SCIENTIFIC AQUATIC SERVICES

Reg No. 2003/078943/23
VAT Reg No. 4020235273
PO Box 751779
Gardenview
2047
Tel: 011 616 7893
Fax: 086 724 3132
Email: admin@sasenvgroup.co.za
www.sasenvironmental.co.za

FRESHWATER ECOLOGICAL ASSESSMENT AS PART OF THE ENVIRONMENTAL AUTHORISATION AND WATER USE AUTHORISATION (WUA) FOR THE PROPOSED 132 KV OVERHEAD POWERLINE ROUTE AS PART OF THE HYPERION HYBRID FACILITY, NEAR KATHU, NORTHERN CAPE PROVINCE

BASELINE REPORT

Prepared for

Hyperion Solar Hybrid (Pty) Ltd

November 2020

Prepared by: Scientific Aquatic Services
Report author: R. Mathakutha (Cand. Sci. Nat)
Report reviewers: K. Marais (Pr. Sci. Nat)
S. van Staden (Pr. Sci. Nat)
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EXECUTIVE SUMMARY

A 132 kV overhead powerline (OHPL) is proposed to be routed from the new Hyperion on-site substation to the existing Eskom Kalbas Substation as part of the Hyperion Hybrid Facility, near Kathu in the Northern Cape Province. A 300 m corridor between the proposed OHPL route was assessed. No watercourses are traversed by the proposed OHPL or occur within the 300 m corridor. However, several cryptic wetlands were identified within the investigation area (i.e. 500 m "zone of investigation" around the proposed OHPL) and vicinity thereof and classified as watercourses, along with a seasonal depression which does not meet the definition of a watercourse from an ecological perspective.

Based on the outcome of the Department of Water and Sanitation (DWS) Risk Assessment, the proposed OHPL infrastructure was determined to pose a Low impact significance to the cryptic wetlands. Due to these infrastructure components located outside of the delineated boundary of the cryptic wetlands and 32m NEMA Zone of Regulation (ZoR), no direct impacts from the construction of the OHPL and related infrastructure are expected to occur on the cryptic wetlands. Nevertheless, the potential occurrence of impacts associated with edge effects on the watercourses must be considered. If these edge effects are managed accordingly (i.e. if all the proposed mitigation measures as stipulated in this report are implemented), the impact significance on the cryptic wetlands is expected to remain low.

It is the opinion of the freshwater ecologist that the proposed OHPL be considered acceptable, provided that the essential mitigation measures as listed in this report are strictly adhered to.

MANAGEMENT SUMMARY

INTRODUCTION

SAS was appointed to conduct a freshwater ecological assessment as part of the Environmental Authorisation and Water Use Authorisation (WUA) processes for the proposed 132 kV Overhead Powerline (OHPL) route and associated substation as part of the Hyperion Hybrid Facility, near Kathu in the Northern Cape Province. The exact location of the OHPL may be subjected to some readjustment to allow flexibility during construction, therefore a 300 m corridor was assessed. To identify all watercourses that may potentially be impacted by the proposed OHPL as a whole, a 500m "zone of investigation" around the proposed OHPL and all associated project activities was investigated (hereafter referred to as the 'investigation area').

RESULTS OF DESKTOP ANALYSIS

A desktop study was conducted, in which possible watercourses were identified for on-site investigation. In addition, relevant national, provincial and municipal databases were consulted. The results of the desktop study are contained in Section 4 of this report. A summary is provided below:

- According to the National Freshwater Ecosystem Priority Areas (NFEPA) database (2011) and National Biodiversity Assessment (NBA) database (2018), several natural wetlands are located within the investigation area. All the wetlands identified by the NFEPA (2011) and NBA (2018) databases are considered to be in a natural or good ecological condition (Class AB).

RESULTS OF THE WATERCOURSE ASSESSMENT

In addition to the recent field assessment, use was made of the findings from the field assessment undertaken in 2018 and 2019 by SAS to verify the watercourses identified from the various desktop databases consulted, along with digital satellite imagery to assist in the delineation of watercourses that were not visited during the 2018 and 2019 field assessment. No watercourses are traversed by the proposed OHPL or occur within the 300 m corridor. However, several cryptic wetlands were identified

within the investigation area and vicinity thereof and classified as watercourses, along with a seasonal depression which does not meet the definition of a watercourse from an ecological perspective.

The results of the assessment of the relevant desktop databases and previous studies (SAS, 2019) indicate that the cryptic wetlands identified are in a largely natural ecological state, with few to no impacts on hydraulic and geomorphological processes. The area surrounding the identified cryptic wetlands is mainly natural, untransformed areas; however, sand mining and various informal roads were identified as the main anthropogenic activities occurring within the local catchment of these wetlands.

LEGISLATIVE REQUIREMENTS

Based on the applicable legislation, the following Zones of Regulation (ZoR) were applied:

- A 32m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) was applied to all the cryptic wetlands associated with the proposed OHPL and investigation area.
- Zones of Regulation in accordance with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA):
  - 500m Zone of Regulation applied to the cryptic wetlands.

The following should be considered as part of the environmental authorisation of the proposed development activities:

- No infrastructure is located within the 32m NEMA ZoR of the cryptic wetlands. However, the 300 m corridor of the proposed OHPL encroaches on the 500m GN509 ZoR of some of the cryptic wetlands. Thus, the proposed construction and operational activities associated with these activities are not expected to result in a high impact significance to the cryptic wetlands.

IMPACT ASSESSMENT

Following the assessment of the cryptic wetlands, the Department of Water and Sanitation (DWS) Risk Assessment Matrix as defined in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), and an impact assessment methodology (as provided by the EAP), were applied to ascertain the significance of possible impacts which may occur as a result of the proposed OHPL activities. The impact assessment was undertaken based on the preliminary layout plan provided by the EAP, which indicates that the proposed OHPL (and associated pylons and substation) are located outside the boundaries of the delineated cryptic wetlands and their 32 m NEMA ZoR. Whilst the cryptic wetlands will not be directly impacted by the proposed OHPL activities, they may be partially encroached upon or impacted by edge effects.

Table A below provides a summary of the outcome of the DWS Risk Assessment.

Table A: Summary of the results of the risk assessment applied to the cryptic wetlands at risk of potential impacts arising from the proposed OHPL.

Phases	Activity	Risk Rating
Construction Phase	Removal of vegetation and associated disturbances to soil, and access to the site, including grading of existing informal farm roads.	L
	Excavation of pits for the pylons.	L
	Mixing and casting of concrete for foundations for the pylons.	L
Operational Phase	Operation and maintenance of the powerline.	L

The activities associated with the construction and operational phases of the proposed OHPL based on the alignment provided by the proponent, include site preparation, excavation of pits and installation of the pylons, and operation and maintenance of the OHPL. Considering that the proposed infrastructure will be located outside the delineated edge of the cryptic wetlands poses a Low risk to the cryptic wetlands. Nevertheless, all mitigation measures as stipulated in this report must be implemented to prevent any negative edge effects from occurring to the cryptic wetlands. Should the OHPL route be adjusted to fall outside of the 500m ZoR of all wetlands, it is the opinion of the freshwater specialist there would be no quantum of risk to the watercourses.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed OHPL are likely to be reduced during the construction and operational phases assuming that a high level of mitigation takes place.

CONCLUSION

Based on the outcome of the risk assessment, the proposed OHPL will have a low impact on the various aspects of freshwater ecology (i.e. habitat and ecology, ecological and socio-cultural service provision and hydrological function and sediment balance) during the construction and operation phases, provided that well-conceived, strictly implemented and managed impact minimisation takes place.

Should the route of the proposed OHPL be required to move/shift within the 300 m corridor, it is recommended that the route be shifted eastwards where the impact to the cryptic wetlands would be lower compared to moving westwards where there are many more cryptic wetlands and a risk of infringing on the property of a different landowner. It is thus the opinion of the freshwater ecologist that the proposed OHPL be considered acceptable, provided that the essential mitigation measures as listed in this report are strictly adhered to.

DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on 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).

No.	Requirements	Section in report/Notes
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Cover Page and Appendix E.
2.2	Description of the preferred development site , including the following aspects-	
2.2.1	a. Aquatic ecosystem type b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns	Section 4 and 5
2.2.2	Threat status, according to the national web based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Section 4: Table 1
2.2.3	National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub- catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Section 4: Table 1
2.2.4	A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including: a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Section 4: Table 1
2.3	Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification	None. Entire site considered very high sensitivity.
2.4	Assessment of impacts – a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Section 7: Table 4
2.4.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	No. Implementation of the proposed mitigation measures will minimise the impacts.
2.4.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	
2.4.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regime (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); b. Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; c. The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.) and d. Assessment of the risks associated with water use/s and related activities.	Section 7: Table 4
2.4.4	How will the development impact on the functionality of the aquatic feature including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of system);	Section 7: Table 4

	b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over abstraction or instream or off-stream impoundment of a wetland or river); c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley-bottom wetland to a channelled valley-bottom wetland); d. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); e. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and f. Loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soil, etc).	
2.4.5	How will the development impact on key ecosystem regulating and supporting services especially Flood attenuation; Streamflow regulation; Sediment trapping; Phosphate assimilation; Nitrate assimilation; Toxicant assimilation; Erosion control; and Carbon storage.	Section 7: Table 4
2.4.6	How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	N/A
2.4.7	In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to: size of the estuary; availability of sediment; wave action in the mouth; protection of the mouth; beach slope; volume of mean annual runoff; and extent of saline intrusion (especially relevant to permanently open systems).	N/A
3.	The report must contain as a minimum the following information:	
3.1	Contact detail of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	Appendix E
3.2	A signed statement of independence by the specialist.	Appendix E
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 5
3.4	The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant.	Section 3, Appendix C
3.5	A description of the assumptions made, any uncertainties or gaps in knowledge or data.	Section 1.2
3.6	The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant.	Section 6
3.7	Additional environmental impacts expected from the proposed development.	Section 7
3.8	Any direct, indirect and cumulative impacts of the proposed development on site.	Section 7
3.9	The degree to which impacts and risks can be mitigated.	Section 7
3.10	The degree to which impacts and risks can be reversed.	Section 7
3.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	Section 5
3.12	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies.	Section 6 & 7
3.13	Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr).	Section 7
3.14	A motivation must be provided if there were development footprints identified as per paragraph 2.3 for reporting in terms of Section 24(5)(a) and (h) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) that were identified as having a “low” aquatic biodiversity and sensitivity and that were not considered appropriate.	None. The entire study area falls within a very high aquatic biodiversity sensitivity
3.15	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not.	Section 8
3.16	Any conditions to which this statement is subjected.	Section 8

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ACRONYMS

°C	Degrees Celsius.
AC	Alternating Current
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
DC	Direct Current
DM	District Municipality
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EC	Ecological Class or Electrical Conductivity (use to be defined in relevant sections)
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
IHI	Index of Habitat Integrity
kV	KiloVolt
LM	Local Municipality
m	Meter
MAP	Mean Annual Precipitation
MC	Management Classes
NBA	National Biodiversity Assessment
NC CBA	Northern Cape Critical Biodiversity Areas
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
NWCS	National Wetland Classification System
OHPL	Overhead Power Line
ONA	Other Natural Area
PES	Present Ecological State
PoSEIA	Plan of Study for Environmental Impact Assessment
PV	Photovoltaic
REC	Recommended Ecological Category
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services
subWMA	Sub-Water Management Area
SEF	Solar Energy Facility
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WRC	Water Research Commission
WULA	Water Use License Application

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 river:	Alluvial river channels are self-formed features, meaning that they are shaped by the magnitude and frequency of the floods that they experience, and the ability of these floods to erode, deposit, and transport sediment. Alluvial channels are, therefore, formed in material that is able to move during moderate floods. This means that the bed and banks of an alluvial river channel are characteristically made up of unconsolidated mobile sediment such as silt, sand or gravel, or (in some cases) cobbles and small boulders. Alluvial river channels tend to erode their banks and deposit the eroded material on bars and on their floodplains.
Alluvial soil:	A deposit of sand, mud, etc. formed by flowing water, or the sedimentary matter deposited thus within recent times, especially in the valleys of large rivers.
Base flow:	Long-term flow in a river that continues after storm flow has passed.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animans and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
Buffer:	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
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.
Chroma:	The relative purity of the spectral colour which decreases with increasing greyness.
Cryptic wetland	Temporary wetlands in very arid areas often too shallow, too saline or too temporarily inundated to exhibit typical wetland features in their soil. Such wetlands are called “cryptic”, and cannot reliably be identified as wetlands during the dry season on the basis of standard wetland identification and delineation tools
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”.
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
Fluvial:	Resulting from water movement.
Gleying:	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydromorphic soil:	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soil).
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Hydromorphy:	A process of gleying and mottling resulting from the intermittent or permanent presence of excess water in the soil profile.
Hydrophyte:	Any plant that grows in water or on a substratum that is at least periodically deficient of oxygen as a result of soil saturation or flooding; plants typically found in wet habitats.
Intermittent flow:	Flows only for short periods.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soil with variegated colour patterns are described as being mottled, with the “background colour” referred to as the matrix and the spots or blotches of colour referred to as mottles.
Obligate species:	Species almost always found in wetlands (>99% of occurences).
Perched water table:	The upper limit of a zone of saturation that is perched on an unsaturated zone by an impermeable layer, hence separating it from the main body of groundwater
Perennial:	Flows all year round.

RDL (Red Data listed) species:	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status
Seasonal zone of wetness:	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50cm of the surface
Temporary zone of wetness:	the outer zone of a wetland characterised by saturation within 50cm of the surface for less than three months of the year
Watercourse:	In terms of the definition contained within the National Water Act, a watercourse means: • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; • and a reference to a watercourse includes, where relevant, its bed and banks
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soil, which may in turn have an influence on the ecological characteristics and functioning of wetlands.

1 INTRODUCTION

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecological assessment as part of an Environmental Authorisation and Water Use Authorisation (WUA) processes for the proposed 132 kV Overhead Powerline (OHPL) route and associated substation as part of the Hyperion Hybrid Facility, near Kathu in the Northern Cape Province. The proposed OHPL is situated approximately 12 km north-east of the town of Kathu, with the N14 located approximately 3.6 km from the location of the proposed OHPL. The area to be developed is situated within the Gamagara Metropolitan Municipality which is an administrative area of the John Taolo Gaetses District Municipality. A description of the project is provided in Section 2.

In order to identify all potential watercourses that may potentially be impacted by the proposed OHPL, a 500 m “zone of investigation” around the proposed OHPL and associated substation, in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA), was used as a guide in which to assess possible sensitivities of the receiving freshwater environment. This area – i.e. the 500 m zone of investigation around the proposed OHPL - will henceforth be referred to as the “investigation area”.

The purpose of this report is to define the ecology of the area from a watercourse resource management perspective, including mapping and classification of watercourse delineated during the field assessment undertaken by SAS in 2018 and 2019, as well as delineations of watercourses identified within the investigation area which were mapped using desktop methods. This study makes use of various spatial databases (such as, but not limited to, the National Freshwater Ecosystem Priority Area (NFEPA), the National Biodiversity Assessment (NBA) 2018, and the Northern Cape Critical Biodiversity Areas (2016) database) to further define the ecology of the area associated with the proposed OHPL. It is a further objective of this study to provide detailed information when considering the proposed OHPL activities in the vicinity of the identified watercourses, to ensure the ongoing functioning of the ecosystems, such that local and regional conservation requirements and the provision of ecological services in the local area are supported while considering the need for sustainable economic development.

The Department of Water and Sanitation (DWS) Risk Assessment Matrix (2016) as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998), and the impact assessment methodology (as provided by the EAP), were applied to determine the significance of the perceived impacts associated with the proposed OHPL, and the operational activity impacts on the receiving freshwater environment. In addition, mitigatory measures were developed which aim to minimise the perceived impacts associated with the proposed OHPL, followed by an assessment of the significance of the impacts after mitigation, assuming that they are fully implemented.

This report, after consideration and a description of the ecological integrity of the investigation area and watercourses associated with the proposed OHPL, must guide the Environmental Assessment Practitioner (EAP) as well as the proponent and the relevant authorities, by means of a reasoned opinion and recommendations, as to the viability of the proposed OHPL from a watercourse resource management point of view and provide recommendations to minimise the impacts on the receiving freshwater environment in line with the requirements of the mitigation hierarchy as advocated by the Department of Environmental Affairs (DEA) and DWS.

1.1 Structure of this report

This report investigates the impact significance of the proposed OHPL and associated substation development in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998)

(NEMA) as well as the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The following structure applies to this report:

Section 1: Introduction
Provides an Introduction, the structure of this report, the assumptions and limitation and indemnity of use.

Section 2: Project Description
This section provides a project description and the locality and layout of all proposed activities.

Section 3: Assessment Approach
Provides the relevant methodology and definitions, a description of the sensitivity mapping and the risk/impact assessment approach. Additional information regarding the methodology is provided in Appendix C.

Section 4: Desktop Assessment Results
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 Biodiversity Assessment (NBA) 2018, the Northern Cape Critical Biodiversity Areas (NCCBA) (2016) database and the Department of Water and Sanitation (DWS) Resource Quality Information System (RQIS) PES/EIS, 2014 database) were considered to aid in defining the PES and EIS of the watercourses.

Section 5: Watercourse Assessment
This section reports on the following scope of work:

- Delineation of all the watercourses associated with the development area based on findings from previous studies (SAS, 2019) using the Department of Water Affairs and Forestry (DWAF) 2008[1] guideline: "A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones";
- Delineation of all watercourses (utilising desktop methods) within 500m of the proposed OHPL in accordance with Government Notice 509 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA);
- The watercourse classification according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013);

Section 6: Legislative Requirements
Provides the applicable legislative requirements based on the findings from Section 5 and indicates any applicable zones of regulation in accordance with the relevant legislations that may trigger various authorisation requirements.

Section 7: Impact Assessment
Provides the outcomes from the Impact Assessment methodology (as provided by the EAP) and the DWS Risk Assessment Matrix which highlight all potential impacts that may affect the watercourses. Management and mitigation measures are provided which should be implemented during the various development phases to assist in minimising the impact on the receiving environment.

Section 8: Conclusion
Summarises the key findings and recommendations based on the watercourse findings as well as the impact assessment.

[1] The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA). At present, the Department is known as the Department of Water and Sanitation (DWS). For the purposes of referencing in this report, the name under which the Department was known during the time of publication of reference material, will be used.

1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The determination of the watercourse boundaries and the assessment thereof is confined to the watercourses within the proposed OHPL route and investigation area. The watercourses identified were delineated based on the findings of the field assessment undertaken by SAS in 2018 and 2019, and in fulfilment of Government Notice 509 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). However, these resources were not assessed individually. The general surroundings were considered in the desktop assessment of the investigation area;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. This is especially applicable given the semi-arid climatic conditions of the Northern Cape;
- The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) detailed assessments of the watercourses were not undertaken because all the watercourses identified occur within investigation area and none fall within the proposed route of the OHPL. The PES and EIS as indicated by the relevant desktop databases were thus used to inform the DWS Risk Assessment matrix and impact assessment methodology (as provided by the EAP);
- The delineations as presented in this report are regarded as the best estimate of the boundaries of the watercourse based on the site conditions present at the time of assessment (November 2018 and February 2019). Limitations in the accuracy of the delineation due to low water levels within the systems and anthropogenic disturbances are deemed possible;
- Watercourse and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate freshwater species. Within this transition zone some variation of opinion on the watercourse boundary may occur, however, if the DWAF (2008) method is followed, all assessors should get largely similar results; and
- Global Positioning System (GPS) technology is inherently inaccurate, and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the watercourses will need to be surveyed and pegged according to surveying principles.

2 PROJECT DESCRIPTION

The development of a 132 kV OHPL route and associated substation as part of the Hyperion Hybrid Facility is proposed on the remaining portion of the Farm Lyndoch 432 (portion 1 of Farm Selsden 464 and Farm Kathu 465), which is located approximately 16 km north of the town of Kathu in the Gamagara Local Municipality (LM) and within the greater John Taolo Gaetsewe District Municipality (DM), in the Northern Cape Province.

The proposed 132 kV OHPL will be approximately 8 km in length and will be located from the new Hyperion on-site substation, to the existing Eskom Kalbas Substation (existing national grid). The OHPL has two-end alternative alignments when connecting to the Eskom substation (Figure 1); however, the final one is yet to be confirmed. As such, both alternative alignments were assessed accordingly.

Please note that the OHPL route depicted in Figures 1 and 2 below are a preliminary OHPL route. A 300 m corridor is thus assessed to provide flexibility with minor changes of the OHPL route should any be required during construction.

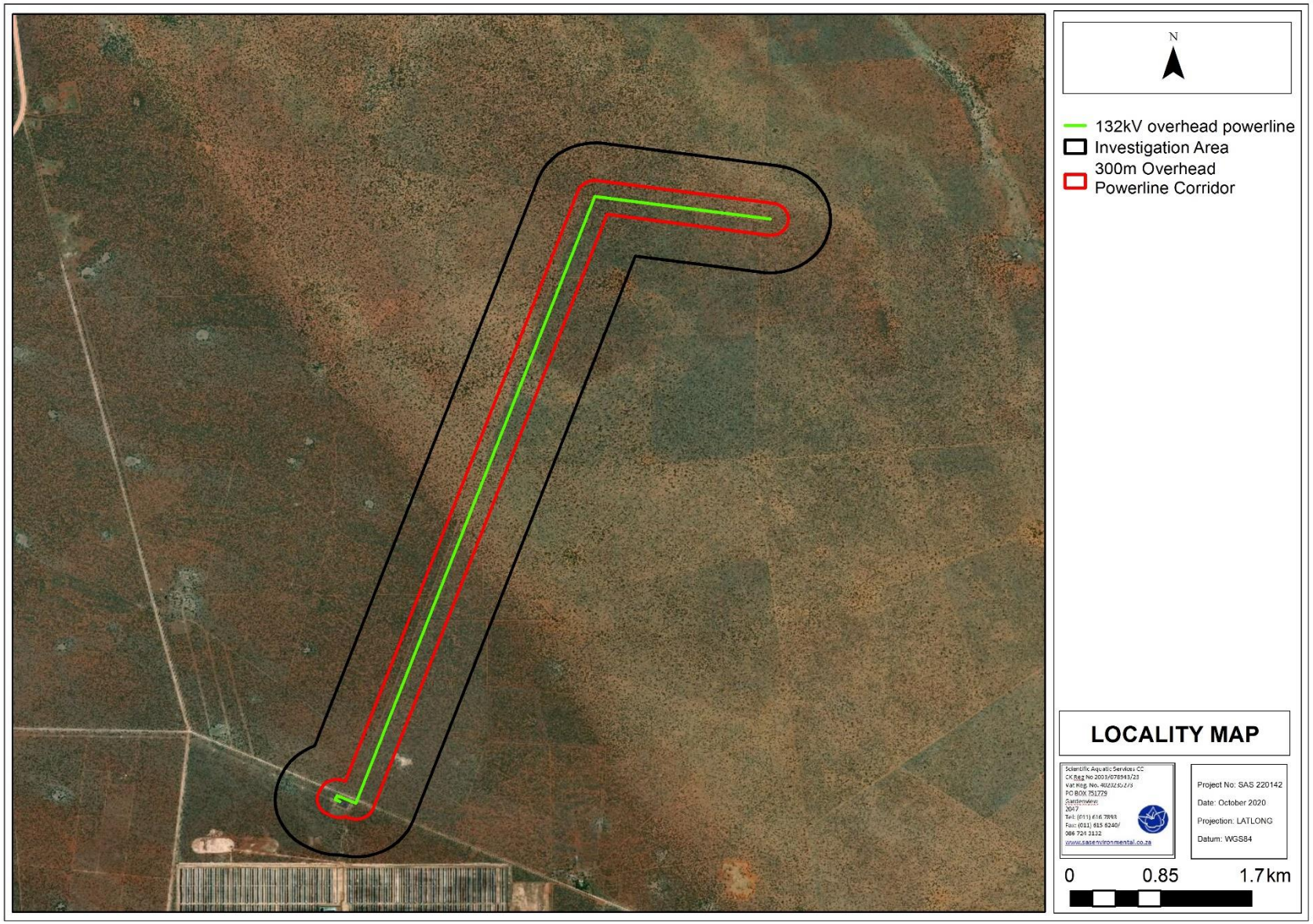

Figure 1: Digital satellite image depicting the proposed OHPL, 300 m corridor and investigation area in relation to surrounding areas.

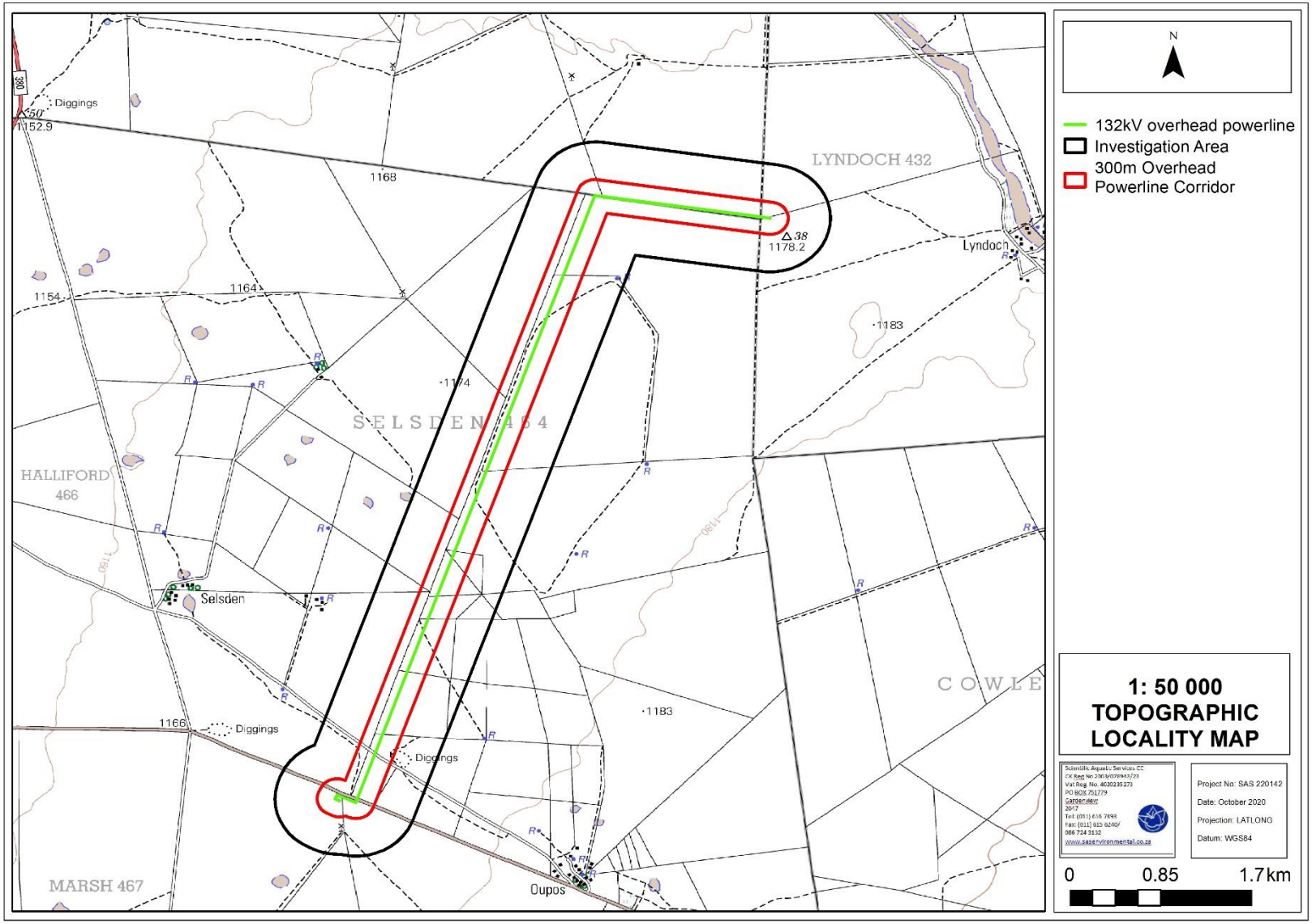

Figure 2: Location of the proposed OHPL, 300m corridor and investigation area depicted on a 1:50 000 topographical map in relation to the surrounding area.

3 ASSESSMENT APPROACH

3.1 Watercourse Site Selection and Field Verification

For this investigation, the definition of a watercourse, wetland and riparian habitat was taken as per that in the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The definitions are as follows:

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 to be a watercourse, and a reference to a watercourse includes where relevant, its bed and banks.

Wetland means-
"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."

Riparian habitat includes-
"The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soil, 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 areas".

During the desktop phase, use was made of topographical maps, digital satellite imagery, and available provincial and national freshwater databases to identify points of interest for the field survey. Details of the relevant databases which were consulted are contained in Section 4 of this report. Points of interest were defined considering the following:

- Encompassing a geographic spread of points to ensure that all conditions in the area were adequately addressed; and
- Ensuring that features displaying a diversity of digital signatures were identified to allow for field verification. In this regard specific mention is made of the following:
  - Freshwater vegetation: a distinct increase in density as well as tree size near drainage lines;
  - Hue: with drainage lines and outcrops displaying soil of varying chroma created by varying vegetation cover and soil conditions identified; and
  - Texture: with areas displaying various textures, created by varying vegetation cover and soil conditions being identified.

Where possible, use was made of the findings from the field assessment undertaken in 2018 and 2019 (SAS, 2019) to verify the watercourses identified from the various desktop databases consulted. During the site assessment, the watercourse delineation took place according to the method presented in "A practical field procedure for identification and delineation of wetlands and riparian areas" (DWAF, 2008) as far as practically feasible, given the condition of the onsite characteristics at the time of assessment. The foundation of the method is based on the fact that watercourses have several distinguishing factors including the following:

- Landscape position;
- The presence of water at or near the ground surface;
- Distinctive hydromorphic soil;

- Vegetation adapted to saturated soil; and
- The presence of alluvial soil in stream systems.

3.1 Sensitivity Mapping

All watercourses associated with the proposed OHPL and investigation area were considered and all sensitive areas were delineated at a desktop level following the applicable legislative requirements. The sensitivity map is provided in Section 6 of this report.

3.2 Risk Assessment and recommendations

Following the completion of the assessment, an impact assessment methodology (as provided by the EAP) and the DWS Risk Assessment Matrix were conducted (please refer to Appendix C for the methods of approach) and recommendations were developed to address and mitigate impacts associated with the proposed OHPL. These recommendations also include general management measures which apply to the proposed OHPL as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the OHPL from planning, through construction and operation. The detailed mitigation measures are outlined in Section 7 of this report, while the general management measures, which are considered to be best practice mitigation applicable to a project of this nature, are outlined in Appendix D.

4 RESULTS OF THE DESKTOP ANALYSIS

The following section contains data accessed as part of the desktop assessment which is presented as a “dashboard-style” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible, to allow the reader to understand how this information has been integrated into the findings of this report.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics associated with the study area at the scale required to inform the environmental authorisation and/or water use authorisation processes. Given these limitations, this information is considered useful as background information to the study, is important in legislative contextualisation of the risks and impacts, and was thus used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance during the field survey. It must however be noted that site verification of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision making process.

Table 1: Desktop data relating to the character of the watercourses associated with the proposed OHPL and surrounding region.

Aquatic ecoregion and sub-regions in which the proposed OHPL is located	
Ecoregion	Southern Kalahari Ecoregion
Catchment	Orange
Quaternary Catchment	D41K
WMA	Lower Vaal
subWMA	Molopo
Dominant characteristics of the Southern Kalahari (29.01) Aquatic Ecoregion Level 2 (Kleynhans *et al.*, 2007)	
Dominant primary terrain morphology	Plains; moderate relief, closed hills, mountains; moderate and high relief. Extremely irregular plains, lowlands and hills. Slightly irregular plains and pans
Dominant primary vegetation types	Karroid Kalahari Bushveld, Kalahari Mountain Bushveld, Kalahari Plateau Bushveld
Altitude (m a.m.s.l)	700 to 1500
MAP (mm)	0 to 500
Coefficient of Variation (% of the MAP)	30 to 40
Rainfall concentration index	60 to >65
Rainfall seasonality	Late Summer
Mean annual temp. (°C)	16 to 22
Winter temperature (July)	0 to 22
Summer temperature (Feb)	16 to >32
Median annual simulated runoff (mm)	<5 to 40
Ecological Status of the most proximal sub-quaternary reach (DWS, 2014)	
Sub-quaternary reach	D41K-02240 (Vlermuisleegte River)
Proximity to the investigation area?	± 7,8 km north-west of the investigation area
Assessed by an expert?	No (Episodic river*)
Mean Ecological Importance (EI) Class	Moderate
Mean Ecological Sensitivity (ES) Class	High
Stream Order	1
Default Ecological Class (based on median PES and highest EI or ES mean)	Moderate (Class C)
Phase 2 Strategic Environmental Assessment for Wind and Solar PV Energy in South Africa	

Detail of the proposed OHPL in terms of the National Freshwater Ecosystem Priority Area (NFEPA, 2011) database	
FEPACODE	The proposed OHPL is situated in an area defined as an upstream management catchment. Upstream management catchments are required to prevent the downstream degradation of Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Areas (FSAs).
NFEPA Wetlands (Figure 3 &4)	According to the NFEPA database (2011) a natural flat wetland is located within the southern portion of the investigation area. According to the NFEPA Database, the natural flat wetland is in a natural or good ecological condition (Class AB).
Wetland Vegetation Type	Eastern Kalahari Bushveld Group 1 (Least Threatened according to SANBI, 2012 and Mbona *et al*, 2015))
NFEPA Rivers (Figure 3)	The episodic Vlermuisleegte River is located 1 km north-east of the investigation area. This river is considered to be in a largely natural ecological condition according to the PES 1999, however, according to NFEPA database, the river is considered to be in a moderately modified ecological condition (Class C). Additionally, the river is considered an upstream management river.
Detail of the proposed OHPLin terms of the Northern Cape Critical Biodiversity Areas (2016) (Figure 6)	
Ecological Support Areas (ESA)	The southern portion of the proposed OHPL falls within an area classified as an ESA. According to the technical guidelines for CBA Maps document ESAs are areas which must retain their ecological processes 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's not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017).
Other Natural Areas (ONA)	The eastern portion of the proposed OHPL is located within an area defined as "other natural areas" (ONA). According to the technical guidelines for CBAmaps document 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).
National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Figure 5)	
According to the NBA (2018):SAIIAE there is one natural depression located within the southern portion of the investigation area. The depression wetland is indicated as being in a natural or good ecological condition (Class AB). The depression wetland is currently poorly protected (Ecosystem Protection Level (EPL)), and of least concern (Ecosystem Threat Status (ETS)). The Vlermuisleegte River is currently not protected (EPL), and is therefore considered endangered (ETS). At the time of the compilation of the NBA Dataset the Vlermuisleegte River was dry and therefore it is data deficient.	
The proposed OHPL is located within an approved area for solar energy according to the South African Renewable Energy EIA Application Database, and falls within the northern corridor of the Strategic Transmission Corridors, in terms of GNR 113 of 16 February 2018.	

National Web Based Environmental Screening Tool (2020)	
The screening tool is intended for pre-screening of sensitivities in the landscape to be assessed within the EIA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas.	The aquatic sensitivity for the proposed OHPL and surrounds has a very high sensitivity, as a result of wetlands located within the proposed OHPL route Additionally, the proposed OHPL is located within a groundwater strategic water source area (SWSA). Groundwater SWASs are areas which have a high groundwater recharge / availability and are classified as a nationally important resource.

*** With the Vlermuisleegte River being classified as an episodic river, no fish or macro-invertebrates could be recorded. CBA = Critical Biodiversity Area; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; ESA = Ecological Support Area; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; ONA = Other Natural Areas; PES = Present Ecological State; PV = Photovoltaic; WMA = Water Management Area**

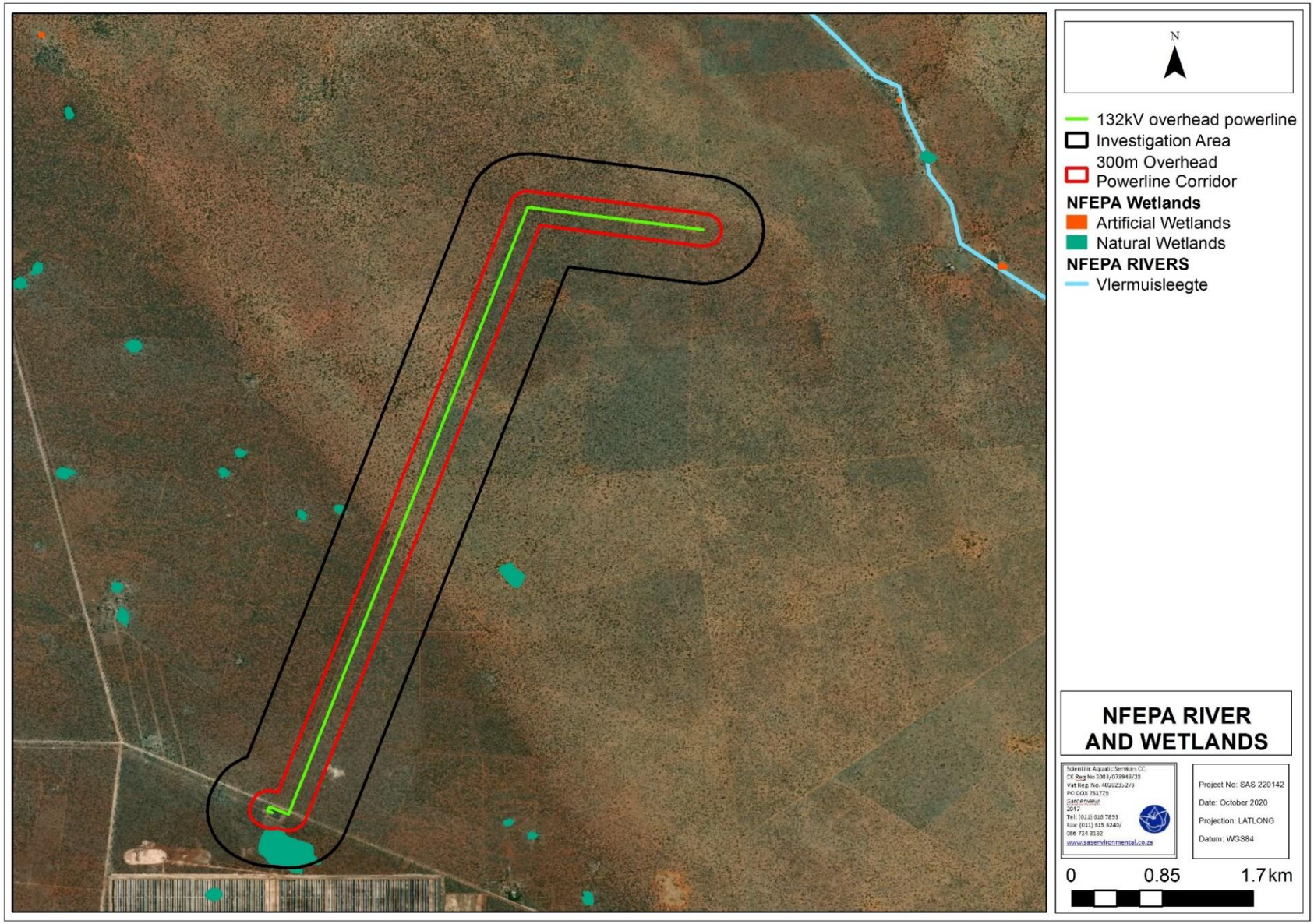

Figure 3: The natural and artificial wetlands and Vlermuisleegte River associated with the proposed OHPL, 300m corridor and investigation area according to the NFEPA database (2011).

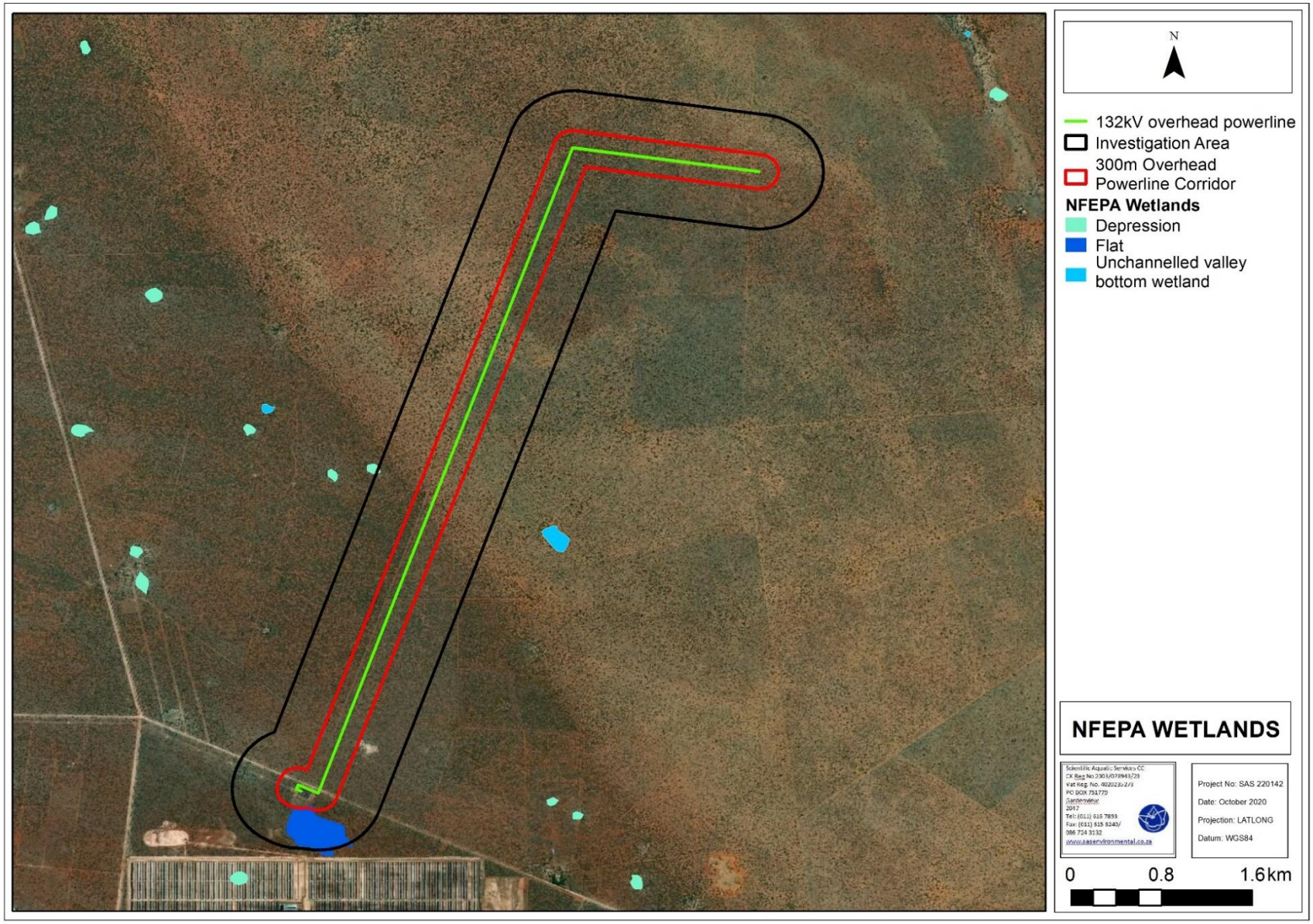

Figure 4: The hydrogeomorphic (HGM) units associated with the proposed OHPL, 300m corridor and investigation area according to the NFEPA database (2011).

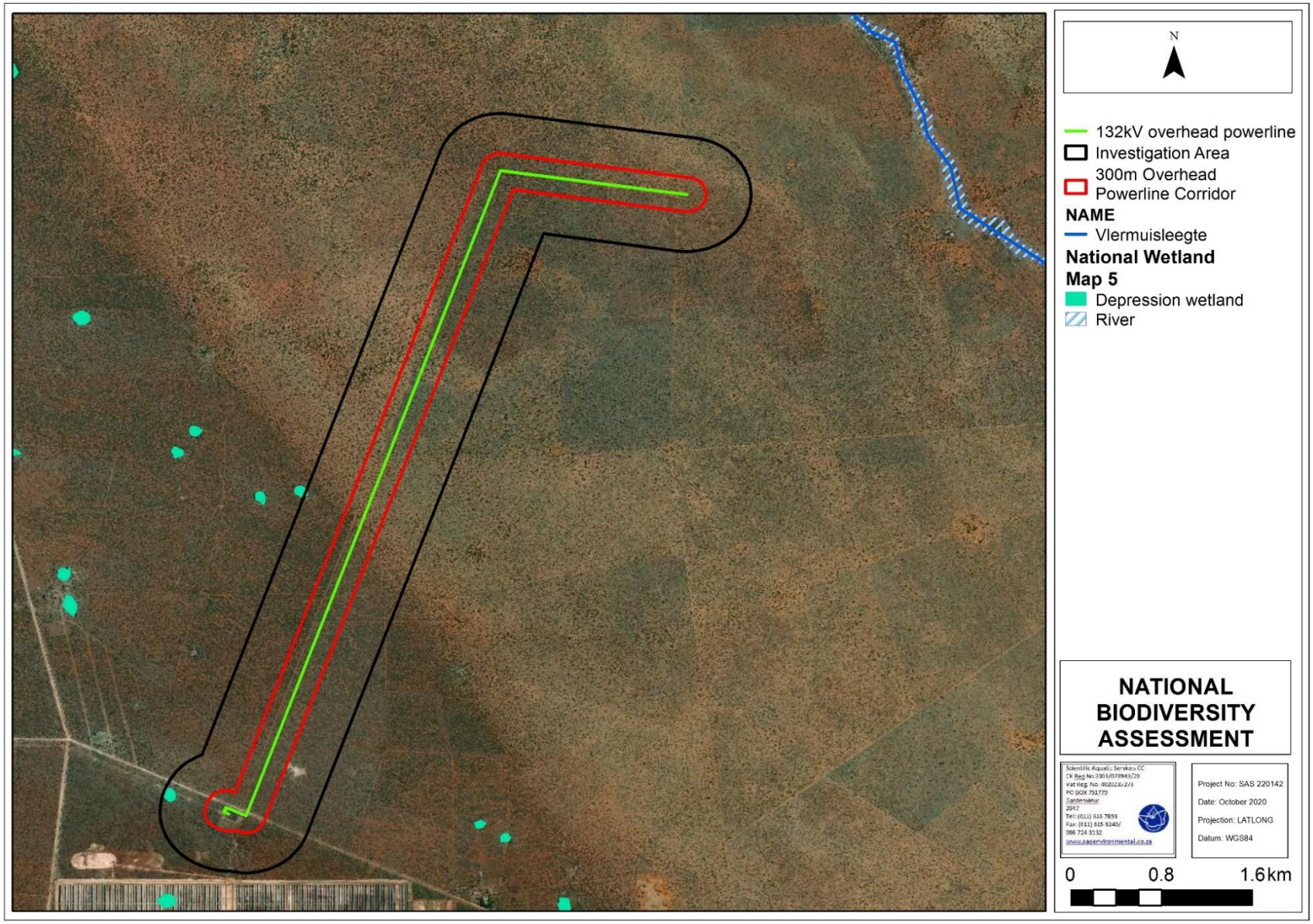

Figure 5: Vlermuisleegte River and natural depression wetlands associated with the proposed OHPL, 300m corridor and investigation area according to the National Biodiversity Assessment (NBA) (2018).

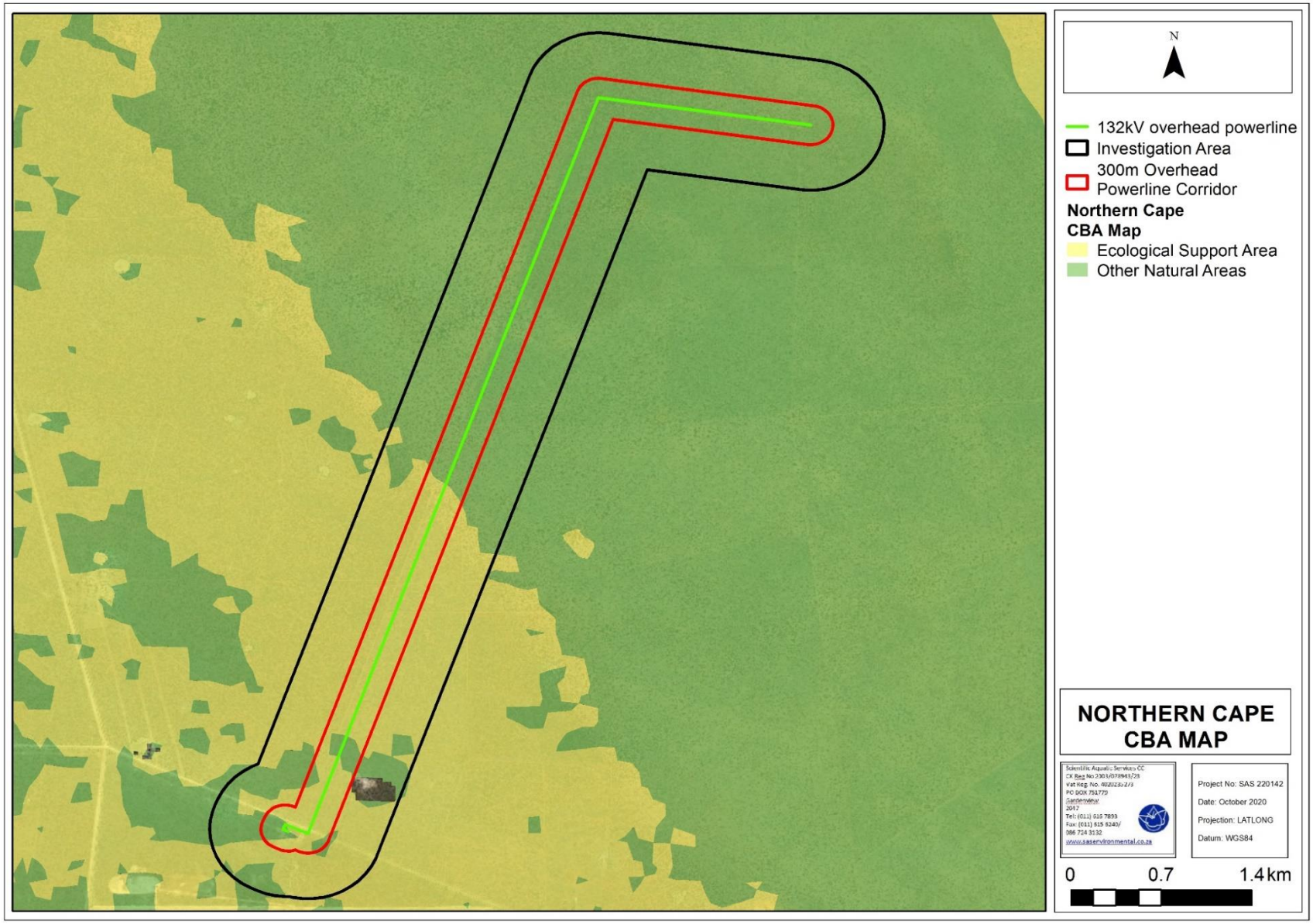

Figure 6: The Ecological Support Areas associated with the proposed OHPL, 300m corridor and investigation area according to the Northern Cape Critical Biodiversity Area Database (2016).

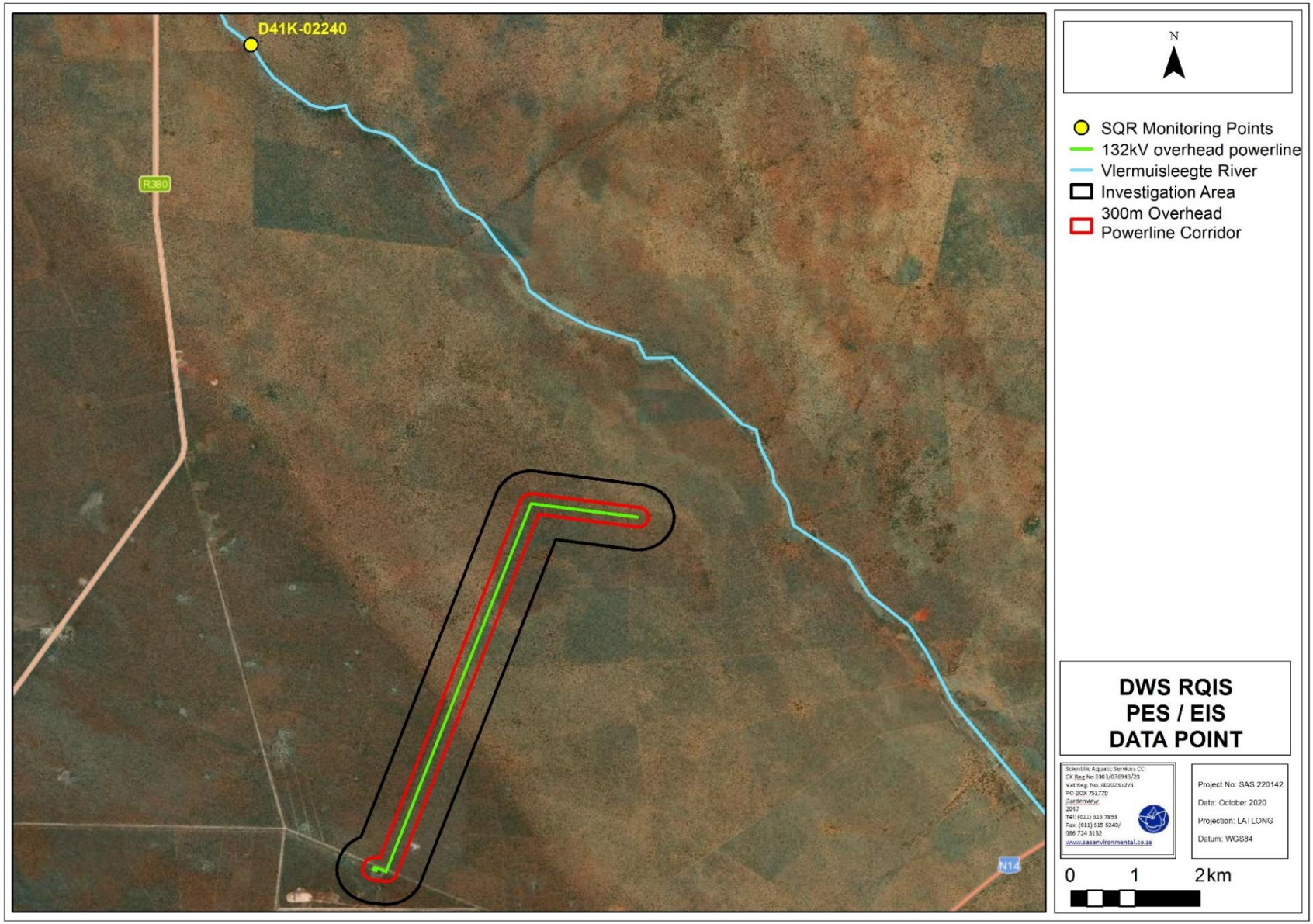

Figure 7: The SQR Monitoring Point associated with the Vlermuisleegte River, in relation to the proposed OHPL, 300m corridor and investigation area.

5 WATERCOURSE ASSESSMENT

5.1 Watercourse Delineation

The watercourses identified by the NFEPA and NBA databases were verified during the field assessment undertaken in 2018 and 2019 (SAS, 2019). Based on the field assessment, no watercourses are traversed by the proposed OHPL or occur within the 300 m corridor. However, a quarry, which may have historically been a pan, occurs on the south-eastern extent of the 300 m corridor (see Figure 8 and 11 below). Several watercourses were identified within the investigation area and immediately outside the investigation area (Figure 11 below). The Vlermuisleegte River which drains in a south-eastern to north-western direction is located 1 km north-east of the investigation area (SAS, 2019).

As discussed in Section 3.1, the industry standard guidelines provided by DWAF (2008) for the identification and delineation of wetlands and riparian zones was used as a basis for the delineation of the watercourses identified on site during the 2018 and 2019 field assessment (SAS, 2019). Onsite delineation was supplemented with the use of digital satellite imagery to assist in the delineation of watercourses that were not visited during the 2018 and 2019 field assessment. However, due to the typically arid conditions of the region, additional indicators, as provided by Day *et al* (2010) were utilised. Whilst the presence of "vegetation typically adapted to life in saturated soil under "normal circumstances" is the key determinant in the definition of a wetland according to the NWA, such features are not always present in wetlands in arid to semi-arid environments such as the Northern Cape (based on experience within the region), the features identified within and in the vicinity of the investigation area are defined as either cryptic wetlands or seasonal depressions.

Several indicators can be used to identify and delineate the boundaries of cryptic wetlands and seasonal depressions. During the assessment, the following indicators were used to identify and delineate the boundaries of the cryptic wetlands and seasonal depressions:

- Topography/elevation was a key determinant in the identification of these features. Cryptic wetlands were identified as areas situated within distinct, low-lying depressions in the landscape, and as clear endorheic systems where surface water, when sufficient is present, will accumulate. Seasonal depressions were defined as low-lying areas in the landscape, usually but not always possessing closed contours and as inwardly draining;
- Sediment deposits on plants: the presence of sediment deposits on rocks or plants indicates minimum levels of inundation; thus a feature displaying such deposits is assumed to be seasonally inundated. The absence of such sediment deposits is inconclusive, and other indicators may be required to determine whether a feature is seasonally inundated. Whilst this is a subtle determinant of possible wetland conditions in some of the assessed features, it was nevertheless apparent in sufficient features to be utilised as an indicator, particularly for the features identified as cryptic wetlands;
- Soil wetness / morphological characteristics: whilst soil wetness is considered by Day *et al.* (2010) to be an unreliable indicator of wetlands in arid areas, consideration was nevertheless given to the soil classification and morphological characteristics. The soil characteristics differed between the two types of features, with those in the cryptic wetlands predominantly lacking in chroma whilst the soils in seasonal depressions were generally high-chroma, sandy soils; and
- Vegetation: Due to the semi-arid climate of the study area, the absence of obligate floral species was expected, and none were identified. According to Day *et al.* (2010), the absence of both dryland and wetland plants from a site may equally be an indicator of a cryptic wetland. However, five floral indicators were generally present within the cryptic wetlands, and a combination of at least two of these within any given feature was considered sufficient, in conjunction with other indicators, to classify a feature as a cryptic wetland. These floral

indicators were *Eragrostis bicolor*, *Eragrostis echinochloidea*, *Aristida congesta* subsp. *congesta*, *Cullen tomentosum* and *Ziziphus mucronata*. The floral species associated with seasonal depressions were different from those depressions classified as cryptic wetlands, but some overlapping of floral component was still noted. The seasonal depressions were dominated floristically by *Tarchonanthus camphoratus* (camphor bush) and *Chrysocoma obtusata* as well as *Eragrostis x pseudo-obtusa* (false tick grass). Additionally, the woody component associated with the seasonal depressions occurred throughout the depression, whereas the woody component associated with the cryptic wetlands was largely limited to the outer boundaries thereof.

The figure below shows the quarry as was identified on site. Soil disturbance including the presence of informal roads, soil deposition and excavation were observed in the quarry. Vegetation noted to occur throughout and along the edges of the quarry included a combination of graminoid species such as *Eragrostis cf. echinochloidea* × *obtuse*, *Enneapogon desvauxii*, *Aristida sp*., *Eragrostis lehmanniana*; forb species such as *Cullen tomentosum* and *Laggera decurrens* and tree species such as *Senegalia melifera*, *Lycium hirsutum*, *Pentzia sp*., *Diospyros lycioides*, and *Chrysocoma sp*. These species typically occur in arid environments as noted on site.

Figure 8: Photographs showing the feature labelled as a quarry. (Top): evidence of infill and sediment deposition along the edge of the quarry, (Bottom): conditions within the quarry showing soil disturbance and evidence of recent excavation and deposition of soil within the quarry.

The figure below depicts a typical cryptic that occurs on site, showing a distinct woody edge. Woody vegetation noted around the edge of this cryptic wetland includes *Senegalia mellifera*, *Tarchonanthus camphoratus* and *Vachellia erioloba*.

Figure 9: A typical photograph of one of the cryptic wetlands that was identified on site showing a distinct woody edge and minimal vegetation in the centre of the cryptic wetland. This cryptic wetland is located towards the south of the proposed OHPL but outside the investigation area.

5.2 Characterisation of the Watercourses

Wetlands in arid areas are under-researched, particularly cryptic wetlands such as those identified in the investigation area and vicinity thereof, and little is known about the biodiversity associated with such systems (Henschel, unknown date, retrieved from http://fbip.co.za/wp-content/uploads/2018/08/Henschel-Abstract-2017-Small-Project.pdf , 18th March 2020). Thus, the cryptic wetlands identified in this study may not always possess key indicators typically associated with wetlands in South Africa, such as hydrophytic vegetation. Such systems are nevertheless deemed to be potentially ecologically important and may play a significant role in the ecology of the area. For example, cryptic wetlands such as those identified may host populations of invertebrates (mostly Branchiopods but also Phyllopods) which are considered keystone species of ephemeral pans globally, playing a pivotal role in the food web as prey (Henschel; unknown date of publication).
Thus, it is the opinion of the specialist that the cryptic wetlands identified within and in the vicinity of the investigation area should be afforded the same protection as a wetland which meets the legislated definition thereof, and that suitable mitigation measures be implemented to minimise impacts to these features.

The seasonal depressions did not meet the definitions of cryptic wetlands or watercourses from an ecological perspective (as defined by the NWA) and were therefore excluded from further assessment. Nevertheless, should these features be found to possess a 1:100 year floodline, from a legal perspective, they would be considered as watercourses and would enjoy protection as such. Determination of a 1:100 year floodline should be undertaken by a suitably qualified specialist, if necessary.

Classification of the cryptic wetlands was undertaken at Levels 1 - 4 of the Classification System (Ollis *et al*, 2013). These systems were classified as Inland Systems falling within the Southern Kalahari Aquatic Ecoregion and the Eastern Kalahari Bushveld Group 1 Wetland Vegetation (WetVeg) group, considered as “least threatened” by SANBI (2012) and Mbona *et al.,* (2015). The table below presents

the further classification of these cryptic wetlands at Levels 3 and 4 of the Classification System (Ollis *et al.,* 2013).

Table 2: Characterisation of the "cryptic wetlands" identified within the investigation area and vicinity thereof, according to the Classification System (Ollis *et al*., 2013).

Drainage system	Level 3: Landscape unit	Level 4: Hydrogeomorphic Unit
		HGM Type
Cryptic wetlands	**Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land.	**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.

5.3 Ecological Assessment Results

Following the site assessment, detailed assessments of the PES and EIS of the cryptic wetlands were not undertaken because all the cryptic wetlands identified only occur within investigation area and none fall within the 300 m corridor. Therefore, relevant desktop databases and previous studies (SAS, 2019), were utilized to highlight the PES and EIS of the cryptic wetlands, supported by site observations.

The results of the assessment of the relevant desktop databases and previous studies indicate that the cryptic wetlands identified are in a largely natural ecological condition, with few to no impacts on the hydraulic and geomorphological processes. The area surrounding the identified cryptic wetlands is mainly natural, untransformed areas; however, sand mining and various informal roads were identified as the main anthropogenic activities occurring within the local catchment of these wetlands. Due to the natural semi-arid climatic conditions of the Northern Cape, assessing ecological service provision, importance and sensitivity can be challenging. As such freshwater systems (i.e. the cryptic wetlands) are under-researched, and little is known about the way in which they function and their contribution to the greater ecology of the area. Furthermore, the indices developed for the assessment of South African wetlands are largely focused towards assessing those systems found in higher rainfall regions than the study site and are thus geared towards systems which are less temporary in nature. The figure below shows conditions of one of the cryptic wetlands identified on site.

Figure 10: A cryptic wetland towards the southern extent of the investigation area west of the proposed OHPL. (Top): The extent of the cryptic wetland is indicated by the blue dashed line; (Bottom left): evidence of sediment deposition and (Bottom right): bare areas within the cryptic wetland but the rest of the wetland remains largely intact.

Extent of modification anticipated

No modification is anticipated to the extent of the delineated cryptic wetlands. No infrastructure is proposed within the cryptic wetlands that may fragment or degrade the system.

The cryptic wetland and seasonal depressions as described above are presented in relation to the proposed infrastructure footprint in Figure 11 below.

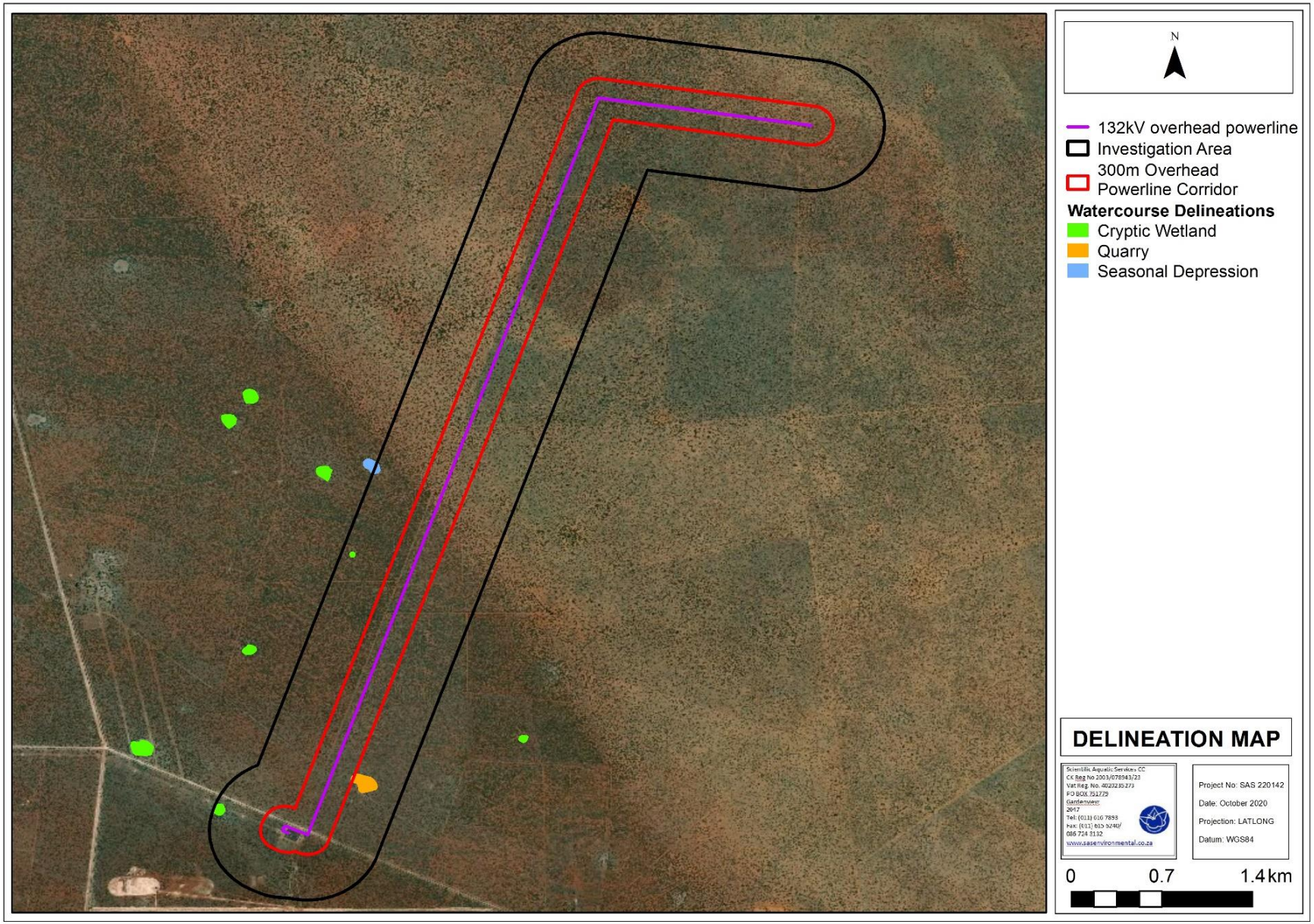

Figure 11: The locality of the watercourses associated with the OHPL and investigation area.

6 LEGISLATIVE REQUIREMENTS

The following legislative requirements were considered during the assessment. A detailed description of these legislative requirements is presented in Appendix B of this report:

- The Constitution of the Republic of South Africa, 1996[2];
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA); and
- 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).

According to Macfarlane *et al.* (2015) the definition of a buffer zone is variable, depending on the purpose of the buffer zone, however, it is considered to be "a strip of land with a use, function or zoning specifically designed to protect one area of land against impacts from another". Buffer zones are considered to be important to provide protection of basic ecosystem processes (in this case, the protection of aquatic and wetland ecological services), reduce impacts on water resources arising from upstream activities (e.g. by removing or filtering sediment and pollutants), provision of habitat for aquatic and wetland species as well as for certain terrestrial species, and a range of ancillary societal benefits (Macfarlane *et. al,* 2015). It should be noted, however, that buffer zones are not considered to be effective mitigation against impacts such as hydrological changes arising from stream flow reduction, impoundments or abstraction, nor are they considered to be effective in the management of point-source discharges or contamination of groundwater, both of which require site-specific mitigation measures (Macfarlane *et. al,* 2015).

The definition and motivation for a regulated zone of activity for the protection of watercourses can be summarised as follows:

Table 3: Articles of legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998). ***Department of Water and Sanitation***	In accordance with General Notice 509 of 2016, a regulated area of a watercourse for section 21c and 21i of the National Water Act, 1998 (Act 36 of 1998) is defined as: • 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 **500m radius** from the delineated boundary (extent) of any wetland or pan.
Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998). ***Department of Environmental Affairs and Development Planning***	The EIA Regulations (2014), as amended in April 2017, must be taken into consideration if any activities (for example, stockpiling of soil) are to take place within the applicable zone of regulation. This must be determined by the EAP in consultation with the relevant authorities. The following activities are considered as part of this freshwater assessment:

[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, 19996". 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.

	Activity 12 of Listing Notice 1 (GN 327) of the NEMA EIA regulations, 2014 (as amended) states that: *The development of:* *(xii) 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 has been adopted, within **32 meters of a watercourse**, measured from the edge of a watercourse.* Excluding – where such development occurs within existing roads, [or] road reserves **Activity 19** of Listing Notice 1 (GN 327) of the NEMA EIA regulations, 2014 (as amended) states "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse".*

Based on the above applicable legislation, the following Zones of Regulation (ZoR) were applied:

- A 32m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) was applied to all the cryptic wetlands associated with the OHPL and within the 300m corridor and investigation area;
- Zones of Regulation in accordance with Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA):
    - 500m Zone of Regulation applied to the wetlands (cryptic wetlands).

The applicable Zones of Regulation are depicted in Figure 12 below, which indicated the following:

- No infrastructure is located within the 32m NEMA ZoR of the watercourses; and
- The central to southern portion of the 300m corridor associated with the proposed OHPL is located within the 500m GN509 ZoR of some of the cryptic wetlands.

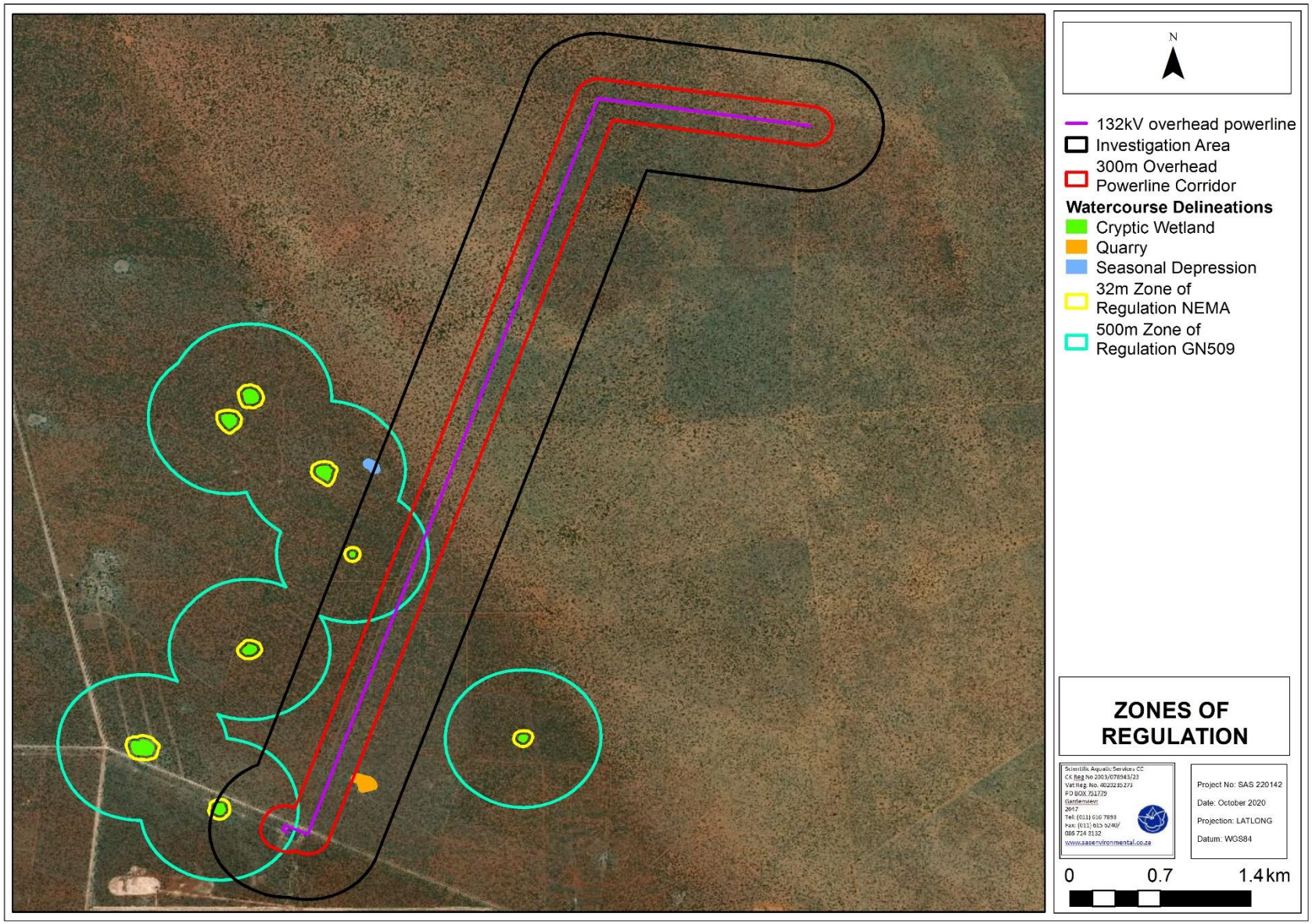

Figure 12: Map indicating the NEMA and GN509 regulated areas applicable to the cryptic wetlands associated with the investigation areas and vicinity thereof.

7 IMPACT ASSESSMENT

This section provides the impact assessment outcomes and highlight all potential impacts and that may affect the identified cryptic wetlands. The risk assessment is undertaken according to the DWS specified Risk Assessment Matrix (as promulgated in GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)), and results translated into the impact assessment methodology provided by the EAP (refer to Section 7.2). Management and mitigation measures are provided which should be implemented during the various development phases to assist in minimising the impact on the receiving environment.

7.1 DWS RISK ASSESSMENT

Following the assessment of the watercourses, the DWS specified Risk Assessment Matrix (as promulgated in GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)) was applied to ascertain the significance of risk associated with the proposed OHPL on the key drivers and receptors (hydrology, water quality, geomorphology, habitat and biota) of the cryptic wetlands identified. The points below summarise the considerations undertaken:

- The proposed OHPL (and associated pylons and substation) are located outside the boundaries of the delineated cryptic wetlands and their 32 m NEMA Zone of Regulation (ZoR), but two systems fall within the 500 m ZoR. However, it is not anticipated that there would be any direct negative impacts to the cryptic wetlands due to their distance from the watercourses;
- At the time of this assessment the layout of the proposed access roads (potential new) was not available. As such, it is assumed that the existing informal farm roads will be used as access roads. It is assumed that these roads will be used as is or will be graded to accommodate construction vehicles. No formal construction of roads, widening of roads, use of tar or concrete, was considered as part of this risk assessment;
- The risk assessment was applied assuming that a high level of mitigation is implemented, thus the results of the risk assessment provided in this report present the perceived impact significance ***post-mitigation***;
- In applying the risk assessment, it was assumed that the mitigation hierarchy as advocated by the Department of Environmental Affairs (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;
- The activities relating to the proposed OHPL are all highly site specific, not of a significant extent relative to the area of the cryptic wetlands assessed, and therefore have a limited spatial extent;
- While the operation of the proposed OHPL will be a permanent activity, the installation thereof is envisioned to take no more than a few months. However, the frequency of the construction impacts may be daily during this time;
- Most impacts are considered to be easily detectable;
- The considered mitigation measures are easily practicable; and
- It is recommended that the proponent make provision for rehabilitation of any edge effects which might affect cryptic wetlands, and that in consultation with the relevant authorities, implement appropriate management measures in line with the mitigation hierarchy which are deemed acceptable to both the competent authorities and the proponent.

7.1.1 Risk Assessment Discussion

There are three key ecological impacts on the cryptic wetlands that are anticipated to occur namely:

- Impacts on the hydrology and sediment balance of the wetlands;
- Changes to the socio-cultural and service provision; 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 (considering that the cryptic wetlands are not located within the proposed project footprint) 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.

The results of the risk assessment are summarised in Table 4 below, including key mitigation measures for each activity that must be implemented in order to reduce the impacts of the proposed OHPL on the wetlands. All general good housekeeping mitigation measures are provided in Appendix D.

Table 4: Summary of the results of the DWS risk assessment applied to the cryptic wetlands which may potentially be impacted by the proposed OHPL.

	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures	Reversibility of the impact
1	Construction Phase	Site preparation prior to construction activities (within 500m of the cryptic wetlands).	Vehicular movement (transportation of construction materials)	*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	*It is imperative that all construction works be undertaken during the dry, winter months when the flow/level of water is very low in the wetlands; *Due to the accessibility of the sites, no unnecessary crossing of the wetlands may be permitted and it is strongly recommended that the 32m ZoR be considered a no-go area. This will limit edge effects, erosion and sedimentation of the wetlands during the construction phase; *Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the wetland areas and their associated 32 m NEMA Zone of Regulation (ZoR); * Any material stockpiled should be kept to a minimum. Should the vegetation not be suitable for reinstatement after the construction phase or be alien/invasive vegetation species, all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site.	Fully Reversible
2			Removal of vegetation within the development footprint and associated disturbances to soil, and access to the site, potentially including grading of existing informal farm roads.	*Exposure of soil, leading to increased runoff, and erosion, and thus increased sedimentation of the receiving wetlands; *Increased sedimentation of the wetlands, leading to smothering of vegetation associated with the wetlands; *Dust pollution during construction which may impact on water quality; and *Proliferation of alien and/or invasive vegetation as a result of disturbances.	1,25	3,25	14	45,5	L		Fully Reversible

	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures	Reversibility of the impact
3		Installation of the pylons and spanning of the proposed powerline within 500m of the cryptic wetlands.	*Excavation of pits for the pylons leading to stockpiling of soil; *Potential movement of construction equipment and personnel within the watercourses.	*Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream wetland areas; *Disturbances of soil leading to potential impacts to wetland vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered wetland habitat; *Altered runoff patterns, leading to increased erosion and sedimentation of the receiving wetlands down gradient of the development; *Dust pollution during construction which may impact on water quality.	1,25	3,25	14	45,5	L	*It is imperative that all construction works be undertaken during the dry, winter months when the flow is low in the watercourses, and no diversion of flow would be necessary; *The construction period should be kept as short as possible and construction activities within the delineated wetlands should be avoided; *Protect exposed stockpiles from wind and limit the time in which the stockpiled soil is exposed, by covering with a suitable geotextile such as hessian sheeting; *When the powerline is spun between the pylons, no vehicles may indiscriminately drive through the wetlands, use must be made of the dedicated access roads. <u>Control measures for concrete mixing on site:</u> *No mixed concrete may be deposited outside of the designated construction footprint; *As far as possible, concrete mixing should be restricted to the contractor laydown area. Additionally, batter / dagga board mixing trays and impermeable sumps should 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. <u>With regards to backfilling of the concrete encasing;</u>	Fully Reversible

	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures	Reversibility of the impact
4			Mixing and casting of concrete for foundations.	*Potential contamination of surface water (if present).	1,25	3,25	14	45,5	L	*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 (within the 5 m buffer zone) must be loosened to natural soil compaction levels; *Any remaining soil following the completion of backfilling of the pits are to be spread out thinly surrounding the installed pylon (outside wetlands) to aid in the natural reclamation process; and *The construction footprint must be limited to the pit area (to allow for the stockpiling and movement of personnel). The area must be rehabilitated after the completion of the construction phase, including revegetation thereof with indigenous vegetation. In addition, alien vegetation eradication of the footprint area must be undertaken.	Fully Reversible

	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Control Measures	Reversibility of the impact
5	OPERATIONAL PHASE	Operation and maintenance of the powerline	*Potential indiscriminate movement of maintenance vehicles within close proximity of the wetlands; *Increased risk of sedimentation and/or hydrocarbons entering the wetlands via stormwater runoff from the access roads	*Disturbance to soil and ongoing erosion as a result of periodic maintenance activities; *Altered water quality (if surface water is present) as a result of increased availability of pollutants	1	3	12	36	L	*Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the watercourses may be permitted; *During periodic maintenance activities of the powerline, monitoring for erosion should be undertaken; *Should erosion be noted at the base of the pylon, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; *Monitoring for the establishment of alien and invasive vegetation species must be undertaken, specifically where pylons are within close proximity (within 32 m) to the wetlands and for access roads through or along the watercourses. Should alien and invasive plant 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.	Fully Reversible

7.2 IMPACT ASSESSMENT

The results of the DWS specified Risk Assessment Matrix (as promulgated in GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)) are translated into the impact assessment methodology provided by the EAP.

Tables 5 - 7 below provide the outcome of the impact assessment for the above-listed activities, based on the methods presented in Appendix C.

Table 5: Impact table summarising the impact significance with and without mitigation for the construction of the proposed OHPL.

Nature: Site preparation prior to construction activities (within 500m of the cryptic wetlands) resulting in disturbance to soil and potential sedimentation of cryptic wetlands

Site preparation as part of the construction of proposed OHPL will require Vehicular movement (transportation of construction materials) and removal of vegetation within the development footprint and associated disturbances to soil, potentially including grading of existing informal farm roads. This is likely to result in the following impacts to the cryptic wetlands:

- Transportation of construction materials can result in disturbances to soil, and increased risk of sedimentation/erosion;
- Soil and stormwater contamination from potentially spilled oils and hydrocarbons originating from construction vehicles;
- Exposure of soil, leading to increased runoff, and erosion, and thus increased sedimentation of the receiving wetlands;
- Dust pollution during construction which may impact on water quality; and
- Proliferation of alien and/or invasive vegetation as a result of disturbances.

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Moderate (4)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Low (28)**	**Low (8)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation

- It is imperative that all construction works be undertaken during the dry, winter months when the flow/level of water is very low in the wetlands;
- Due to the accessibility of the sites, no unnecessary crossing of the wetlands may be permitted and it is strongly recommended that the 32m ZoR be considered a no-go area. This will limit edge effects, erosion and sedimentation of the wetlands during the construction phase;
- Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the wetland areas and their associated 32 m NEMA Zone of Regulation (ZoR);
- Any material stockpiled should be kept to a minimum. Should the vegetation not be suitable for reinstatement after the construction phase or be alien/invasive vegetation species, all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site.

Table 6: Impact table summarising the impact significance with and without mitigation for the construction activities related to installation of the pylons and spanning of the proposed OHPL.

Nature: Installation of the pylons and spanning of the proposed powerline within 500m of the cryptic wetlands resulting in soil disturbance and potential impacts on water quality

Installation of the pylons and spanning of the proposed powerline within 500m of the cryptic wetlands will involve excavation of pits for the pylons leading to stockpiling of soil, potential movement of construction equipment and personnel within the watercourses, and mixing and casting of concrete for foundations. This is likely to result in the following impacts to the cryptic wetlands:

- Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream wetland areas;
- Disturbances of soil leading to potential impacts to wetland vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered wetland habitat;
- Altered runoff patterns, leading to increased erosion and sedimentation of the receiving wetlands down gradient of the development;
- Dust pollution during construction which may impact on water quality; and
- Potential contamination of surface water (if present).

	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (6)	Low (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (32)**	**Low (12)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation

- It is imperative that all construction works be undertaken during the dry, winter months when the flow is low in the watercourses, and no diversion of flow would be necessary;
- The construction period should be kept as short as possible and construction activities within the delineated wetlands should be avoided;
- Protect exposed stockpiles from wind and limit the time in which the stockpiled soil is exposed, by covering with a suitable geotextile such as hessian sheeting;
- When the powerline is spun between the pylons, no vehicles may indiscriminately drive through the wetlands, use must be made of the dedicated access roads.

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 should be restricted to the contractor laydown area. Additionally, batter / dagga board mixing trays and impermeable sumps should 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.

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 (within the 5 m buffer zone) must be loosened to natural soil compaction levels;
- Any remaining soil following the completion of backfilling of the pits are to be spread out thinly surrounding the installed pylon (outside wetlands) to aid in the natural reclamation process; and
- The construction footprint must be limited to the pit area (to allow for the stockpiling and movement of personnel). The area must be rehabilitated after the completion of the construction phase, including revegetation thereof with indigenous vegetation. In addition, alien vegetation eradication of the footprint area must be undertaken.

Table 7: Impact table summarising the impact significance with and without mitigation for the operation of proposed OHPL.

Nature: Operation and maintenance of the powerline resulting in soil disturbance, potentially altered water quality and increased susceptibility of sedimentation and erosion of cryptic wetlands		
• The operation and maintenance of the powerline will involve potential indiscriminate movement of maintenance vehicles within close proximity of the wetlands and an increased risk of sedimentation and/or hydrocarbons entering the wetlands via stormwater runoff from the access roads This is likely to result in the following impacts to the cryptic wetlands: • Disturbance to soil and ongoing erosion as a result of periodic maintenance activities; • Altered water quality (if surface water is present) as a result of increased availability of pollutants		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Moderate (4)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Low (28)**	**Low (8)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation		
• Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the watercourses may be permitted; • During periodic maintenance activities of the powerline, monitoring for erosion should be undertaken; • Should erosion be noted at the base of the pylon, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation; • Monitoring for the establishment of alien and invasive vegetation species must be undertaken, specifically where pylons are within close proximity (within 32 m) to the wetlands and for access roads through or along the watercourses. Should alien and invasive plant 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.		

7.3 Risk/Impact Assessment Discussion

The activities associated with the construction and operational phases of the proposed OHPL based on the alignment provided by the proponent, include site preparation, excavation of pits and installation of the pylons, and operation and maintenance of the OHPL. Considering that the proposed infrastructure will be located outside of all delineated cryptic wetlands as well as their 32 m buffer (the OHPL alignment is located approximately 400 m to the closest cryptic wetland) poses a Low risk to the wetlands. Nevertheless, all mitigation measures as stipulated in Tables 4 to 7 above must be implemented to prevent any negative edge effects from occurring to the wetlands, including for the outcome of the impact assessment that came out as a low without mitigation. Should the OHPL route be adjusted to fall outside of the 500m ZoR of all wetlands, it is the opinion of the freshwater specialist that there would be no quantum of risk to the watercourses.

Additional “good practice” mitigation measures applicable to a project of this nature are provided in **Appendix D** of this report.

7.4 Cumulative Impacts

Cumulative impacts are activities and their associated impacts on the past, present and foreseeable future considered together with the impacts identified in Section 7.1 above. The proposed 132 kV OHPL between the on-site substation and the existing national grid is part of the Hyperion Hybrid Facility. Since no surface infrastructure associated with the proposed OHPL is located within any of the identified cryptic wetlands, the significance of the cumulative impacts of the proposed project are therefore regarded to be insignificant. If the mitigation measures, as set out in this report are adhered to, impacts from the proposed OHPL construction activities will not exceed the boundaries of the investigation area and the cumulative impact on the larger catchment can, therefore, be considered low/limited.

8 CONCLUSION

SAS was appointed to conduct a freshwater ecological assessment as part of the Environmental Authorisation and Water Use Authorisation (WUA) processes for the proposed 132 kV Overhead Powerline (OHPL) route and associated substation as part of the Hyperion Hybrid Facility, near Kathu in the Northern Cape Province. The exact location of the OHPL may be subjected to some readjustment to allow flexibility during construction, therefore a 300 m corridor was assessed. No watercourses are traversed by the proposed OHPL or occur within the 300 m corridor. However, several cryptic wetlands were identified within the investigation area and vicinity thereof and classified as watercourses, along with one seasonal depression which does not meet the definition of a watercourse from an ecological perspective.

The results of the assessment of the relevant desktop databases and previous studies (SAS, 2019) indicate that the cryptic wetlands identified are in a largely natural ecological state, with few to no impacts on hydraulic and geomorphological processes. The area surrounding the identified cryptic wetlands is mainly natural, untransformed areas; however, sand mining and various informal roads were identified as the main anthropogenic activities occurring within the local catchment of these wetlands. Due to the natural semi-arid climatic conditions of the Northern Cape, assessing ecological service provision, importance and sensitivity can be challenging, as such freshwater systems (i.e. the cryptic wetlands) are under-researched, and little is known about the way in which they function and their contribution to the greater ecology of the area. Furthermore, the indices developed for the assessment of South African wetlands are largely focused towards assessing those systems found in higher rainfall regions than the study site and are thus geared towards systems which are less temporary in nature.

Based on the outcome of the risk assessment, the proposed OHPL infrastructure was determined to pose a Low impact significance to the cryptic wetlands. Due to these infrastructure components located outside of the delineated boundary of the cryptic wetlands and 32m NEMA Zone of Regulation (ZoR), no direct impacts from the construction of the OHPL and related infrastructure are expected to occur. Nevertheless, the potential occurrence of impacts associated with edge effects on the watercourses must be considered. If these edge effects are managed accordingly (i.e. if all the proposed mitigation measures as stipulated in this report are implemented), the impact significance on the wetlands is expected to remain low. Should the route of the proposed OHPL be required to move/shift within the 300 m corridor, it is recommended that the route be shifted eastwards where the impact to the cryptic wetlands would be lower compared to moving westwards where there are many more cryptic wetlands and a risk of infringing on the property of a different landowner.

The information as provided in this report is considered sufficient to aid the layout of the infrastructure components associated with the proposed OHPL, in order to limit the potential impact thereof on the identified watercourses and guide the environmental authorisation process.

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APPENDIX A: 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 CC and its staff reserve the right to 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 without the prior written consent of the author. 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: LEGISLATIVE REQUIREMENTS

The Constitution of the Republic of South Africa, 1996	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 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 normalization 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.
National Environmental Management Act, 1998 (Act No. 107 of 1998)	The National Environmental Management Act, 1998 (Act No. 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.
National Water Act , 1998 (Act No. 36 of 1998)	The National Water Act, 1998 (Act No. 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). A watercourse is defined as: 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.
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 Government Notice (GN)509 of 2016, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as: ➢ 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. This notice **replaces GN1199** and may be exercised as follows: 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; 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 storm water management activities as contained in a river management plan; v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities have 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. 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. 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.

APPENDIX C: RISK/IMPACT ASSESSMENT METHODOLOGY

DWS 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 risk 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'[3]. 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 wetlands, 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; and
- **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 necessary[4].

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 Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of

[3] The definition has been aligned with that used in the ISO 14001 Standard.

[4] Some risks/impacts that have low significance will however still require mitigation

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 C1: 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 C2: 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 C3: 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 C4: 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 C5: 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 C6: 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 C7: 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 C8: 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. Licence 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. Licence required.

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

Table C9: 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 develop 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 impacts[5] 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
- 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.

[5] Mitigation measures should address both positive and negative impacts

Recommendations

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

Reversibility and/or irreplaceable loss

The following indicates the rationale for the reversibility scoring in relation to the watercourses.

Table D10: Reversibility of impacts on the watercourse

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)

Ecological Impact Assessment Method of assessment (as provided by the EAP)

In order for the Environmental Assessment Practitioner (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.

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:
S= (E+D+M) x P
S = Significance weighting
E = Extent
D = Duration
M =Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
  > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of Cumulative Impacts

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[6].

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The specialist is required to conclude if the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

[6] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, GNR 982

APPENDIX D – RISK ANALYSIS AND MITIGATION MEASURES

General management and good housekeeping practices

The following essential mitigation measures are considered to be standard best practice measures applicable to development of this nature, and must be implemented during all phases of the proposed development activities, in conjunction with those stipulated in Section 7 of this report which define the mitigatory measures specific to the minimisation of impacts on freshwater resources.

Development and operational footprint

- Sensitivity maps have been developed for the study area, indicating the location of the cryptic wetlands and the relevant regulatory zones in accordance with 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), as shown in Section 6. It is recommended that these sensitivity maps be considered during all phases of the development and with special mention of the planning of any additional infrastructure or relocating the infrastructure footprint, to aid in the conservation of riparian habitat and environmental resources within the study area;
- All development footprint areas should remain as small as possible and should not encroach onto surrounding more sensitive areas. It must be ensured that the cryptic wetlands and the associated regulatory zones are off-limits to construction vehicles and personnel;
- The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas;
- Planning of temporary roads and access routes should take the site sensitivity plan into consideration, and wherever possible, existing roads should be utilised. If additional roads are required, then wherever feasible such roads should be constructed a distance from the more sensitive cryptic wetland / riparian areas and not directly adjacent thereto. If crossings are required they should cross the system at right angles, as far as possible to minimise impacts in the receiving environment, and any areas where bank failure is observed due to the effects of such crossings should be immediately repaired by reducing the gradient of the banks to a 1:3 slope and where needed necessary, installing support structures. This should only be necessary if existing access roads are not utilised;
- All areas of increased ecological sensitivity should be marked as such and be off limits to all unauthorised construction and maintenance vehicles and personnel;
- The duration of impacts on the freshwater system should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised;
- Appropriate sanitary facilities must be provided for the life of the proposed project and all waste removed to an appropriate waste facility;
- All hazardous chemicals should be stored on bunded surfaces and no storage of such chemicals should be permitted within the riparian buffer zones;
- No informal fires should be permitted in or near the construction areas;
- Ensuring that an adequate number of rubbish and “spill” bins are provided will also prevent litter and ensure the proper disposal of waste and spills; and
- Edge effects of activities, particularly erosion and alien/weed control need to be strictly managed.

Vehicle access

- All areas of increased ecological sensitivity should be marked as such and kept off limits to all unauthorised construction and maintenance vehicles as well as personnel;
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; and
- All spills, should they occur, should be immediately cleaned up and treated accordingly.

Alien plant species

- Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the project footprint, particularly as the study area is located within a sensitive area. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled;
- Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) and Section 28 of the National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA)). Removal of species should take place throughout the construction, operational, closure/decommissioning and rehabilitation/ 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 should be kept as small as possible when removing alien plant species*;*
  - No vehicles should be allowed to drive through designated sensitive drainage line and riparian areas during the eradication of alien and weed species.

Cryptic wetland habitat

- Ensure that as far as possible all infrastructure is placed outside of the cryptic wetlands and applicable regulatory zones. If these measures cannot be adhered to, strict mitigation measures will be required to minimize the impact on the receiving watercourses. Such measures include those stipulated in Section 7 of this report, in addition to the following:
  - Ensuring that measures are implemented to prevent dirty runoff water entering the receiving freshwater environment; and
  - Ensuring that where necessary, exposed soil in the vicinity of cryptic wetland habitat are protected from erosion by means of reinstating natural vegetation following construction, or installation of an appropriate commercially available product such as Geojute or MacMatR;
  - Any additional measures which may be considered necessary by the project Environmental Officer during the construction and/or operational phases;
- Permit only essential construction personnel within 32m of the cryptic wetlands, if absolutely necessary that they enter the regulatory zone;
- Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage;
- During the construction phase, no vehicles should be allowed to indiscriminately drive through the wetland or riparian areas;
- The characteristics of the cryptic wetlands could potentially be altered locally, if construction materials, such as rock and rubble created during construction which is likely to have sharp edges (and not the smooth surfaces typically associated with river rocks and pebbles) are not prevented from entering these features. Such material must therefore be prevented from entering the cryptic wetlands or within 50m thereof, and all construction related waste must be must be removed from the study area once construction has been completed; and
- Implement effective waste management in order to prevent construction related waste from entering the freshwater environments.

Soil

- To prevent the erosion of soil, management measures may include berms, soil traps, hessian curtains and stormwater diversion away from areas particularly susceptible to erosion;
- Install erosion berms during construction to prevent gully formation. Berms every 50m should be installed where any disturbed soil have a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%;
- Sheet runoff from access roads should be slowed down by the strategic placement of berms and sandbags;
- Maintain topsoil stockpiles below 5 meters in height;
- As far as possible, all construction activities should occur in the low flow season, during the drier winter months;

- All soil compacted as a result of construction activities falling outside of project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas; and
- Monitor all areas for erosion and incision, particularly any riparian crossings. Any areas where erosion is occurring excessively quickly should be rehabilitated as quickly as possible and in conjunction with other role players in the catchment.

Rehabilitation

- All soil compacted as a result of construction activities falling outside of project footprint areas should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all construction and rehabilitation phases to prevent loss of floral habitat;
- Rehabilitate all cryptic wetland habitat areas affected by construction to ensure that the ecology of these areas is re-instated during all phases. In this regard, special mention is made of the need to stockpile soil separately during the construction and/or operation phase where relevant in order for these soil to be utilised during the rehabilitation phase;
- Edge effects of activities including erosion and alien/ weed control need to be strictly managed in these areas;
- As far as possible, all rehabilitation activities should occur in the low flow season, during the drier winter months.
- As much vegetation growth (of indigenous/endemic floral species) as possible should be promoted within the proposed development area in order to protect soil;
- All alien vegetation should be removed from rehabilitated areas and reseeded with indigenous grasses as specified by a suitably qualified specialist (ecologist);
- All areas affected by construction and operation should be rehabilitated upon completion of the specific construction and operation activity throughout the life of the development;
- Cryptic wetland vegetation cover should be monitored to ensure that sufficient vegetation is present to bind the soil and prevent erosion and incision; and
- It is recommended that a detailed rehabilitation plan be developed by a suitably qualified ecologist prior to commencement of the operations phase in order to address specific rehabilitation requirements.

Table D1: Risk Assessment outcomes for the proposed overhead powerline.

	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph & Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level
1	Construction Phase	Site preparation prior to construction activities (within 500m of the cryptic wetlands).	Vehicular movement (transportation of construction materials)	*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	High
2			Removal of vegetation within the development footprint and associated disturbances to soil, and access to the site, potentially including grading of existing informal farm roads.	*Exposure of soil, leading to increased runoff, and erosion, and thus increased sedimentation of the receiving wetlands; *Increased sedimentation of the wetlands, leading to smothering of vegetation associated with the wetlands; *Dust pollution during construction which may impact on water quality; 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	High

	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph & Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level
3		Installation of the pylons and spanning of the proposed powerline within 500m of the cryptic wetlands.	*Excavation of pits for the pylons leading to stockpiling of soil; *Potential movement of construction equipment and personnel within the watercourses.	*Earthworks could be potential sources of sediment, which may be transported as runoff into the downstream wetland areas; *Disturbances of soil leading to potential impacts to wetland vegetation, increased alien vegetation proliferation in the footprint areas, and in turn to altered wetland habitat; *Altered runoff patterns, leading to increased erosion and sedimentation of the receiving wetlands down gradient of the development; *Dust pollution during construction which may impact on water quality.	2	1	1	1	**1,25**	1	1	**3,25**	5	3	5	1	**14**	**45,5**	**L**	**High**
4			Mixing and casting of concrete for foundations.	*Potential contamination of surface water (if present).	1	2	1	1	**1,25**	1	1	**3,25**	5	3	5	1	**14**	**45,5**	**L**	**High**

	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph & Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level
5	**OPERATIONAL PHASE**	Operation and maintenance of the powerline	*Potential indiscriminate movement of maintenance vehicles within close proximity of the wetlands; *Increased risk of sedimentation and/or hydrocarbons entering the wetlands via stormwater runoff from the access roads	*Disturbance to soil and ongoing erosion as a result of periodic maintenance activities; *Altered water quality (if surface water is present) as a result of increased availability of pollutants	1	1	1	1	**1**	1	1	**3**	3	3	5	1	**12**	**36**	**L**	**High**

APPENDIX E: DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

Rabia Mathakutha	MSc Plant Science (University of Pretoria)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Stephen van Staden	MSc (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 Aquatic Services (Pty) Ltd		
Name / Contact person:	Rabia Mathakutha		
Postal address:	221 Riverside Lofts, Tygerfalls Boulevard, Bellville,		
Postal code:	7539	Cell:	083 739 2284
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	rabia@sasenvgroup.co.za		
Qualifications	MSC Plant Science		
Registration / Associations	Registered Candidate Member of the South African Council for Natural Scientific Professions (SACNASP)		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

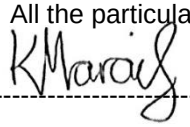
I, Rabia Mathakutha, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the 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

1.(b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Kim Marais, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the 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



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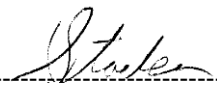
1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Stephen van Staden, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the 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



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF RABIA MATHAKUTHA

PERSONAL DETAILS

Position in Company	Field Ecologist Wetland ecology
Joined SAS Environmental Group of Companies	2020

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Candidate member of the South African Council for Natural Scientific Professions (SACNASP – Reg. No. 120040)
South African Association of Botany (SAAB)

EDUCATION

Qualifications

MSc Plant Science (University of Pretoria)	2018
BSc (Hons) Environmental Science (Biogeography) (University of KwaZulu-Natal)	2015
BSc Environmental Science (Life Science stream) (University of KwaZulu-Natal)	2014

Short Courses

Official DWS Section 21 (c) and (i) Water Use Authorisation Course	2018
Basic and Applied Statistics in R	2016

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga
Africa – Lesotho, Mozambique

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species Plan

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF KIM MARAIS

PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)
Member of the Western Cape Wetland Forum (WCWF)

EDUCATION

Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal, Northern Cape, Eastern Cape,
Africa - Uganda

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plans

Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

Legislative Requirements, Processes and Assessments

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

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource discipline lead, Managing member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum;
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland assessment short course Rhodes University	2016
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2013

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

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

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
- Maintenance and Management Plans
- Plant species and Landscape Plan
- Freshwater Offset Plan
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Soil Monitoring
- Soil Mapping

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

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