “low” sensitivity, or if it is assigned a high sensitivity, however, the proposed development risks are deemed low) then the relevant assessment approach must be followed based on the site survey results and not the DFFE Screening Tool allocation.

The DFFE Web-based Environmental Screening Tool indicates that the majority of the study area is classified as an area of ‘low’ aquatic biodiversity sensitivity (Figure 4). A small north-western section of the study area is classified as an area of ‘very high’ sensitivity due to the presence of Freshwater Ecosystem Priority Areas (FEPA’s).



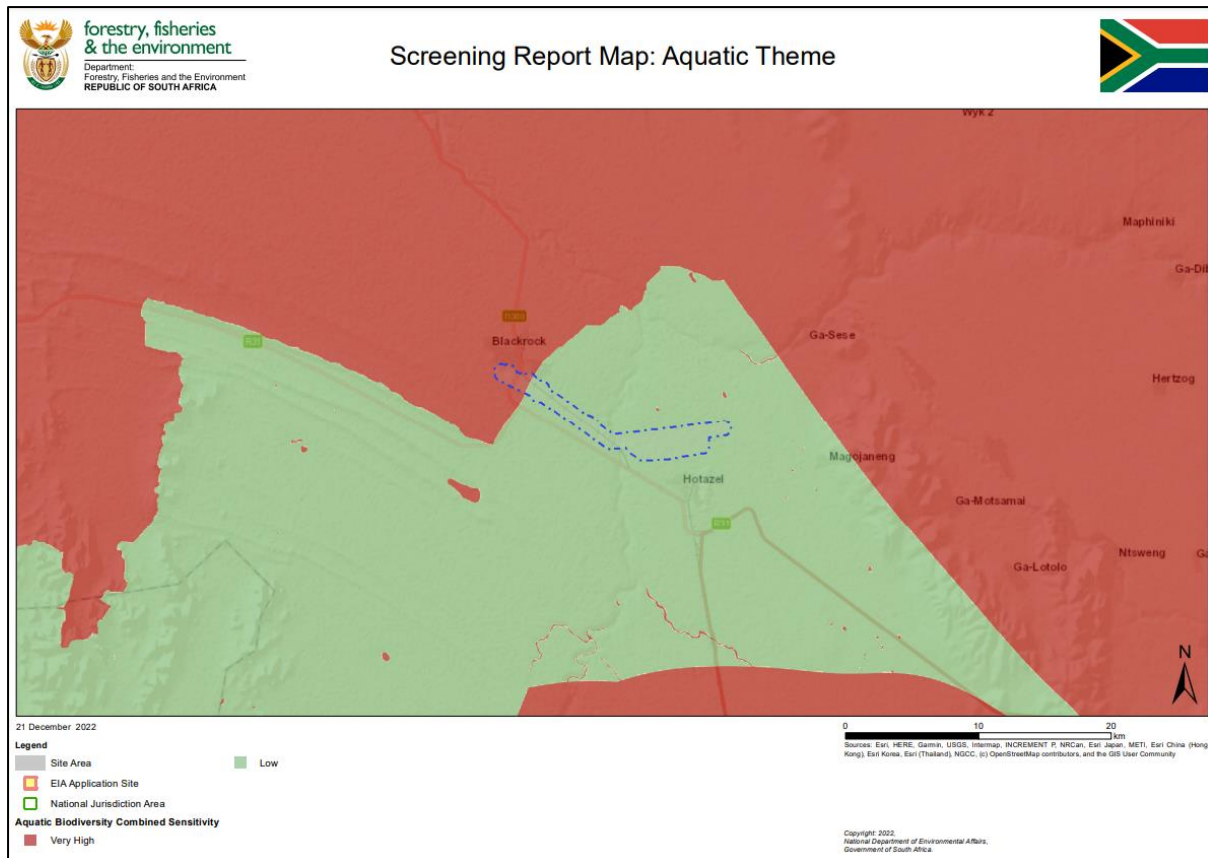


Figure 4: The Screening Tool image snippet depicting the low aquatic sensitivity associated with the investigation area in relation to the surrounding area.

5. DESKTOP INVESTIGATION FINDINGS

A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; The National Wetland Map 5 (2018), the Northern Cape Critical Biodiversity Areas (2016) was undertaken to aid in defining presence of any freshwater ecosystems prior to the site survey of the study area (see Table 1) as well as the associated 500 m investigation area. The results are summarised in the dashboard and relevant maps below.

The results are summarised in the dashboard below.



Table 1: Desktop data relating to the characteristics of the freshwater ecosystems / features associated with the study and investigation area.

Aquatic ecoregion and sub-regions		Detail in terms of the National Freshwater Ecosystem Priority Area (NFEPA, 2011) database	
Ecoregion	Southern Kalahari	FEPACODE (Figure 6)	A small north-western section of the study area is classified as a freshwater ecosystem priority area (FEPACODE = 1). River Freshwater Ecosystem Priority Area (FEPA) achieves biodiversity targets for river ecosystems and threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, shading of the whole sub-quaternary catchment reach indicate that that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition of the river reach. The majority of the study and investigation area is situated within a SubWMA considered an upstream management area (FEPACODE = 4), required to prevent the downstream degradation of FEPAS and Fish Support Areas.
Catchment	Orange		
Quaternary Catchment (Figure 5)	D41K; D41L; D41M		
WMA	Lower Vaal		
subWMA	Molopo		
Dominant characteristics of the Southern Kalahari (29.01) Aquatic Ecoregion Level 2 (Kleynhans <i>et al.</i> , 2007)		NFEPA Wetlands (Figure 7)	According to the NFEPA database (2011) there are no natural wetland features located within the study or investigation area. One artificial "unchanneled valley bottom wetland" is indicated
Dominant primary terrain morphology	Plains; moderate relief, Closed Hills, mountains; moderate and high relief.	Wetland Vegetation Type (Figure 8)	The majority of the study and investigation area is situated within the Eastern Kalahari Bushveld Group 1 and the remaining eastern portion falls within the Kalahari Duneveld vegetation type, considered Least Threatened according to Mbona <i>et al.</i> (2015).
Dominant primary vegetation types	Karroid Kalahari Bushveld, Kalahari Mountain Bushveld, Kalahari Plateau Bushveld	NFEPA Rivers (Figure 7)	According to the NFEPA Database the Ga-Mogara River traverses the central portion of the study area. According to the PES 1999 Classification and the NFEPA Database, the Ga-Mogara River is considered largely natural (Class B) and an upstream management river and is moderately modified (Class C) according to the NFEPA Database.
Altitude (m a.m.s.l)	700 - 1500		
MAP (mm)	0 - 500	Details in terms of the Northern Cape Critical Biodiversity Areas (2016) (Figure 9)	
The coefficient of Variation (% of the MAP)	30 - 40		
Rainfall concentration index	60 - >65	Ecological Support Area (ESA)	The portion of the study and investigation area associated with the Ga-Mogara River is classified as an Ecological Support Area. ESAs are areas which must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or Species of special concern when it is not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017).
Rainfall seasonality	Late Summer		
Mean annual temp. (°C)	16 - 22	Other Natural Area	The majority of the study and investigation area falls within an area classified as "Other Natural Areas (ONA)". ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).
Winter temperature (July)	0 - 22		
Summer temperature (Feb)	16 - >32	Detail in terms of the Mining and Biodiversity Guidelines (2013)	
Median annual simulated runoff (mm)	<5 - 40		
National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (including National Wetland Map 5 information) (Figure 10)		According to the mining and biodiversity guidelines the mining right area is currently situated within an area that is not ranked.	
According to the NBA (2018): SAIIAE there are no natural wetlands associated with the study or investigation area. The Ga-Mogara river crosses the central portion of the study area. According to the NBA Dataset the Ga-Mogara River is moderately modified (Class C), it is currently not protected (Ecosystem Protection Level) and therefore critically endangered (Ecosystem Threat Status).			
National Web Based Environmental Screening Tool (2020) (Figure 4)		Detail in terms of the Mining and Biodiversity Guidelines (2013)	
The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. According to the screening tool the overall aquatic sensitivity of the study area is low . A small north-western section of the study area is classified as an area of 'very high' sensitivity due to the presence of Freshwater Ecosystem Priority Areas (FEPA's).			

CBA = Critical Biodiversity Area; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; EPL = Ecosystem Protection Level; ESA = Ecological Support Area; ETS = Ecosystem Threat Status; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; PES = Present Ecological State; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area



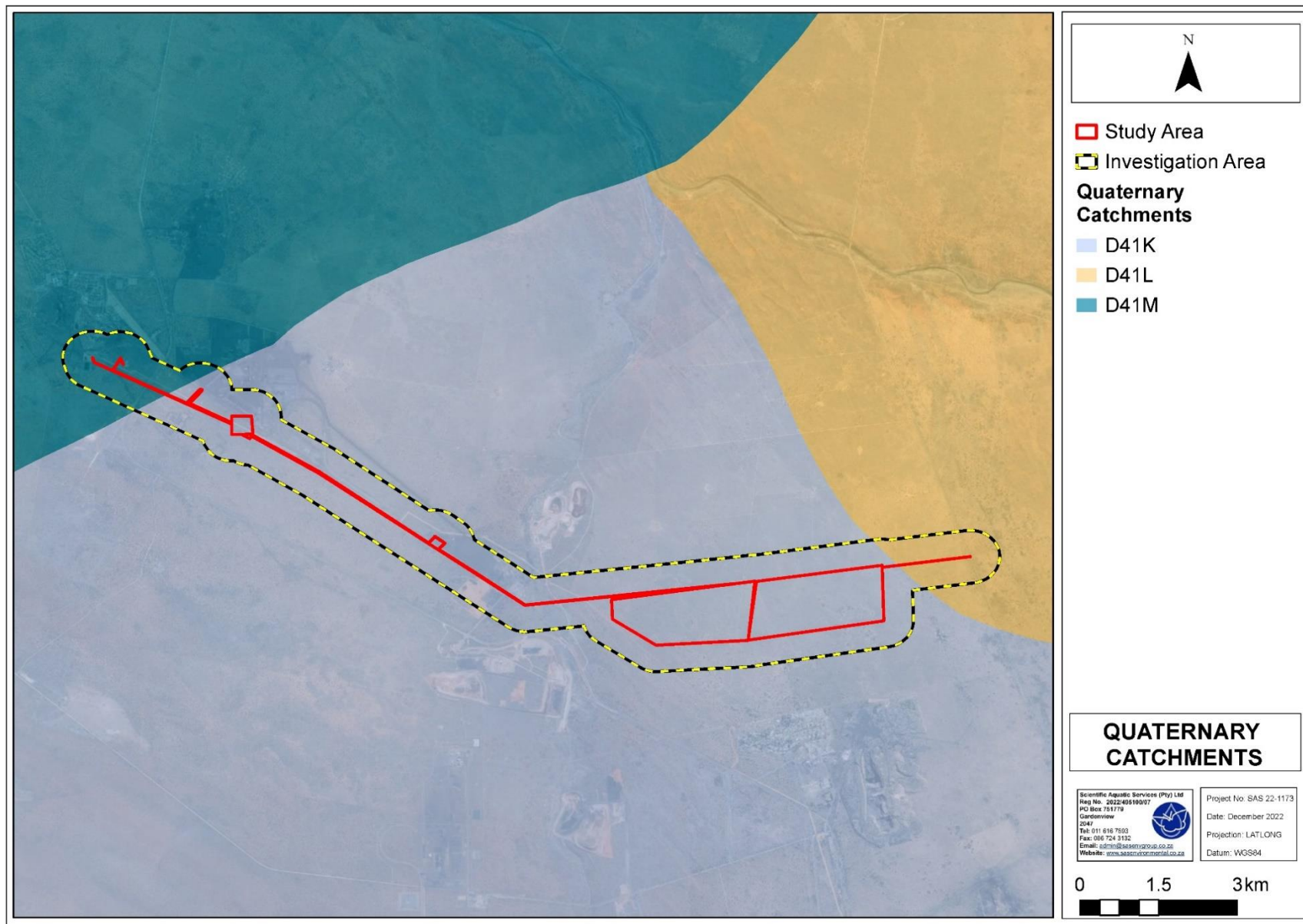


Figure 5: The quaternary catchments associated with the study and investigation area.



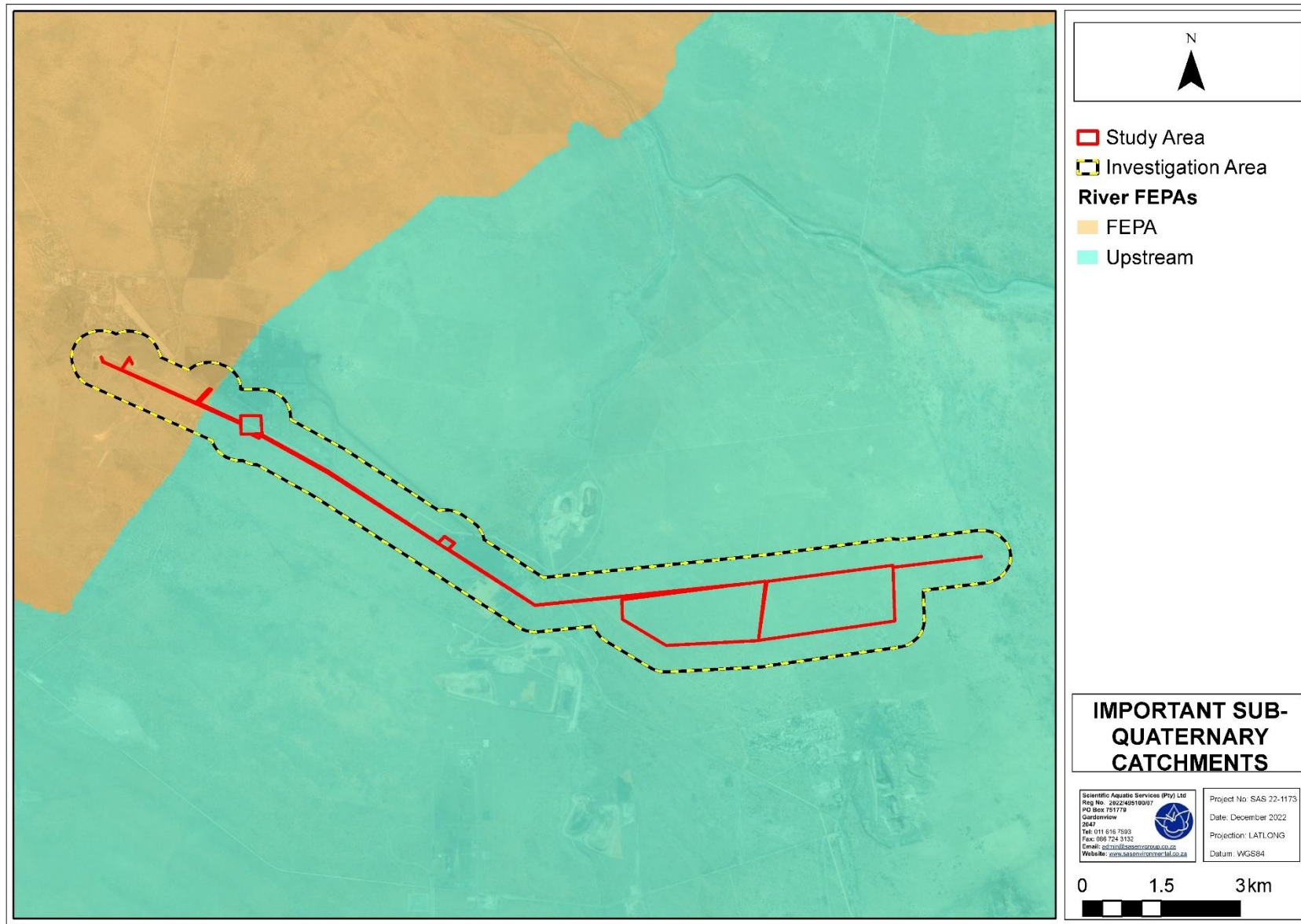


Figure 6: Important sub-quaternary catchments associated with the study and investigation area according to the NFEPA (2011) database.



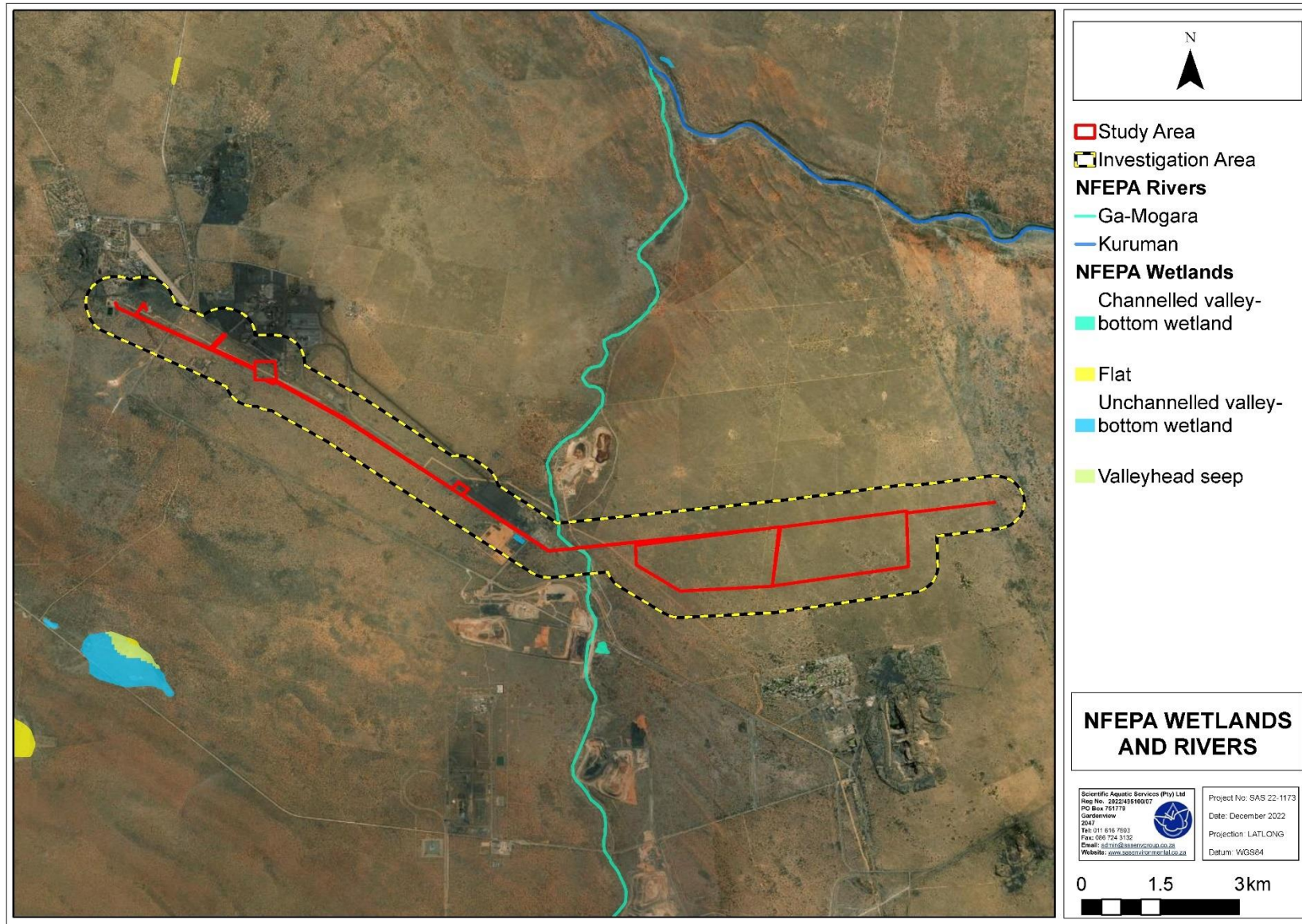


Figure 7: Wetlands and river HGM classifications associated with the study and investigation areas according to the NFEPA database (2011).



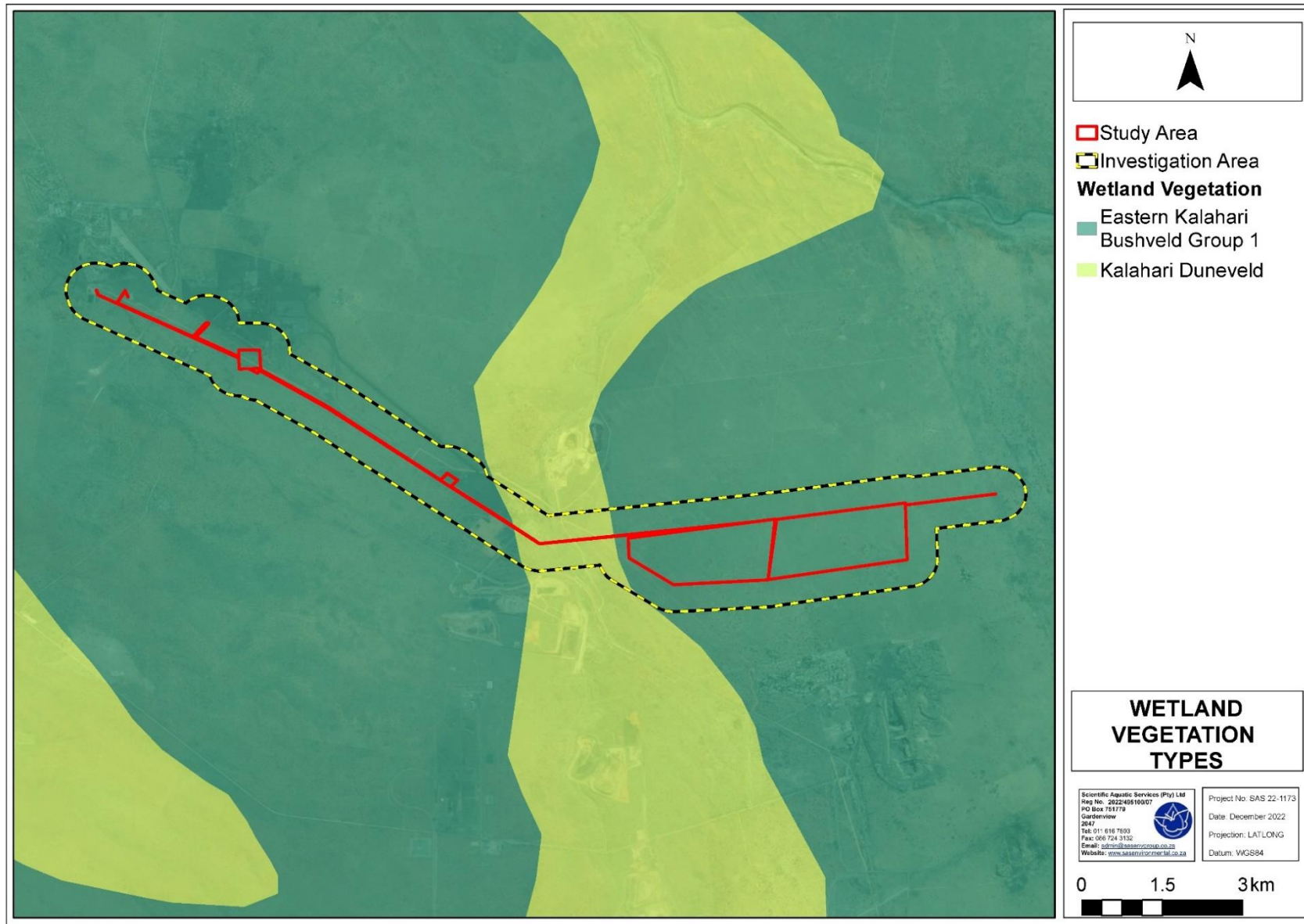


Figure 8: The wetland vegetation types associated with the study and investigation area.



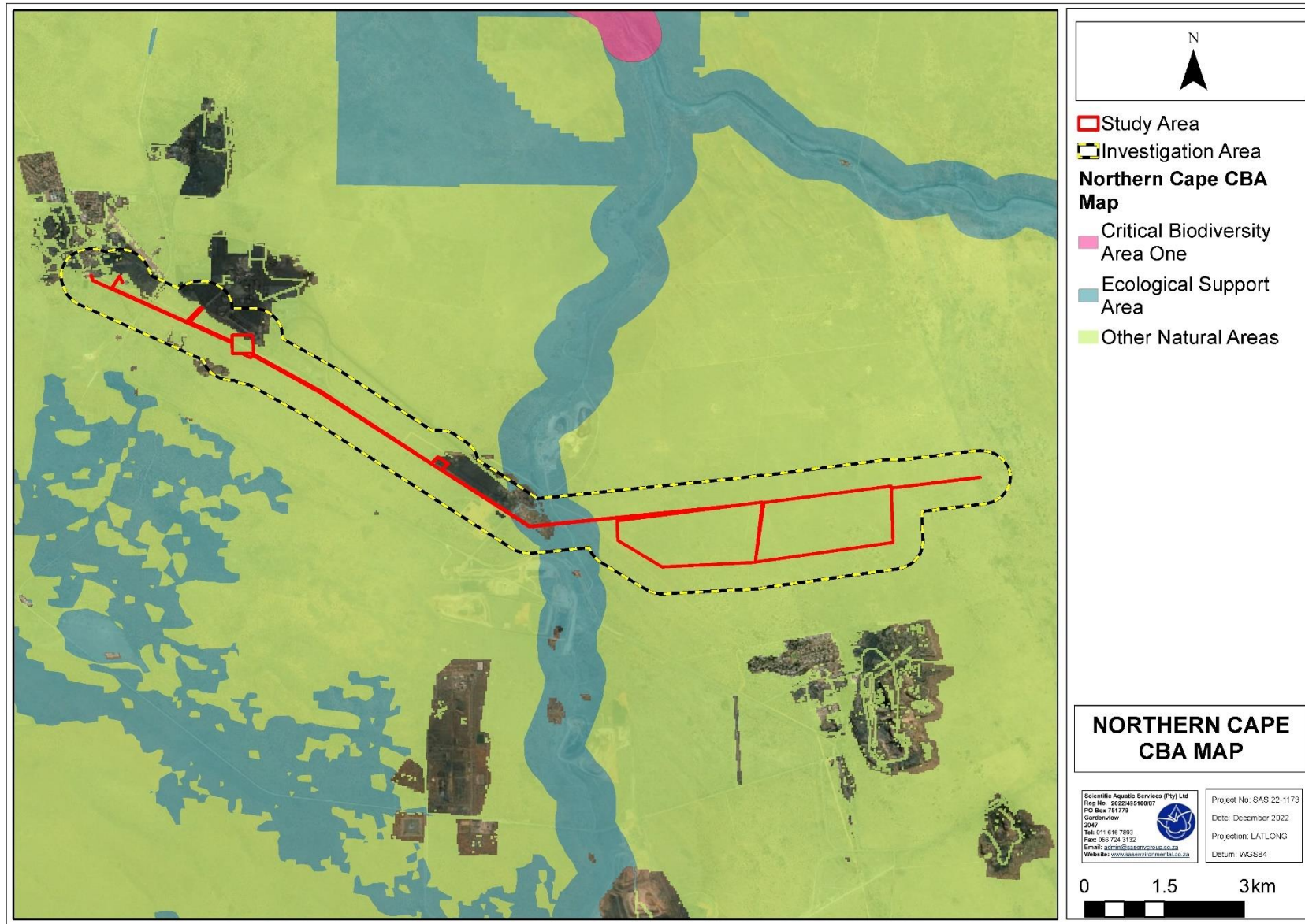


Figure 9: The Northern Cape Critical Biodiversity Areas (2016) associated with the study and investigation area.



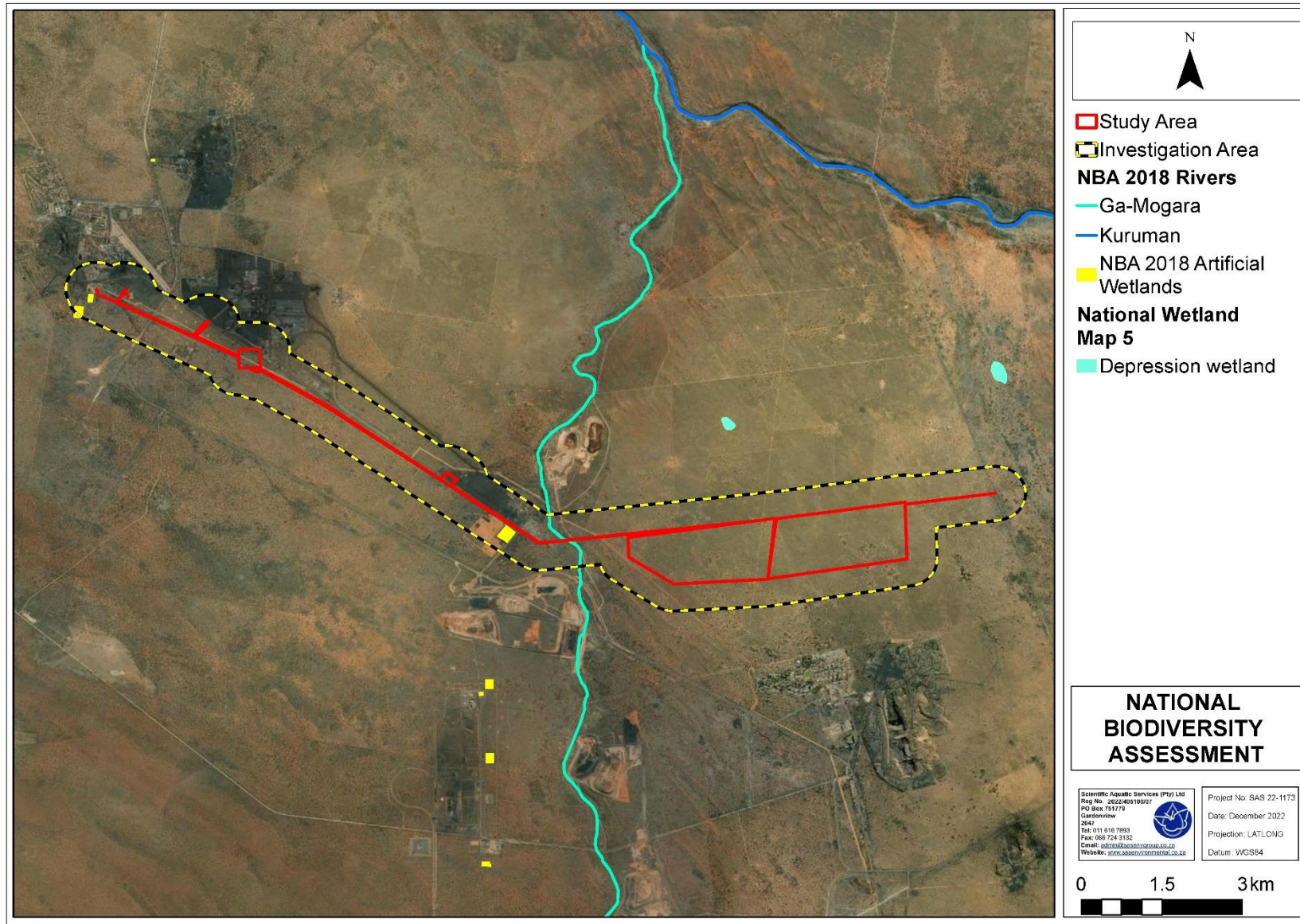


Figure 10: Wetlands and rivers associated with the study and investigation areas according to the National Biodiversity Assessment database (2018).



6. SITE SURVEY RESULTS

Aerial photographs, digital satellite imagery, and provincial and national wetland databases (as outlined in Section 5) were used to identify areas of interest at a desktop level. All possible measures were undertaken to ensure all freshwater ecosystems within the study and investigation areas were assessed. Site investigation of the study area was undertaken in November 2022, using visual assessment methods as well as digital satellite imagery.



Figure 11: Representative photographs of the Ga-Mogara River where the OHPL will traverse.

From a floral perspective, the sections of the Ga-mogara Habitat within the study area are regarded to be degraded and species-poor. The habitat is densely encroached by the invasive *Prosopis glandulosa* and the vegetation has taken on a short-to-tall, closed woodland structure.

The Ga-mogara River is an ephemeral (or episodic) system which means that the river itself is most often dry but should flow for brief periods after heavy rainfall (Figure 12). The Ga-mogara River, however, has been without significant surface flows for a prolonged period due to, *inter alia*, the episodic nature of the river, the upstream dewatering and swallet formation by mine workings of the Sishen Iron Ore Mine¹, several diversions of the river (e.g., the river diversion for the Mokala mine being the closest to the study area), as well as prolonged dry conditions for the region. The Ga-mogara River itself has been altered throughout the years due to regional-scale impacts from historic and ongoing mining and agricultural activities along the greater extent of the river. More important to the vegetation communities of the Ga-mogara Habitat within the study area is the invasion by *Prosopis glandulosa*.

The episodic nature of the resource, as well as the disturbances to vegetation, is likely to contribute to diminished capacity to provide certain ecological functions which would typically be provided by wetland or riverine resources. However, the opportunity to provide services such as sediment trapping, nutrient and toxicant assimilation and biodiversity maintenance are considered to be of moderate levels, particularly if upstream rehabilitation of the swallets and dewatered geological compartment is successful and flow patterns are restored. Although no species of conservation concern (SCC) were observed during the site assessment, , some protected floral species are known to occur on site, and therefore this was taken into account when assessing the biodiversity maintenance provision of the resource.

It should be noted that whilst low scores of ecoservices are expected for the provision of direct human benefits such as cultivated foods and harvestable resources, this is simply due to the location of the resource within an undeveloped area. In reality, the climatic conditions combined with the predominantly friable, well-draining soils which have low arable potential greatly minimise the potential and opportunity for the resource to provide such direct benefits to the local community.

6.1 Freshwater Wetland Sensitivity

Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), for areas of low aquatic biodiversity sensitivity an Aquatic Biodiversity Compliance Statement must be

¹ One of the more significant impacts stem from dewatering activities of the Sishen Iron Ore Mine as well as the formation of swallets south of the Sishen Iron Ore Mine (GCS 2011; PHD 2007), which have contributed to an almost complete loss of surface flow: "As a result of the surface flow in the Gamagara River being captured in recent years mainly by the large N-S structural feature [i.e., the swallets] that crosses the river near the old golf club, surface flow in the downstream sections of the Gamagara River has virtually ceased."

produced. As described in Section 5, the DFFE Web-based Environmental Screening Tool has designated the majority of the study area as being of 'low' aquatic biodiversity sensitivity. Also, the section of the proposed powerline that crosses the Ga-Mogara River is deemed to pose no quantum of risk to this freshwater ecosystem since the pylon position will be located outside of the delineated watercourse boundaries and 1:100-year floodline. This supports the approach of undertaking an Aquatic Biodiversity Compliance Statement.

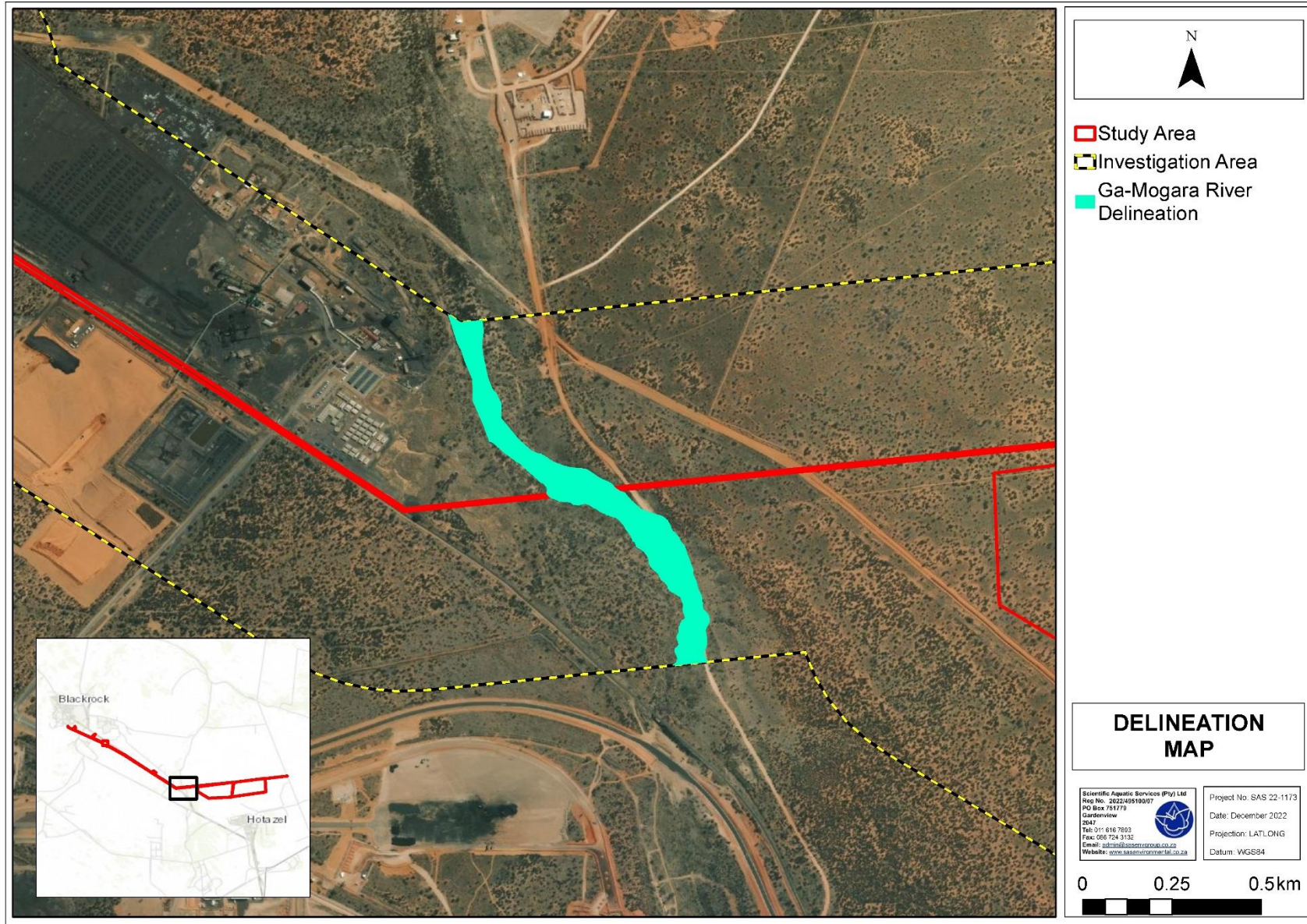


Figure 12: The Ga-Mogara River traversed by the study and investigation areas



7. LEGISLATIVE REQUIREMENTS

The following legislative requirements and provincial guidelines were considered during the assessment.

- The Constitution of the Republic of South Africa, 1996²;
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA);
- The National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA);
- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998); and

The legislative context of a regulated zone(s) of activity for the protection of freshwater ecosystems as based on the above legislation can be summarised as follows:

Table 2: Articles of Legislation and the relevant zones of regulation applicable to each article.

Legislation / Guideline	Zone of applicability
<p>Water Use Authorisation. Application for water uses as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) as amended. Department of Water and Sanitation (DWS)</p>	<p>Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21 (c) and 21(i) is defined as:</p> <ul style="list-style-type: none"> • the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or • a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.
<p>Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended in 2017.</p>	<p>Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended in 2017) The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—; a) within a watercourse; b) in front of a development setback; or c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. excluding— (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p>

² Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

Legislation / Guideline	Zone of applicability
	(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.

*Note that although the GDARD Requirements do not legally apply to areas outside Gauteng, it was still considered for the purpose of this report given that a portion of the investigation area falls within Gauteng.

The following Zones of Regulation applies to the Ga-Mogara River:

- A 32 m Zone of Regulation (ZoR) in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998)
- The outer edge of the 1 in 100 year flood line.

Figure 13 below indicate the potential Zones or Regulation in the study area and in the Investigation area.

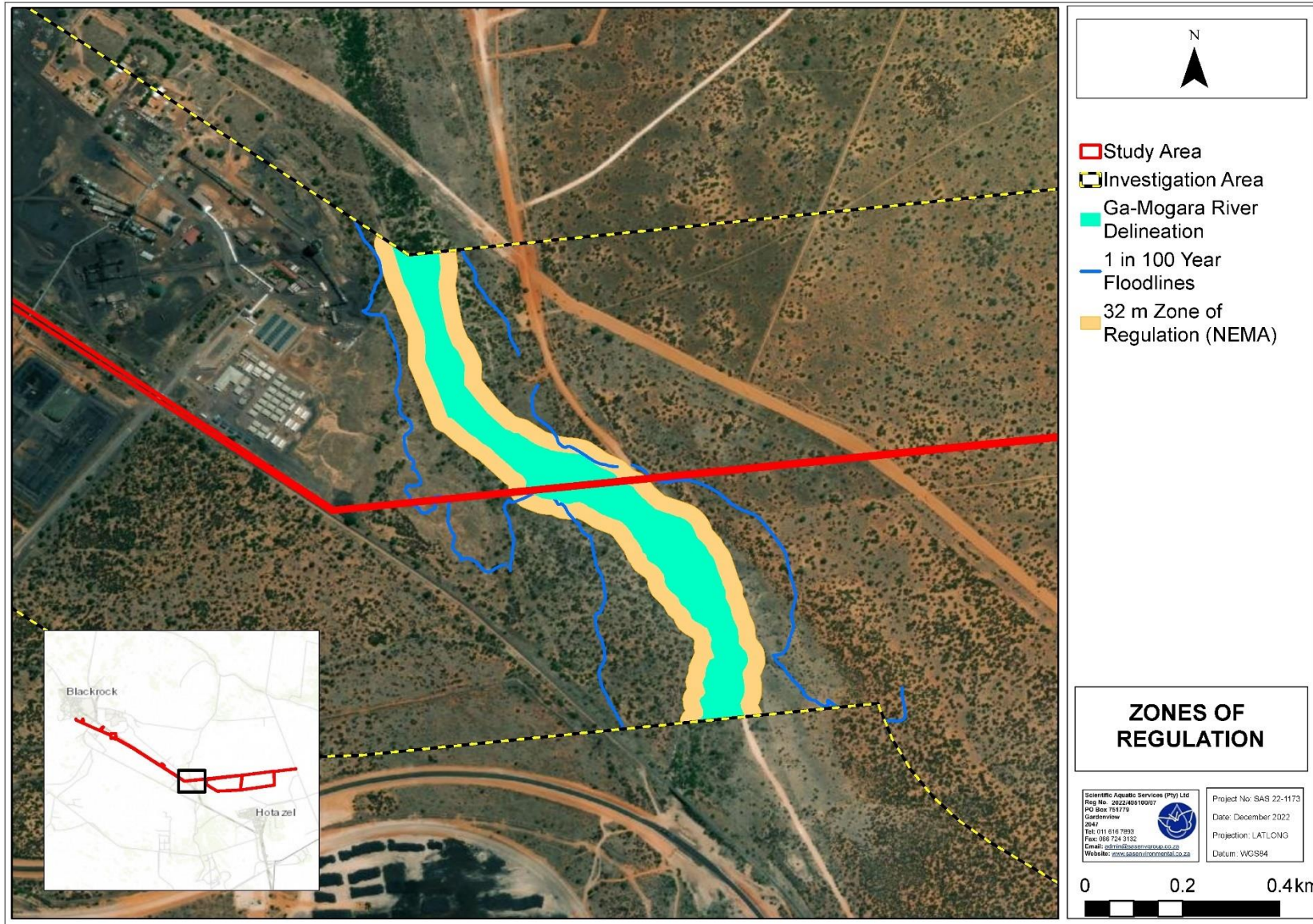


Figure 13: Conceptual presentation of the Ga-Mogara River within the study and investigation area and the applicable zones of regulation in terms of NEMA and GN509 (1:100 year floodline).



8. RISK ASSESSMENT

This section presents the significance of potential impacts on the freshwater ecology of the freshwater ecosystems. In addition, it indicates the required mitigatory measures needed to minimise the perceived impacts of the proposed activities and presents an assessment of the significance of the impacts taking into consideration the available mitigatory measures and assuming that they are fully implemented.

8.1 Risk assessment analysis

8.1.1 Consideration of impacts and application of mitigation measures

Following the assessment of the freshwater ecosystems associated with the proposed powerline, the DWS prescribed Risk Assessment Matrix (2016) was applied to ascertain the significance of perceived impacts on the key drivers and receptors (hydrology, water quality, geomorphology, habitat and biota) of these freshwater ecosystems.

The points below summarise the considerations taken when applying the DWS Risk Assessment Matrix (2016):

- The DWS Risk Assessment Matrix (2016) was applied assuming that a high level of mitigation will be implemented, thus the results, provided in this report presents the perceived impact significance post-mitigation;
- In applying the risk assessment, it was assumed that the mitigation hierarchy as advocated by the DEA et al (2013) would be followed, i.e., the impacts would first be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required;
- Should the proposed powerline route change from the layout provided and assessed in this report, or should details pertaining to the construction and use of materials become available, the Risk Assessment Matrix will need to be revised and potentially amended based on the new design layout and specifics;
- It was assumed that the support towers of the proposed powerline will be situated outside the delineated extent of the freshwater ecosystems and the 1:100-year floodline;
- The proposed powerline is located within the GN509 500 m ZoR in terms of the National Water Act, 1998 (Act No. 36 of 1998) as amended of the freshwater ecosystems. As such, all legal issues pertaining to aspects and activities relating to the freshwater ecosystems were scored as “5”;
- While the operation of the proposed development will be a permanent activity, the construction thereof is envisioned to take no more than a few months to a year. However, the frequency of the construction impacts may be daily during this time; and

- Most impacts are considered to be easily detectable, with the exception of potential contamination of surface and groundwater which will require some effort. Assessing these potential impacts falls outside of the scope of this freshwater ecosystem study.

8.2 Risk Assessment discussion of anticipated ecological impacts

There are four key ecological impacts on the wetlands that are anticipated to occur namely,

- Loss of wetland habitat and ecological structure;
- Changes to the sociocultural and service provision;
- Impacts on the hydrology and sediment balance of the freshwater ecosystems; and
- Impacts on water quality.

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible. The mitigation measures provided in this report have been developed with the mitigation hierarchy in mind, and the implementation and strict adherence to these measures will assist in minimising the significance of impacts on the receiving environment.

A summary of the DWS Risk Assessment Matrix applied to the proposed development activities, is provided in the table below, whilst a comprehensive outcome of the risk assessment is presented in Appendix E.

The activities associated with the construction and operation of all the proposed powerline options pose a “Low” risk significance to the freshwater ecosystems within the study and investigation areas, provided that the supporting structures are placed outside the boundaries of the Ga-Mogara River. In addition, all mitigation measures as stipulated in the above table, must be implemented to prevent any edge effects and cumulative impacts from occurring on the freshwater ecosystems within the study and investigation areas.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed powerline are likely to be reduced during the construction and operational phases assuming that a high level of mitigation takes place. Additional “good practice” mitigation measures applicable to a project of this nature are provided in Appendix F of this report.

Table 3: Summary of the results of the DWS risk assessment matrix applied to the Ga-Mogara river associated with the proposed powerline.

Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Borderline LOW MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
Construction Phase	Site preparation prior to construction activities and planning of tower locations.	Vehicular movement (transportation of construction materials).	<ul style="list-style-type: none"> Loss of freshwater ecosystem vegetation, associated habitat and ecosystem services; Transportation of construction materials can result in disturbances to soil, and increased risk of sedimentation/erosion; and Soil and stormwater contamination from potentially spilled oils and hydrocarbons originating from construction vehicles. 	1,25	3,25	13	42,25	L	85	<ul style="list-style-type: none"> It is assumed that the proposed powerline support structures will be located outside of the delineated extent of the freshwater ecosystems (as far as possible/feasible) from the delineated edge of the freshwater ecosystems. This in itself is considered a mitigation measure, which entails no direct negative impacts from occurring to the freshwater ecosystems. Should the following mitigation measures (pertaining to the construction of the powerline) be applied, a Low risk significance can be expected: It is imperative that all construction works (with specific mention of potential upgrading of any road crossings) be undertaken during the driest period of the year when the flow is very low in the freshwater ecosystems; Towers must be placed outside the delineated edge of the river and 1:100-year floodline and the span of the tower crossings must encompass the delineated river. Use must be made of existing roads and freshwater ecosystem crossings only to access the project sites. This will limit edge effects, erosion and sedimentation of the freshwater ecosystems during the construction phase; The reaches of the freshwater ecosystems where no activities are planned (i.e., no support structures and no spanning of the powerline over the freshwater ecosystems) must be considered no-go areas and must be visibly marked as such; Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the freshwater ecosystems and the associated 10m buffer; Removed vegetation must be stockpiled outside of the delineated boundary of a freshwater ecosystems. The footprint areas and height of these stockpiles should be kept to a minimum; The removed (indigenous) vegetation should be reinstated after the construction phase. However, alien/invasive vegetation species present and removed should not be reinstated but must be disposed of at a registered garden refuse site and may not be burned or mulched on site. 	NA	WET-Health PES Category: D VEGRAI Category: C/D EIS Category: C (Moderately important)
		Removal of vegetation and associated disturbances to soil and access to the site, including grading of existing informal roads (access roads will be maintained as informal gravel roads, or a typical jeep track type road).	<ul style="list-style-type: none"> Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream freshwater ecosystem areas; Exposure of soil, leading to increased runoff, and erosion, and thus increased sedimentation of the freshwater ecosystems ; Increased sedimentation of the freshwater ecosystems , leading to smothering of vegetation associated in the freshwater ecosystems ; and Proliferation of alien and/or invasive vegetation as a result of disturbances. 	1,25	3,25	14	45,5	L	85		NA	
	Installation of the support structures outside the delineated extent of the freshwater ecosystems and spanning of the proposed powerline.	<ul style="list-style-type: none"> Excavation of pits for the support structures leading to stockpiling of soil; Potential movement of construction equipment and personnel in the areas surrounding freshwater ecosystems; Stringing of the power line across the wetland that could potentially involve movement of machinery within the delineated wetland and associated buffer zone. 	<ul style="list-style-type: none"> Disturbances of soil leading to potential impacts to the freshwater ecosystem vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered freshwater ecosystem habitat; and Altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems . 	1,25	3,25	14	45,5	L	85		NA	
		Mixing and casting of concrete for foundations.	<ul style="list-style-type: none"> Potential contamination of surface water (when present). 	1,25	3,25	14	45,5	L	85	<ul style="list-style-type: none"> When the powerline is strung between the support structures, no vehicles may indiscriminately drive through the freshwater ecosystems, use must be made of the existing access roads, or stringing must be undertaken by manual means. Control measures for concrete mixing on site: No mixed concrete may be deposited outside of the designated construction footprint; As far as possible, concrete mixing must be restricted to a designated batching plant that is located in the construction camp. Additionally, batter / dagg board mixing trays and impermeable sumps must be provided, onto which any mixed concrete can be deposited while it awaits placing; and Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. 	NA	
OPERATIONAL PHASE	Operation and maintenance of the proposed powerline	<ul style="list-style-type: none"> Potential indiscriminate movement of maintenance vehicles within the freshwater ecosystems or within close proximity to the freshwater ecosystems ; and Increased risk of sedimentation and/or hydrocarbons entering the freshwater ecosystems via stormwater runoff from the access roads. 	<ul style="list-style-type: none"> Disturbance to soil and ongoing erosion as a result of periodic maintenance activities; and Altered water quality (if surface water is present) as a result of increased availability of pollutants. 	1	3	12	36	L	85	<ul style="list-style-type: none"> No indiscriminate movement in the watercourses may be permitted. Ideally, drones may be used for routine inspection of the lines to avoid any potential physical disturbance of the watercourses. If maintenance vehicles must be used, these vehicles must make use of dedicated access roads; During periodic maintenance activities of the powerline, monitoring for erosion should be undertaken; Should erosion be noted at the base of the support structure that may potentially impact on a watercourse in the surrounding area, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; and Monitoring for the establishment for alien and invasive vegetation species must be undertaken, specifically for access roads through or along the watercourses used to service the powerline and substation. Should alien and invasive plan species be identified, they must be removed and disposed of as per an alien and invasive species control plan and the area must be revegetated with suitable indigenous vegetation. 	NA	WET-Health PES Category: D VEGRAI Category: C/D EIS Category: C (Moderately important)



9. CONCLUSION

9.1 Summary of Desktop Verification Outcome/Findings

Based on the site verification undertaken by Scientific Aquatic Services and the findings thereof presented in this report, it was confirmed that one freshwater ecosystem occur within the study or investigation area (i.e., the Ga-Mogara River). The proposed OHPL poses no significant quantum of risk to existing freshwater ecosystems in the area and therefore no risk assessment is required in accordance with GN509 of 2016 nor would the development be subject to a Water Use Authorisation in terms of Section 21 c and i of the National Water Act (Act No 36 of 1998).

9.2 Compliance Statement/Impact Statement

No impacts to the freshwater environment or freshwater features in the area surrounding the study area are envisioned and the risk profile to the freshwater environment is considered low to negligible. Should the proposed OHPL remain within the demarcated footprint (study area) as provided by the proponent, the OHPL construction and operation will not result in an impact (new or cumulative) on any freshwater features in the vicinity of the study area. The proposed OHPL in its current form is associated with a low risk to the freshwater environment.

9.3 Reasoned Opinion for issuing of EA

Due to the non-invasive nature of the proposed OHPL on the site, no impact on the freshwater environment in the site is anticipated. As such it is the professional opinion of the freshwater specialist that the prospecting right application be granted Environmental Authorisation, subject to the position of the OHPL support structures that must remain outside the delineated boundaries of the Ga-Mogara River.

10. REFERENCES

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APPENDIX A - INDEMNITY AND DECLARATION OF INDEPENDENCE

INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS and its staff reserve the right to, at their sole discretion, modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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This report must not be altered or added to or used for any other purpose other than that for which it was produced without the prior written consent of the author(s). This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.



APPENDIX B – LEGISLATION

LEGISLATIVE CONSIDERATIONS

<p>The Constitution of the Republic of South Africa, 1996</p>	<p>The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.</p>
<p>National Environmental Management Act (Act No. 107 of 1998) (NEMA)</p>	<p>The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered.</p>
<p>National Environmental Management: Biodiversity Act (2004) (Act 10 of 2004) (NEMBA)</p>	<p>Ecosystems that are threatened or in need of protection</p> <p>(1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection.</p> <p>(b) An MEC for environmental affairs in a province may, by notice in <i>the Gazette</i>, publish a provincial list of ecosystems in the province that are threatened and in need of protection.</p> <p>(2) The following categories of ecosystems may be listed in terms of subsection (1):</p> <p>(a) critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;</p> <p>(b) endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;</p> <p>(c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and</p> <p>(d) protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs (a), (b) or (c).</p>
<p>The National Water Act 1998 (Act No. 36 of 1998) (NWA) as amended</p>	<p>The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) & (i).</p>
<p>Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998) as amended</p>	<p>In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as:</p> <ol style="list-style-type: none"> a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; b) In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or c) A 500 m radius from the delineated boundary (extent) of any wetland or pan. <p>This notice replaces GN1199 and may be exercised as follows:</p> <ol style="list-style-type: none"> i) Exercise the water use activities in terms of Section 21(c) and (i) of the Act as set out in the table below, subject to the conditions of this authorisation; ii) Use water in terms of section 21(c) or (i) of the Act if it has a low risk class as determines through the Risk Matrix;



	<ul style="list-style-type: none"> iii) Do maintenance with their existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix; iv) Conduct river and stormwater management activities as contained in a river management plan; v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix; and vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol. <p>A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA.</p> <p>Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA.</p>
<p>Specific guidelines for meeting minimum requirements for CBA and ESA wetlands.</p>	<ul style="list-style-type: none"> ➤ All wetlands are protected under the National Water Act, 1998 (Act No. 36 of 1998) as amended. ➤ In terms of the National Water Act, freshwater ecosystems (all wetlands included) should not be allowed to degrade to an unacceptably modified condition (E or F ecological category). ➤ Conduct a buffer determination assessment around all wetlands, regardless of ecological condition or ecosystem threat status. ➤ Any further loss of area or ecological condition must be avoided, including if needed, a 100 m generic buffer around the wetlands.



APPENDIX C – METHOD OF ASSESSMENT

1. Desktop Study

Prior to the commencement of the field assessment, a background study, including a literature review, was conducted in order to determine the ecoregion and ecostatus of the larger aquatic system within which the freshwater features present or in close proximity of the proposed study area are located. Aspects considered as part of the literature review are discussed in the sections that follow.

1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

The NFEPA project is a multi-partner project between the Council of Scientific and Industrial Research (CSIR), Water Research Commission (WRC), South African National Biodiversity Institute (SANBI), DWA, South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities of conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development.

The NFEPA project aims to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation. Freshwater ecosystems provide a valuable, natural resource with economic, aesthetic, spiritual, cultural and recreational value. However, the integrity of freshwater ecosystems in South Africa is declining at an alarming rate, largely as a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (competition between stakeholders for utilisation) and institutional (building appropriate governance and co-management mechanisms).

The NFEPA database was searched for information in terms of conservation status of rivers, wetland habitat and wetland features present in the vicinity of or within the proposed study area.

2. Classification System for Wetlands and other Aquatic Ecosystems in South Africa

The freshwater features encountered within the proposed study area were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis *et al.*, 2013), hereafter referred to as the "Classification System". A summary of Levels 1 to 4 of the classification system are presented in Table C1 and C2, below.

Table C1: Proposed classification structure for Inland Systems, up to Level 3.

WETLAND / AQUATIC ECOSYSTEM CONTEXT		
LEVEL 1: SYSTEM	LEVEL 2: REGIONAL SETTING	LEVEL 3: LANDSCAPE UNIT
Inland Systems	DWA Level 1 Ecoregions OR NFEPA WetVeg Groups OR Other special framework	Valley Floor
		Slope
		Plain
		Bench (Hilltop / Saddle / Shelf)



Table C2: Hydrogeomorphic (HGM) Unit for the Inland System, showing the primary HGM Types at Level 4A and the subcategories at Level 4B to 4C.

FUNCTIONAL UNIT		
LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT		
HGM type	Longitudinal zonation/ Landform / Outflow drainage	Landform / Inflow drainage
A	B	C
River	Mountain headwater stream	Active channel
		Riparian zone
	Mountain stream	Active channel
		Riparian zone
	Transitional	Active channel
		Riparian zone
	Upper foothills	Active channel
		Riparian zone
	Lower foothills	Active channel
		Riparian zone
Lowland river	Active channel	
	Riparian zone	
Rejuvenated bedrock fall	Active channel	
	Riparian zone	
Rejuvenated foothills	Active channel	
	Riparian zone	
Upland floodplain	Active channel	
	Riparian zone	
Channelled valley-bottom wetland	(not applicable)	(not applicable)
Unchannelled valley-bottom wetland	(not applicable)	(not applicable)
Floodplain wetland	Floodplain depression	(not applicable)
	Floodplain flat	(not applicable)
Depression	Exorheic	With channelled inflow
		Without channelled inflow
	Endorheic	With channelled inflow
		Without channelled inflow
	Dammed	With channelled inflow
		Without channelled inflow
Seep	With channelled outflow	(not applicable)
	Without channelled outflow	(not applicable)
Wetland flat	(not applicable)	(not applicable)

Level 1: Inland systems

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean³ (i.e. characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

Level 2: Ecoregions & NFEPA Wetland Vegetation Groups

For Inland Systems, the regional spatial framework that has been included at Level 2 of the classification system is that of DWA's Level 1 Ecoregions for aquatic ecosystems (Kleynhans *et al.*, 2005). There is a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have

³ Most rivers are indirectly connected to the ocean via an estuary at the downstream end, but where marine exchange (i.e. the presence of seawater) or tidal fluctuations are detectable in a river channel that is permanently or periodically connected to the ocean, it is defined as part of the estuary.



most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

The Vegetation Map of South Africa, Swaziland and Lesotho (Mucina & Rutherford, 2006) group's vegetation types across the country according to Biomes, which are then divided into Bioregions. To categorise the regional setting for the wetland component of the National Freshwater Ecosystem Priority Areas (NFEPA) project, wetland vegetation groups (referred to as WetVeg Groups) were derived by further splitting bioregions into smaller groups through expert input (Nel *et al.*, 2011). There are currently 133 NFEPA WetVeg Groups. It is envisaged that these groups could be used as a special framework for the classification of wetlands in national- and regional-scale conservation planning and wetland management initiatives.

Level 3: Landscape Setting

At Level 3 of the Classification System, for Inland Systems, a distinction is made between four Landscape Units (Table C1) on the basis of the landscape setting (i.e. topographical position) within which an HGM Unit is situated, as follows (Ollis *et al.*, 2013):

- **Slope:** an included stretch of ground that is not part of a valley floor, which is typically located on the side of a mountain, hill or valley;
- **Valley floor:** The base of a valley, situated between two distinct valley side-slopes;
- **Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land; and
- **Bench (hilltop/saddle/shelf):** an area of mostly level or nearly level high ground (relative to the broad surroundings), including hilltops/crests (areas at the top of a mountain or hill flanked by down-slopes in all directions), saddles (relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction), and shelves/terraces/ledges (relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction).

Level 4: Hydrogeomorphic Units

Seven primary HGM Types are recognised for Inland Systems at Level 4A of the Classification System (Table C2), on the basis of hydrology and geomorphology (Ollis *et al.*, 2013), namely:

- **River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water;
- **Channelled valley-bottom wetland:** a valley-bottom wetland with a river channel running through it;
- **Unchannelled valley-bottom wetland:** a valley-bottom wetland without a river channel running through it;
- **Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank;
- **Depression:** a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
- **Wetland Flat:** a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench. Closed elevation contours are not evident around the edge of a wetland flat; and
- **Seep:** a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley but they do not, typically, extend into a valley floor.

The above terms have been used for the primary HGM Units in the classification system to try and ensure consistency with the wetland classification terms currently in common usage in South Africa. Similar terminology (but excluding categories for “channel”, “flat” and “valleyhead seep”) is used, for example, in the recently developed tools produced as part of the Wetland Management Series including WET-Health (Macfarlane *et al.*, 2008), WET-IHI (DAAF, 2007) and WET-EcoServices (Kotze *et al.*, 2009).



APPENDIX D – RISK ASSESSMENT METHODOLOGY

In order for the EAP to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

The first stage of the risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'⁴. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as freshwater features, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria (refer to the table below). The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity, impact, legal issues and the detection of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 20. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigation is necessary⁵.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National

⁴ The definition has been aligned with that used in the ISO 14001 Standard.

⁵ Some risks/impacts that have low significance will however still require mitigation.



Environmental Management Act (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

"RISK ASSESSMENT KEY" (Based on DWS 2015 publication: Section 21 c and i water use Risk Assessment Protocol)

Table D1: Severity (How severe does the aspects impact on the resource quality (flow regime, water quality, geomorphology, biota, habitat))

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Where "or wetland(s) are involved" it means that the activity is located within the delineated boundary of any wetland. The score of 5 is only compulsory for the significance rating.	

Table D2: Spatial Scale (How big is the area that the aspect is impacting on)

Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

Table D3: Duration (How long does the aspect impact on the resource quality)

One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5
PES and EIS (sensitivity) must be considered.	

Table D4: Frequency of the activity (How often do you do the specific activity)

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table D5: The frequency of the incident or impact (How often does the activity impact on the resource quality)

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

Table D6: Legal issues (How is the activity governed by legislation)

No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
Located within the regulated areas	



Table D7: Detection (How quickly or easily can the impacts/risks of the activity be observed on the resource quality, people and resource)

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Table D8: Rating Classes

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

A low risk class must be obtained for all activities to be considered for a GA

Table D9: Calculations

Consequence = Severity + Spatial Scale + Duration
Likelihood = Frequency of Activity + Frequency of Incident + Legal Issues + Detection
Significance/Risk = Consequence X Likelihood

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
 - Primary project site and related facilities that the client and its contractors develops or controls;
 - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
 - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
 - Risks/Impacts were assessed for construction phase and operational phase; and
 - Individuals or groups who may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status were assessed.

Control Measure Development

The following points presents the key concepts considered in the development of mitigation measures for the proposed construction:

- Mitigation and performance improvement measures and actions that address the risks and impacts⁶ are identified and described in as much detail as possible. Mitigating measures are investigated according to the impact minimisation hierarchy as follows:
 - Avoidance or prevention of impact;
 - Minimisation of impact;
 - Rehabilitation; and
 - Offsetting.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation; and

⁶ Mitigation measures should address both positive and negative impacts.



- Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, wherever possible.

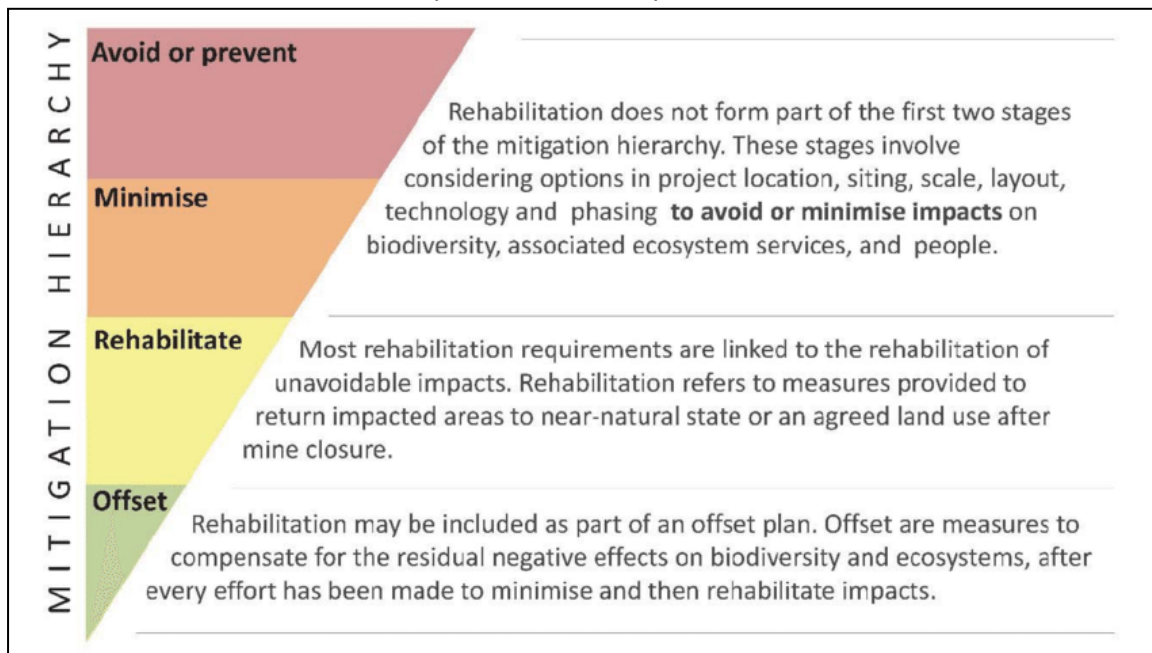


Figure D1: Impact Minimisation hierarchy as advocated by the DEA *et al.*, (2013)

Recommendations

Recommendations were developed to address and mitigate potential impacts on the freshwater ecology of the resources traversed by or in close proximity of the proposed project.

Table D10: Reversibility of impacts on the watercourses

Reversibility Rating:	Irreversible (the activity will lead to an impact that is permanent)
	Partially reversible (The impact is reversible to a degree e.g. acceptable revegetation measures can be implemented but the pre-impact species composition and/or diversity may never be attained. Impacts may be partially reversible within a short (during construction), medium (during operation) or long term (following decommissioning) timeframe)
	Fully reversible (The impact is fully reversible, within a short, medium or long-term timeframe)



APPENDIX E – RISK ASSESSMENT OUTCOME

Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph & Vegetation)	BioB	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Boreline LOW MODERATE Rating Class	PES AND EIS OF WATERCOURSE
1	Site preparation prior to construction activities and planning of tower locations.	Vehicular movement (transportation of construction materials).	<ul style="list-style-type: none"> Loss of freshwater ecosystem vegetation, associated habitat and ecosystem services; Transportation of construction materials can result in disturbances to soil, and increased risk of sedimentation/erosion; and Soil and stormwater contamination from potentially spilled oils and hydrocarbons originating from construction vehicles. 	2	1	1	1	1,25	1	1	3,25	5	2	5	1	13	42,25	L	85	<ul style="list-style-type: none"> It is assumed that the proposed powerline support structures will be located outside of the delineated extent of the freshwater ecosystems (as far as possible/feasible) from the delineated edge of the freshwater ecosystems. This in itself is considered a mitigation measure, which entails no direct negative impacts from occurring to the freshwater ecosystems. Should the following mitigation measures (pertaining to the construction of the powerline) be applied, a Low risk significance can be expected: It is imperative that all construction works (with specific mention of potential upgrading of any road crossings) be undertaken during the driest period of the year when the flow is very low in the freshwater ecosystems; Towers must be placed outside the delineated edge of the river and 1:100-year floodline and the span of the tower crossings must encompass the delineated river. Use must be made of existing roads and freshwater ecosystem crossings only to access the project sites. This will limit edge effects, erosion and sedimentation of the freshwater ecosystems during the construction phase; The reaches of the freshwater ecosystems where no activities are planned (i.e., no support structures and no spanning of the powerline over the freshwater ecosystems) must be considered no-go areas and must be visibly marked as such; Contractor lay-down areas, vehicle re-fueling areas and material storage facilities to remain outside of the freshwater ecosystems and the associated 10m buffer; Removed vegetation must be stockpiled outside of the delineated boundary of a freshwater ecosystem. The footprint areas and height of these stockpiles should be kept to a minimum; The removal (indigenous) vegetation should be reinstated after the construction phase. However, alien/invasive vegetation species present and removed should not be reinstated but must be disposed of at a registered garden refuse site and may not be burned or mulched on site. 	NA	WET-Health PES Category: D VEGRAI Category: C/D EIS Category: C (Moderately important)
		Removal of vegetation and associated disturbances to soil, and access to the site, including grading of existing informal roads (access roads will be maintained as informal gravel roads, or a typical jeep track type road).	<ul style="list-style-type: none"> Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream freshwater ecosystem areas; Exposure of soil, leading to increased runoff and erosion, and thus increased sedimentation of the freshwater ecosystems; Increased sedimentation of the freshwater ecosystems, leading to smothering of vegetation associated in the freshwater ecosystems; and Proliferation of alien and/or invasive vegetation as a result of disturbances. 	2	1	1	1	1,25	1	1	3,25	5	3	5	1	14	45,5	L	85	<ul style="list-style-type: none"> When the powerline is strung between the support structures, no vehicles may indiscriminately drive through the freshwater ecosystems, use must be made of the existing access roads, or stringing must be undertaken by manual means. Control measures for concrete mixing on site: No mixed concrete may be deposited outside of the designated construction footprint; As far as possible, concrete mixing must be restricted to a designated batching plant that is located in the construction camp. Additionally, batter / dagga board mixing trays and impermeable sumps must be provided, onto which any mixed concrete can be deposited while it awaits placing; and Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. 	NA	
		Installation of the support structures outside the delineated extent of the freshwater ecosystems and spanning of the proposed powerline.	<ul style="list-style-type: none"> Excavation of pits for the support structures leading to stockpiling of soil; Potential movement of construction equipment and personnel in the areas surrounding freshwater ecosystems; Stringing of the power line across the wetland that could potentially involve movement of machinery within the delineated wetland and associated buffer zone. 	<ul style="list-style-type: none"> Disturbances of soil leading to potential impacts to the freshwater ecosystem vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered freshwater ecosystem habitat and Altered runoff patterns, leading to increased erosion and sedimentation of the freshwater ecosystems. 	2	1	1	1	1,25	1	1	3,25	5	3	5	1	14	45,5	L	85	<ul style="list-style-type: none"> With regards to backfilling of the concrete encasing: Soil removed for excavating the pit should be used as backfill material; All excavated pits must be compacted to natural soil compaction levels to prevent the formation of preferential surface flow paths and subsequent erosion. Conversely, areas compacted as a result of construction activities must be loosened to natural soil compaction levels; Any remaining soil following the completion of backfilling of the pits must be spread out thinly surrounding the installed support structures (outside of the delineated freshwater ecosystems) to aid in the natural reclamation process; and The construction footprint must be limited to the pit area. The area must be rehabilitated after the completion of the construction phase, including AIP control undertaken until basal vegetation cover is achieved. Hydroseeding of disturbed areas is recommended. 	
2	Mixing and casting of concrete for foundations.		<ul style="list-style-type: none"> Potential contamination of surface water (when present). 	1	2	1	1	1,25	1	1	3,25	5	3	5	1	14	45,5	L	85	<ul style="list-style-type: none"> When the powerline is strung between the support structures, no vehicles may indiscriminately drive through the freshwater ecosystems, use must be made of the existing access roads, or stringing must be undertaken by manual means. Control measures for concrete mixing on site: No mixed concrete may be deposited outside of the designated construction footprint; As far as possible, concrete mixing must be restricted to a designated batching plant that is located in the construction camp. Additionally, batter / dagga board mixing trays and impermeable sumps must be provided, onto which any mixed concrete can be deposited while it awaits placing; and Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. 	NA	
3	OPERATIONAL PHASE	Operation and maintenance of the proposed powerline	<ul style="list-style-type: none"> Potential indiscriminate movement of maintenance vehicles within the freshwater ecosystems or within close proximity to the freshwater ecosystems; and Increased risk of sedimentation and/or hydrocarbons entering the freshwater ecosystems via stormwater runoff from the access roads. 	1	1	1	1	1	1	1	3	3	3	5	1	12	36	L	85	<ul style="list-style-type: none"> No indiscriminate movement in the watercourses may be permitted. Ideally, drones may be used for routine inspection of the lines to avoid any potential physical disturbance of the watercourses. If maintenance vehicles must be used, these vehicles must make use of dedicated access roads; During periodic maintenance activities of the powerline, monitoring for erosion should be undertaken; Should erosion be noted at the base of the support structure that may potentially impact on a watercourse in the surrounding area, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; and Monitoring for the establishment for alien and invasive vegetation species must be undertaken, specifically for access roads through or along the watercourses used to service the powerline and substation. Should alien and invasive plan species be identified, they must be removed and disposed of as per an alien and invasive species control plan and the area must be revegetated with suitable indigenous vegetation. 	NA	WET-Health PES Category: D VEGRAI Category: C/D EIS Category: C (Moderately important)



APPENDIX F – GENERAL “GOOD HOUSEKEEPING” MITIGATION MEASURES

General construction management and good housekeeping practices

Latent and general impacts which may affect the freshwater ecology and biodiversity, will include any activities which take place in close proximity to the proposed development that may impact on the receiving environment. Mitigation measures for these impacts are highlighted below and are relevant to the watercourse identified in this report:

Development footprint

- All development footprint areas must remain as small as possible and must not encroach into the freshwater areas unless absolutely essential and part of the proposed development. It must be ensured that the freshwater habitat is off-limits to construction vehicles and non-essential personnel;
- The boundaries of footprint areas, including contractor laydown areas, must be clearly defined and all activities must remain within defined footprint areas. Edge effects will need to be extremely carefully controlled;
- Planning of temporary roads and access routes must avoid freshwater ecosystems and be restricted to existing roads where possible;
- Appropriate sanitary facilities must be provided for the life of the construction phase and all waste removed to an appropriate waste facility;
- All hazardous chemicals as well as stockpiles must be stored on bunded surfaces and have facilities constructed to control runoff from these areas;
- All hazardous storage containers and storage areas must comply with the relevant SABS standards to prevent leakage;
- No fires must be permitted in or near the construction area; and
- Ensuring that an adequate number of waste and “spill” bins are provided will also prevent litter and ensure the proper disposal of waste and spills.

Vehicle access

- All vehicles must be regularly inspected for leaks. Re-fuelling must take place offsite on a sealed surface area to prevent ingress of hydrocarbons into the topsoil;
- In the event of a vehicle breakdown, maintenance of vehicles must take place with care and spillage must be prevented near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss; and
- All spills should they occur, should be immediately cleaned up and treated accordingly. Contaminated soil must be bagged and disposed of in hazardous waste receptacles.

Vegetation

- Removal of the alien and weed species encountered within the wetlands must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, and maintenance phases; and
- Species specific and area specific eradication recommendations:
 - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;
 - Footprint areas must be kept as small as possible when removing alien plant species; and



- No vehicles must be allowed to drive through designated sensitive watercourse areas during the eradication of alien and weed species.

Soil

- Sheet runoff from access roads and the walk ways must be slowed down by the strategic placement of berms;
- As far as possible, all construction activities must occur in the low flow season, during the drier winter months;
- As much vegetation growth as possible (of indigenous floral species) should be encouraged to protect soil;
- No stockpiling of topsoil must take place within close proximity to the watercourse, and all stockpiles must be protected with a suitable geotextile to prevent sedimentation of the watercourse;
- All soil compacted as a result of construction activities as well as ongoing operational activities falling outside of project footprint areas must be ripped and profiled; and
- A monitoring plan for the development and the immediate zone of influence must be implemented to prevent erosion and incision.

Rehabilitation

- Construction rubble must be collected and disposed of at a suitable landfill site;
- All alien vegetation in the footprint area as well as immediate vicinity of the proposed development must be removed. Alien vegetation control must take place for a minimum period of two growing seasons after rehabilitation is completed; and
- Side slope and embankment vegetation cover must be monitored to ensure that sufficient vegetation is present to bind this soil and prevent further erosion.



APPENDIX G - CV OF SPECIALISTS

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report

Nelanie Cloete MSc Botany and Environmental Management (University of Johannesburg)

1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Nelanie Cloete		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
E-mail:	Nelanie@sasenvgroup.co.za		
Qualifications	MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University)		
Registration / Associations	Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA)		

I, Nelanie Cloete, declare that -

- I act as the **independent specialist (reviewer)** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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







SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF NELANIE CLOETE

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Botanical Science and Terrestrial Ecology
Joined SAS Environmental Group of Companies	2011

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 400503/14)
 Member of the South African Association of Botanists (SAAB)
 Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group
 Member of the Grassland Society of South Africa (GSSA)
 Member of the Botanical Society of South Africa (BotSoc)
 Member of the Gauteng Wetland Forum (GWF)
 Member of the South African Wetland Society (SAWS)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2013
MSc Botany (University of Johannesburg)	2007
BSc (Hons) Botany (University of Johannesburg)	2005
BSc (Botany and Zoology) (Rand Afrikaans University)	2004

Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016
Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Environmental legal compliance, Monitoring and Auditing	2021

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Eastern Cape, Free State
Africa - Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Plant species and Landscape Plan

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions



