WATERCOURSE ASSESSMENT

PROPOSED ESKOM LOMOND SAFARI 88KV POWERLINE, LOCATED

WITHIN THE NECSA PROPERTY IN THE NORTH-WEST PROVINCE

JANUARY 2022

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Reference Number:		**WET-22-002**

I, **Jacob Schrijvershof,** declare that -

- I act as the independent specialist in this matter;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- 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 assessment relevant to this application, including knowledge of the National Environmental Management Act (Act 107 of 1998) (NEMA) and the National Water Act (Act 36 of 1998), regulations and any guidelines that have relevance to the proposed 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 report are true and correct;
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B (1) of the National Environmental Management Act, 1998 (Act 107 of 1998); and
- I understand that any false information published in this document is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Joppie Schrijvershof

Executive summary

The purpose of this report is to summarise the watercourse findings for the proposed Eskom Lomond Safari 88kV powerline, located within the NECSA property in the North-West Province as part of specialist report for the BAR application of the project. The field survey was conducted on the 8th of December 2021 in order to assess the watercourse conditions and to expand baseline data for future reference. The proposed powerline project is located on the South African Nuclear Energy Corporation (NECSA) property.

The scope of work entailed determining the any watercourse systems associated with the proposed powerline. In order to make this determination, the following components were assessed:

- Identify and delineate any watercourses associated within the regulated areas according to the Department of Water Affairs' "Practical field procedure for the identification and delineation of wetlands and riparian areas";
- Determine and assess the significance of the impacts caused by the proposed powerline on any associated watercourses;
- Identifying, describing and rating potential impacts/risks to the rivers/streams/wetlands and recommend mitigation measures for the identified impacts to minimise the negative impacts; enhance any positive impacts; and
- Indicate the minimum buffer required to protect any watercourses identified within the study boundary.

The following results were obtained from the watercourse study:

The site falls within the quaternary drainage region the A21H Quaternary Catchments, and forms part of the Limpopo Water Management Area (WMA) (DWS 2016). The Crocodile River passes the study site in the West (approximately 1 km from the nearest edges). The land use features within the study site are mainly agriculture in the form of subsistence farming, industry, bushveld crops and grazing.

According to the ecological importance classification for the quaternary catchments A21H; the Crocodile system is classified as a seriously modified system (Category E). The default ecological management class for the relevant quaternary catchments is considered to be moderate sensitive system in terms of ecological importance with a moderate ecological sensitivity. The attainable ecological management class for the system is a Category B (Largely natural).

A site assessment was conducted on the 8th of December 2021. During the site visit it was evident that there was no water input from the channels to the Crocodile River, even after heavy recent rains in the vicinity of the Proposed Eskom Powerline Lomond-Safari. It must be noted that these channels were dry and macroinvertebrate samples could not be obtained, therefore all watercourses were delineated within the regulated areas of the Proposed Eskom Powerline Lomond-Safari

No NFEPA wetlands were identified within 500 m of the proposed powerline during the desktop assessment. The Bench wetlands were confirmed to be drying ponds on the NECSA property. The site ranges in altitude from 1180 m to 1475 m

above sea level. A Digital Elevation Model (DEM) of the aerial photography of the site revealed depression in landscape associated with the Crocodile River to the West associated with the A21H Quaternary Catchments

No hydrophytic vegetation or wetland/riparian soils were observed within wetland and channel areas assessed. The channel areas were classified as 'non-perennial A' section channels, where these channels do not have baseflow and convey surface runoff immediately after a storm event and lacks a riparian zone.

The artificially created wetland area does not illustrate any soil or vegetation characteristics associated with natural occurring wetlands, therefore this system is classified as an **artificial seasonal wetland system**. Through assessing historical imagery, this area had a historical dam and was linked with the drainage channel on the western portion.

At the time of this assessment, the drainage channels and artificial wetland area comprised of mainly *Searsia spp.* and a dense tree layer of *Celtis africana, Vachellia karroo, V. robusta, Ziziphus mucronata* and *Searsia pyroides*. Alien invasive *Xanthium spinosum*, *Verbena brasiliensis* and *Persicaria* species were dominant within the channel areas. The main soils identified within these areas were dominated by a terrestrial Hutton soil form with a rocky composition.

The area is currently impacted by industrial development, alien invasive plant species, and sedimentation. The impacts of the proposed powerline on the artificial wetland and non-perennial channels will be **very low**, due to all the anthropogenic impacts and alterations within the area. The artificial wetland system is a manmade system and should not occur naturally in that specific area. The findings from the avifaunal assessment stated that this system is unlikely to support any of the Red Listed species, therefore holding no ecological significance.

It is therefore recommended that a small trench/pipeline be created with the purpose of draining any water from the artificial wetland by Eskom. This will aid in the flow of the 'A' section channels and will avoid any further accumulation of rain water that could be affected by construction activities of the power line.

Mitigation measures, aimed at minimising the afore-mentioned impacts, include (but are not limited to):

- Design and implementation of a suitable stormwater system;
- Construction activities must take place during winter months (low flow season);
- Limiting instream sedimentation;
- Minimising pollutants entering the watercourse;
- Correct managing of stockpiles and construction materials;
- Active stormwater management must be implemented to stop silt and sediments from entering the wetland systems;
- Disturbed soils and stockpiled soils must be protected from erosional features;
- The prevention of alien invasive vegetation encroachment;
- Any disturbed areas should be rehabilitated in line with the rehabilitation guidelines, this includes the clearing of alien vegetation, following the guidelines of a suitable alien invasive plant management plan;

- The site must be regularly monitored for re-growth of alien invasive species, and any new seedlings etc. eradicated using methods appropriate for the particular species, whether mechanical, chemical or biological;
- Protect as much indigenous vegetation as possible; and
- Mitigation measures must be implemented with a suitable EMPr.

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BGIS:	Biodiversity Geographic Information System
DEM:	Digital Elevation Model
DWAF:	Department of Water Affairs and Forestry
DWS:	Department of Water Affairs and Sanitation
EA:	Environmental Authorisation
EMPr:	Environmental Management Program
GIS:	Geographic Information System
NFEPA:	National Freshwater Priority Area
NWA:	National Water Act (Act no 36 of 1998)
PES:	Present Ecological Status
QDS:	Quarter Degree Square
SANBI:	South African National Biodiversity Institute
WMA:	Water Management Areas

1 INTRODUCTION

1.1 Background

The purpose of this report is to summarise the watercourse findings for the proposed Eskom Lomond Safari proposed Eskom Lomond Safari 88kV powerline, located within the NECSA property on Portion 0 of the Farm Weldaba 567 JQ, in the North-West Province (**Figure 1**) as part of an Environmental Authorisation (EA). The field survey was conducted on the 8th of December 2021 in order to assess the watercourse conditions and to expand baseline data for future reference.

The proposed powerline will replace an existing underground cable between two existing substations on the farm Weldaba 567JQ, within the NECSA premises, Phelindaba. The proposed route is about 2.3 km in extent and will connect the Safari substation in the west, with the Lomond substation in the east (**Figure 2**).

The existing cables occasionally lose pressure which results in loss of supply to the substation. Frequent hot connections on 11kV isolators and all operating labels in the substation are not according to standard. Thus, the project aims to replace the existing 88 kV oil cable with an overhead 88kV chickadee power line and refurbish the existing substation replacing old and redundant equipment.

Scope of work for the project:

- The Safari Rural substation is currently supplied through 2 x 88kV underground oil filled cables from the Lomond Main Transmission Substation (MTS).
- The cables sometimes lose pressure resulting in a loss of supply to the Safari Rural substation.
- To address the above situation, Eskom identified the following proposed project:
- Construction of a 1 x 88kV chickadee powerline of ±2.3km from Lomond MTS to Safari Rural substation. Steel structures will be utilised to build the HV powerline.
- Part of the 2 x 88kV underground oil filled cables will be dismantled and sealed off.
- The Safari Rural substation will be refurbished by replacing old and redundant equipment.

These project falls within the quarter degree square 2527DD. The site is currently surrounded by industrial activities and bushveld.

1.2 Legal framework

1.2.1 National Environmental Management Act (Act No. 107 of 1998)

The EIA Regulations, promulgated under NEMA, focus primarily on creating a framework for co-operative environmental governance. NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by State Departments and to provide for matters connected therewith.

1.2.2 National Waste Act, 2008 (Act No. 59 of 2008)

The NEMWA aims at promoting sustainable waste management practices through the implementation of “Integrated Waste Management Planning”, where “Integrated Waste Management Planning is viewed as a holistic approach of managing waste, aimed at optimising waste management practises to ensure that the implementation thereof yields practical solutions that are environmentally, economically and socially sustainable and acceptable to the public and all relevant spheres of government”.

1.2.3 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled in responsible ways. Of specific importance to this application is Section 19 of the NWA, which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices.

Regulations GN 704 dated June 1999 under the NWA, 1998 (Act 36 of 1998) stipulates that no development activities may take place within the 1:100 year floodline of a watercourse, or within 100 m of the watercourse, whichever is the furthest.

Regulations GN 509 dated August 2016 under the Section 21 c and i water uses of the NWA, 1998 (Act No 36 of 1998) stipulates the:

"Extent of a watercourse" as:

(a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam.

"Regulated area of a watercourse" for section 21(c) or (i) of the Act water uses in terms of this Notice means:

(a) The outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

(b) In the absence of a determined 1 in 100 year flood line or riparian area the area within **100 m from the edge of a watercourse** where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

(c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

1.3 Scope of work

The scope of work entailed determining the any watercourse systems associated with the proposed powerline. In order to make this determination, the following components were assessed:

- Identify and delineate any watercourses associated within the regulated areas according to the Department of Water Affairs' "Practical field procedure for the identification and delineation of wetlands and riparian areas";
- Determine and assess the significance of the impacts caused by the proposed powerline on any associated watercourses;
- Identifying, describing and rating potential impacts/risks to the rivers/streams/wetlands and recommend mitigation measures for the identified impacts to minimise the negative impacts; enhance any positive impacts; and
- Indicate the minimum buffer required to protect any watercourses identified within the study boundary.

1.4 Assumptions and Limitations

It is difficult to apply pure scientific methods within a natural environment without limitations, and consequential assumptions need to be made. The following constraints may have affected this assessment:

- A hand-held Garmin eTrex 30 were used to delineate the watercourses had an accuracy of 3 m to 6 m
- The findings, results, observations, conclusions and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the perceived impacts on the watercourses and biodiversity; and
- It must be noted that during the time of the assessment the channels surrounding the proposed powerline were dry.

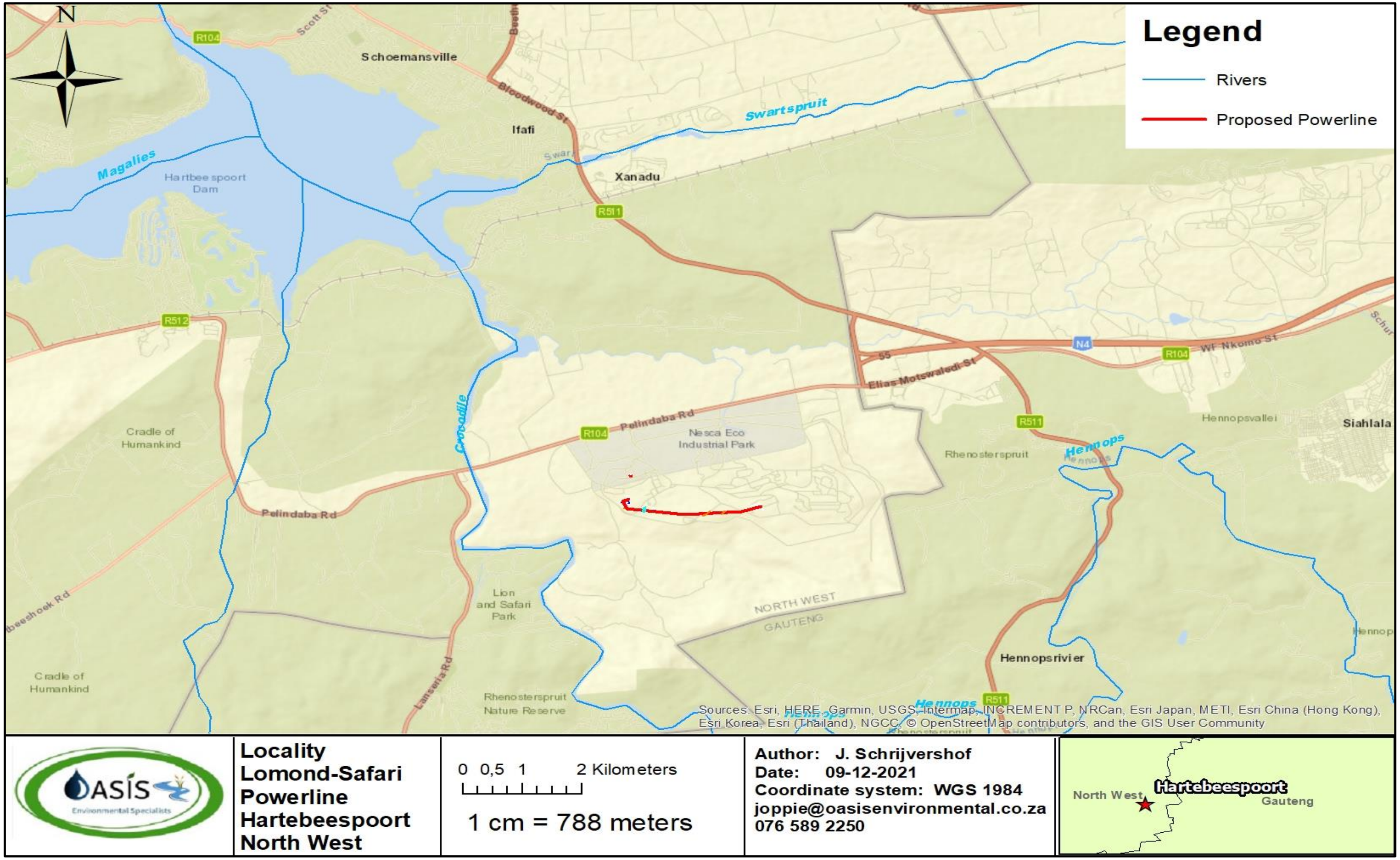

Figure 1: Locality of the proposed Lomond-Safari powerline near Hartebeespoort, North-West Province.

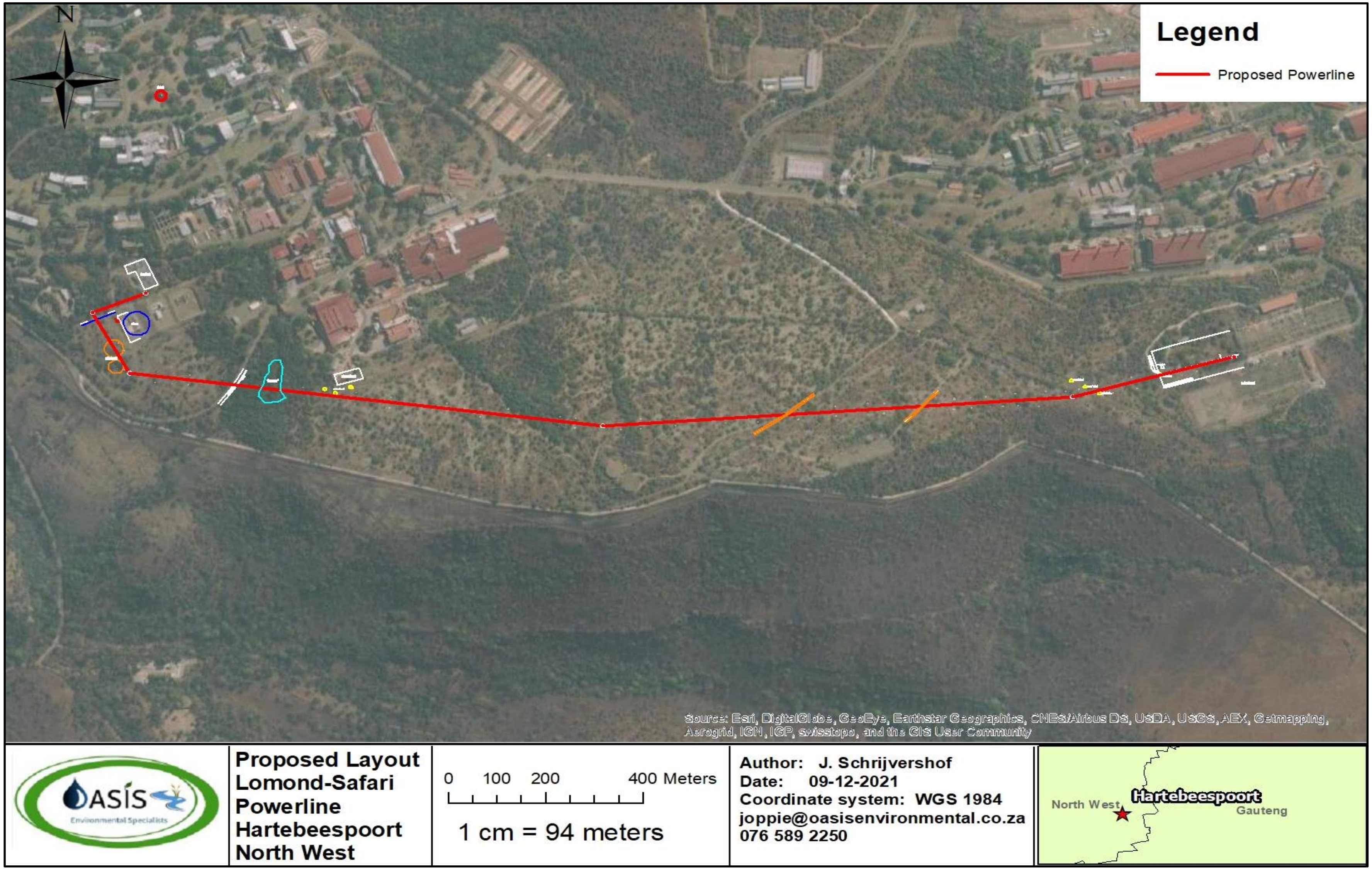

Figure 2: Proposed layout of the Lomond-Safari powerline.

2 METHODOLOGY

This section details the different techniques and methods utilised to obtain the data for this report in order to finally assess the aquatic and wetland conditions of the site based on the various inputs explained below.

2.1 Watercourse Delineation Assessment

For the purpose of this assessment, wetlands and pans are considered as those ecosystems defined by the National Water Act No. 36 of 1998 as:

Wetlands: *''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'';* and

Examination of the National Freshwater Ecosystem Priority Areas (NFEPA)'s databases were undertaken for the project. The NFEPA project aims to produce maps which provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or FEPAs. FEPAs are determined through a process of systematic biodiversity planning and involved collaboration of over 100 freshwater researchers and practitioners. They are identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (MacFarlane *et al*., 2014).

The assessment of the study site involved the investigation of aerial photography, GIS databases including the NFEPA and South African National Wetland maps as well as literature reviews of the study site in order to determine the likelihood of wetland areas within this site.

The following data sources and GIS information provided in **Table 1** was utilised to inform the delineation.

Table 1: **Information used to inform the desktop assessment.**

DATA	USE	SOURCE
Latest and Historic Google Earth ™ imagery	Used to assist with identifying potential areas within the study boundary for the presence of wetland systems.	Google Earth PRO™ On-line
River line	Mapping of watercourses outside of the study site.	Surveyor General
National Wetland Classification System	Assistance with information collection about the site and surrounding areas.	SANBI
National Freshwater Ecosystem Priority Area maps and database	Information gathering regarding the presence of FEPA wetlands on the site and within surrounding areas.	Water Research Commission, Implementation: Manual and Maps for FEPA area

Figure 3 below represents and describes all specific wetland types and have been divided into eight units. These units are described as follows (Kotze *et al*., 2008):

Channel (river, including the banks) - an open conduit with clearly defined margins that continuously or periodically contains flowing water. Dominant water sources include concentrated surface flow from upstream channels and tributaries, diffuse surface flow or interflow, and/or groundwater flow.

Channelled valley-bottom wetland - a mostly flat valley-bottom wetland dissected by and typically elevated above a channel. Dominant water inputs to these areas are typically from the channel, either as surface flow resulting from overtopping of the channel bank/s or as interflow, or from adjacent valley-side slopes (as overland flow or interflow).

Un-channelled valley-bottom wetland - a mostly flat valley-bottom wetland area without a major channel running through it, characterised by an absence of distinct channel banks and the prevalence of diffuse flows, even during and after high rainfall events.

Floodplain wetland - the mostly flat or gently sloping wetland area adjacent to and formed by a Lowland or Upland Floodplain river, and subject to periodic inundation by overtopping of the channel bank.

Depression - a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates. Dominant water sources are precipitation, ground water discharge, interflow and (diffuse or concentrated) overland flow.

Flat - a near-level wetland area (i.e. with little or no relief) with little or no gradient, situated on a plain or a bench in terms of landscape setting. The primary source of water is precipitation.

Hillslope seep - a wetland area located on (gentle to steep) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope.

Valley head seep - a gently-sloping, typically concave wetland area located on a valley floor at the head of a drainage line, with water inputs mainly from subsurface flow.

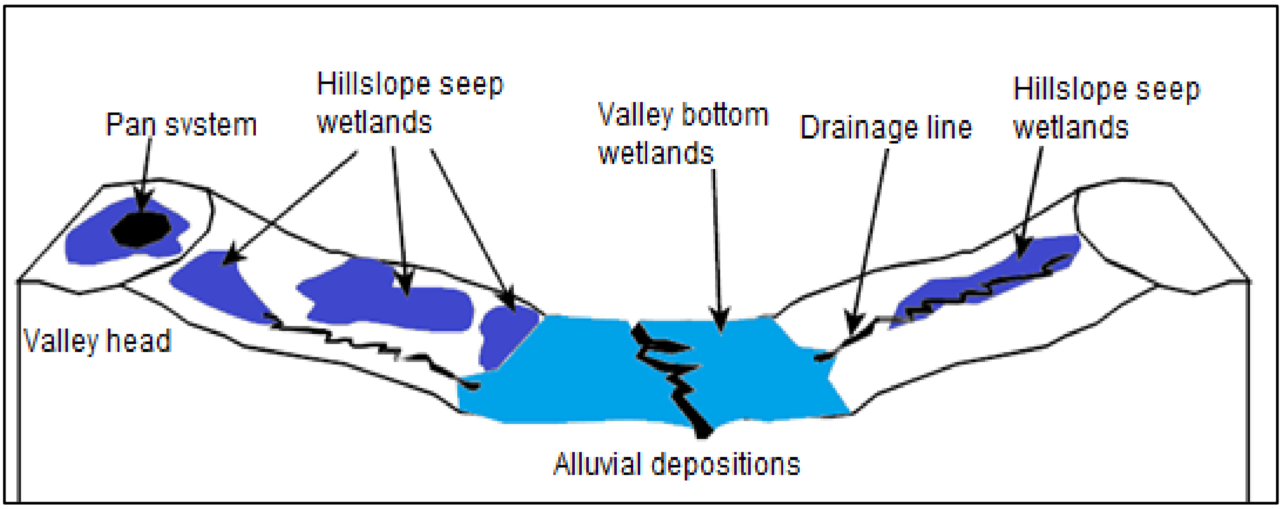

Figure 3: Diagrammatic representation of common wetland systems identified in Southern Africa (based on Kotze *et al.*, 2008).

Channel areas were delineated based on topographic setting, vegetative indicators as well as the presence or absence of alluvial soils as described in 'A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas – Edition 1' (DWAF, 2005) requirements. This manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area (**Figure 4**). The classification system separates channels into: those that do not have baseflow ('A' Sections); those that sometimes have baseflow ('B' Sections), namely non-perennial or those that always have baseflow ('C' Sections), namely perennial. 'A' Section channels convey surface runoff immediately after a storm event and are not associated with a riparian zone. 'B' Section channels are categorised as channels that sometimes have baseflow, dependant on rainfall events and are therefore non-perennial. They are in contact with the zone of saturation often enough to have vegetation associated with saturated conditions as well as gleyed soil within the channel confines. 'B' Section channels are considered hydrologically sensitive as they are associated with riparian habitats.

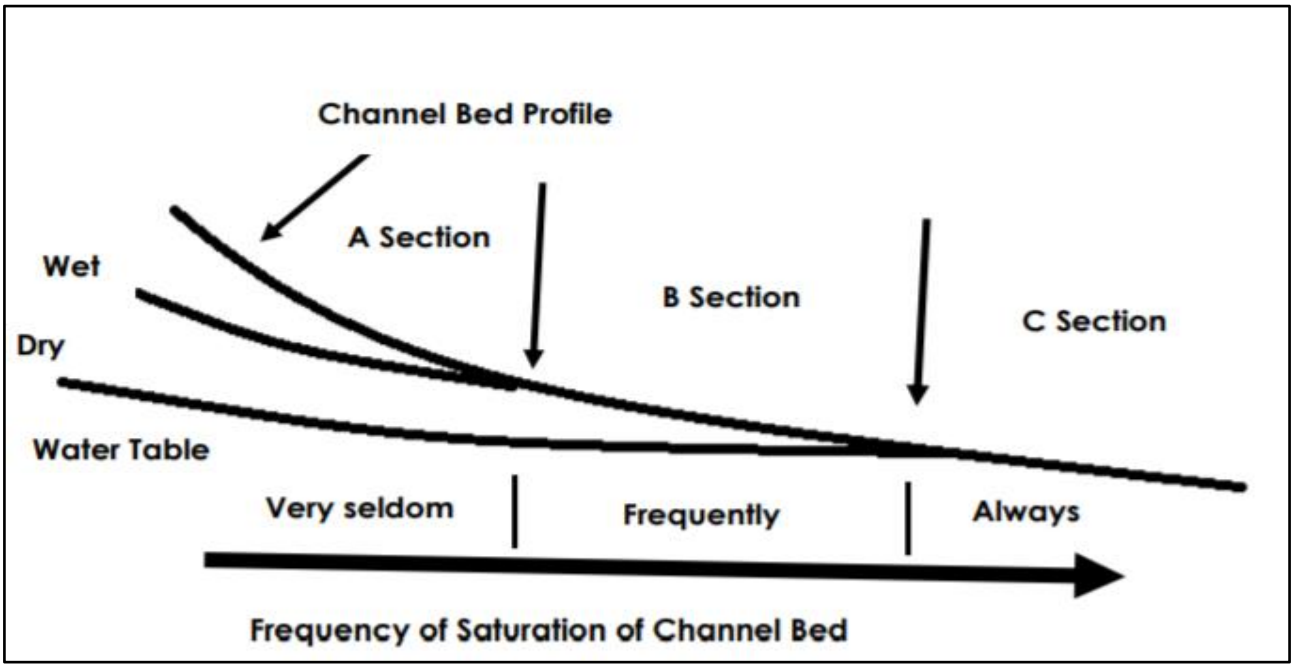

Figure 4: Different zones of wetness found in channels (DWAF, 2005).

Riparian areas perform numerous vital functions including the protection and enhancement of water resources through the following resources:

- Aiding in the storage of water and flood prevention;
- Stabilising stream banks;
- Improving water quality by trapping sediment and nutrients;
- Maintaining natural water temperatures for aquatic species;
- Providing foraging and roosting habitats for birds and other animals;
- Providing corridors for dispersal and migration of different species; and
- Acting as a buffer between aquatic ecosystems and adjacent land uses.

2.2 Risk Assessment

The risk assessment was conducted in accordance with the DWS risk-based water use authorisation approach and delegation guidelines.

The matrix assesses impacts in terms of consequence and likelihood. Consequence is calculated based on the following formula:

Consequence = Severity + Spatial Scale + Duration

Whereas likelihood is calculated as:

Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection.

Significance is calculated as:

Significance \Risk= Consequence x Likelihood.

Each metric of the severity (flow regime, water quality, geomorphology, biota and habitat) and spatial scale, duration, frequency of the activity, frequency of the incident/impact and detection are rated to a 1 to 5 scale (GNR 509, of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as Defined in Section 21(C) or Section 21(I), 2016).

The score is then placed into one of the three classes, with **low risk activities** to the watercourse will qualify for a **General Authorisation (GA)**. Medium and **high risk activities** will require a **Section 21(C) and (I) water use licence** as per the National Water Act of 1998 (**Table 5**).

Table 2: Significance of the Section 21 C and I ratings matrix as prescribed by the National Water Act 1998 (Act No. 36).

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

3 BACKGROUND INFORMATION

3.1 Climate

The study site is characterised by summer rainfalls with very dry winters. Mean Annual Precipitation (MAP) ranges between 600 and 700mm (overall MAP of 593 mm) and frost is frequent in winter. Summer temperatures are normally very high with the Mean monthly maximum and minimum temperatures for Brits are 35.3°C and -3.3°C for January and June respectively. Altitude ranges between 1360 m to 1620 m (Mucina & Rutherford, 2006).

3.2 Quaternary catchment and Land Use

The site falls within the quaternary drainage region the A21H Quaternary Catchments, and forms part of the Limpopo Water Management Area (WMA) (DWS 2016). The Crocodile River passes the study site in the West (approximately 1 km from the nearest edges), (**Figure 5**). The land use features within the study site are mainly agriculture in the form of subsistence farming, industry, bushveld crops and grazing (**Figure 6**).

According to the ecological importance classification for the quaternary catchments A21H; the Crocodile system is classified as a seriously modified system (Category E). The default ecological management class for the relevant quaternary catchments is considered to be moderate sensitive system in terms of ecological importance with a moderate ecological sensitivity. The attainable ecological management class for the system is a Category B (Largely natural). A summary of the ecological integrity (health) and management categories for the Crocodile River in quaternary catchments A21H is presented in **Table 3**.

Table 3: Sub-Quaternary reach desktop data for the area assessed (DWS, 2013).

Reach	SQR Name	PES Category Median	Mean EI Class	Mean ES Class	Length km	Stream Order	Attainable PES
A21H-01158	Crocodile	E	Moderate	Moderate	5,68	3	B

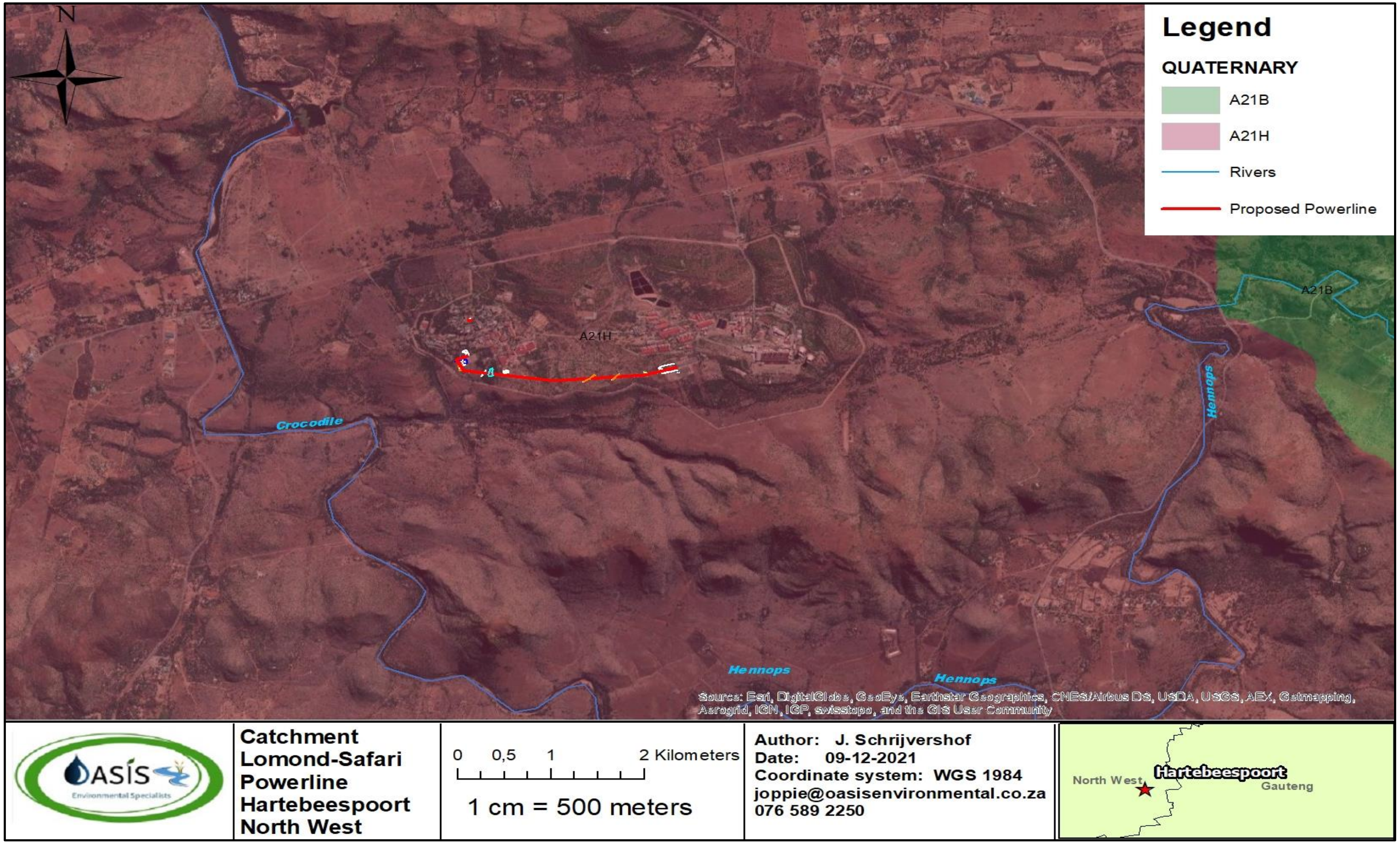

Figure 5: Proposed Lomond-Safari Powerline - Catchment map.

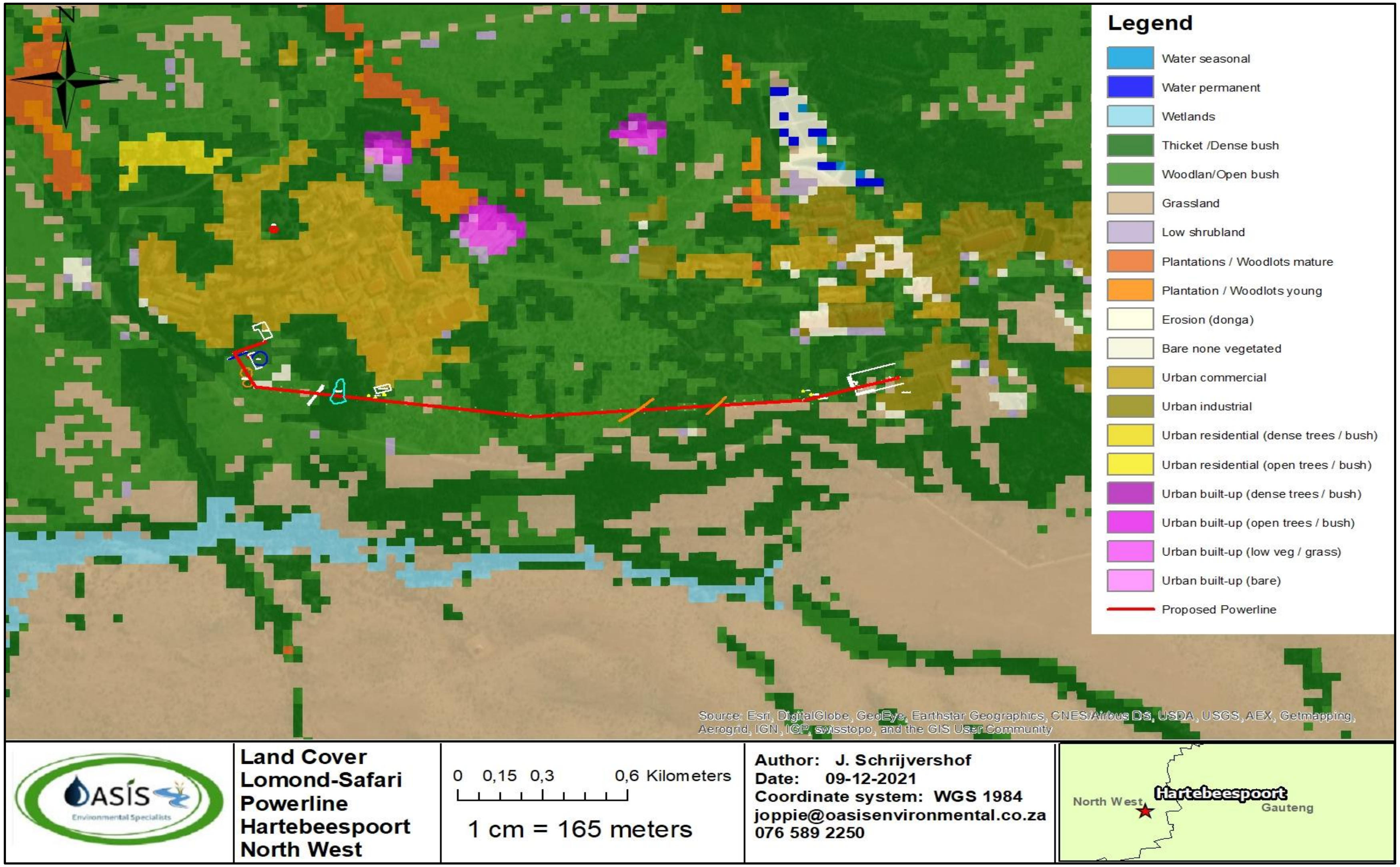

Figure 6: Proposed Lomond-Safari Powerline - Land-use map.

3.3 Western Bankenveld Ecoregion

This region has a complex topography that varies from lowlands, hills and mountains to closed hills and mountains with the relief varying from moderate to high. Although various Bushveld and Grassland types occur, Mixed Bushveld is the most definitive vegetation type of the region. Several rivers traverse this region, e.g. the Marico, the Crocodile (west), the Elands (west) and the Pienaars. Some perennial tributaries of these rivers rise in the southern part of the region in particular.

The perennial tributary of the Sand River has its source in the northern part of the region. (**Table 4**)(**Figure 9**).

- Mean annual precipitation: Low to moderate.
- Coefficient of variation of annual precipitation: Moderate.
- Drainage density: Moderate but low in parts.
- Stream frequency: Low to medium.
- Slopes <5%: Varies from <20%, 20-50%, 60-80% and in few cases >80%
- Median annual simulated runoff: Moderate/low to moderate.
- Mean annual temperature: Moderate to hot in limited areas.

Table 4: Western Bankenveld Ecoregion attributes (Department of Water Affairs, 2012).

Main attributes	Bushveld Basin
Terrain morphology: Broad division (dominant types in bold (Primary)	Plains; Low Relief; Plains; Moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to High Relief; Closed Hills; Mountains; Moderate and High Relief;
Vegetation types (Dominant types in bold)	Waterberg Moist Mountain Bushveld; Mixed Bushveld; Kalahari Plains Thorn Bushveld (limited); Clay Thorn Bushveld; (limited)

Main attributes	Bushveld Basin
	Rocky Highveld Grassland; Dry Clay Highveld Grassland; (limited)
Altitude (m.a.m.s.l) (secondary)	900-1700
MAP (mm) (modifying)	400 to 700
Coefficient of Variation (% of annual precipitation)	20 to 35
Rainfall concentration index	60 to >65
Rainfall seasonality	Early to mid summer
Mean annual temp. (°C)	14 to 22
Mean daily max temp. (°C) February	24 to 32
Mean daily max temp. (°C) July	14 to 24
Mean daily min. temp. (°C): February	12 to 20
Mean daily min. temp. (°C): July	0 to 6
Median annual simulated runoff (mm) for quaternary catchment	20 to 80; 80 to 100

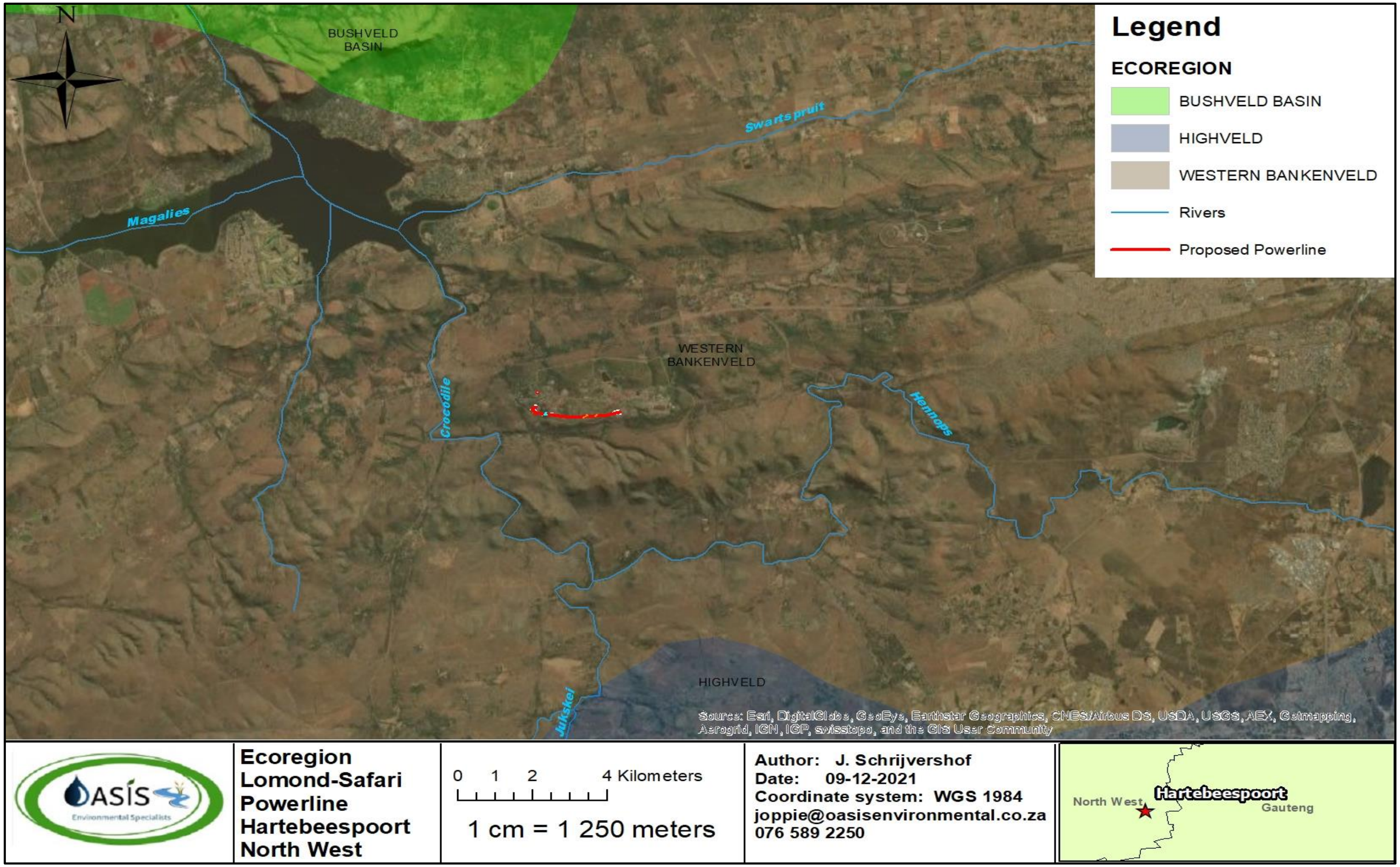

Figure 7: Proposed Eskom Powerline Lomond-Safari - Ecoregion map.

4 RESULTS

A site assessment was conducted on the 8th of December 2021. During the site visit it was evident that there was no water input from the channels into the Crocodile system in the vicinity of the Proposed Eskom Powerline Lomond-Safari. It must be noted that these channels were completely dry. Water samples could not be obtained and therefore all watercourses were delineated within the regulated areas of the Proposed Eskom Powerline Lomond-Safari (**Figure 8**).

Figure 8: A non-perennial channel in vicinity to the Proposed Eskom Powerline Lomond-Safari.

4.1 NFEPA Watercourses

Examination of the National Freshwater Ecosystem Priority Areas (NFEPA) database were undertaken for the proposed powerline. The NFEPA project aims to produce maps which provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. They were identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (MacFarlane *et al*., 2009). Identification of FEPA Wetlands are based on a combination of special features and modelled wetland conditions that include expert knowledge on features of conservation importance as well as available spatial data on the occurrence of threatened frogs and wetland-dependent birds.

No NFEPA wetlands were identified within 500 m of the proposed powerline during the desktop assessment (**Figure 9**). The Bench wetlands were confirmed to be drying ponds on the NECSA property.

However, ground-truthing the existence and condition of FEPA wetlands is important to understand local conditions which have an impact on the wetland system, their functional integrity and health.

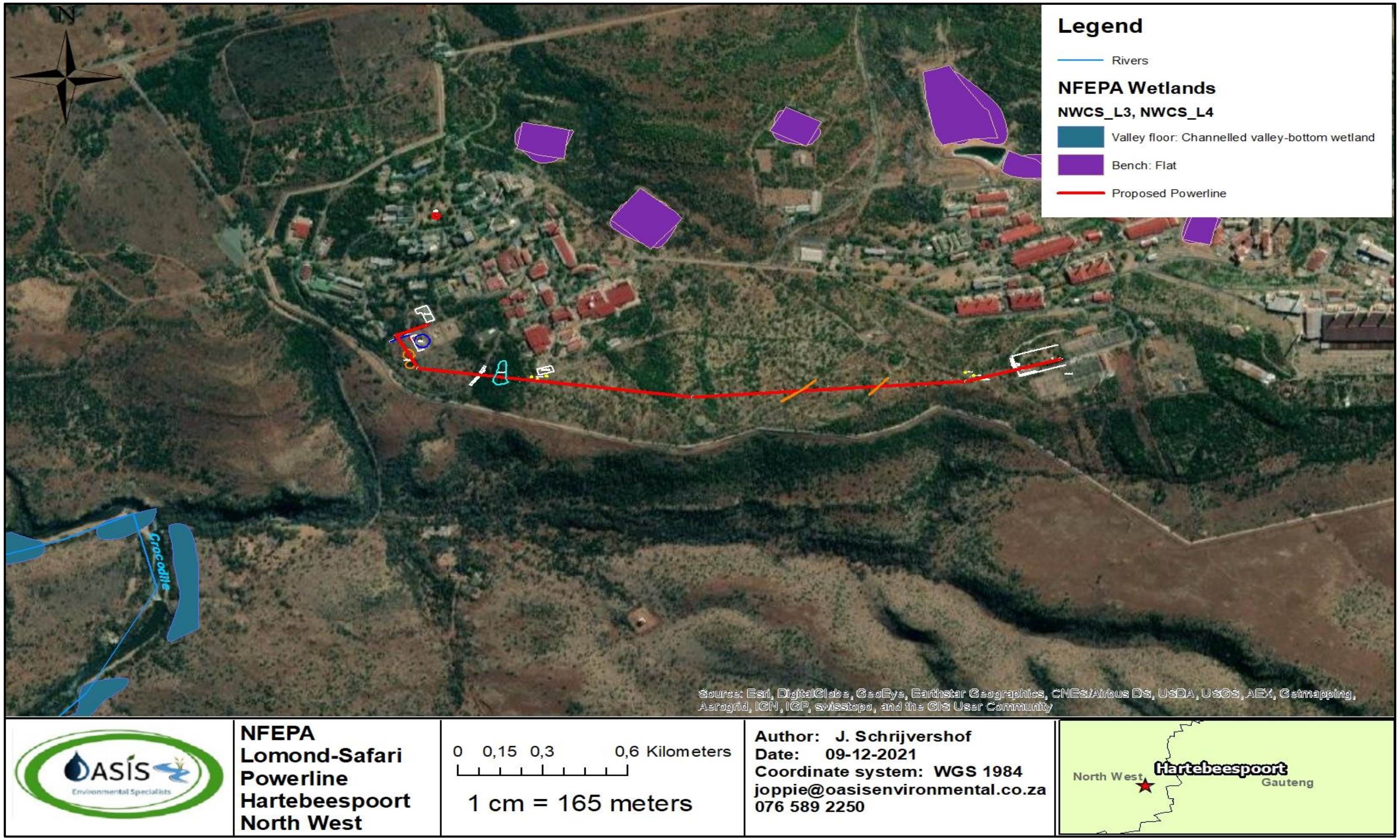

Figure 9: Proposed Eskom Powerline Lomond-Safari - NFEPA Wetland map.

4.2 Terrain indicator

The topography of an area is generally a good practical indicator for identifying those parts in the landscape where wetlands are likely to occur. Generally, wetlands occur as a valley bottom unit however wetlands can also occur on steep to mid slopes where groundwater discharge is taking place through seeps (DWAF, 2005). In order to classify a wetland system, the localised landscape setting must be taken into consideration through ground-truthing of the study site after initial desktop investigations (Ollis *et al*., 2014).

The study site can be characterised as having rolling hills with relatively steep sloping topography. The site ranges in altitude from 1180 m to 1475 m above sea level. A Digital Elevation Model (DEM) of the aerial photography of the site revealed depression in landscape associated with the Crocodile River to the West associated with the A21H Quaternary Catchments (**Figure 10**).

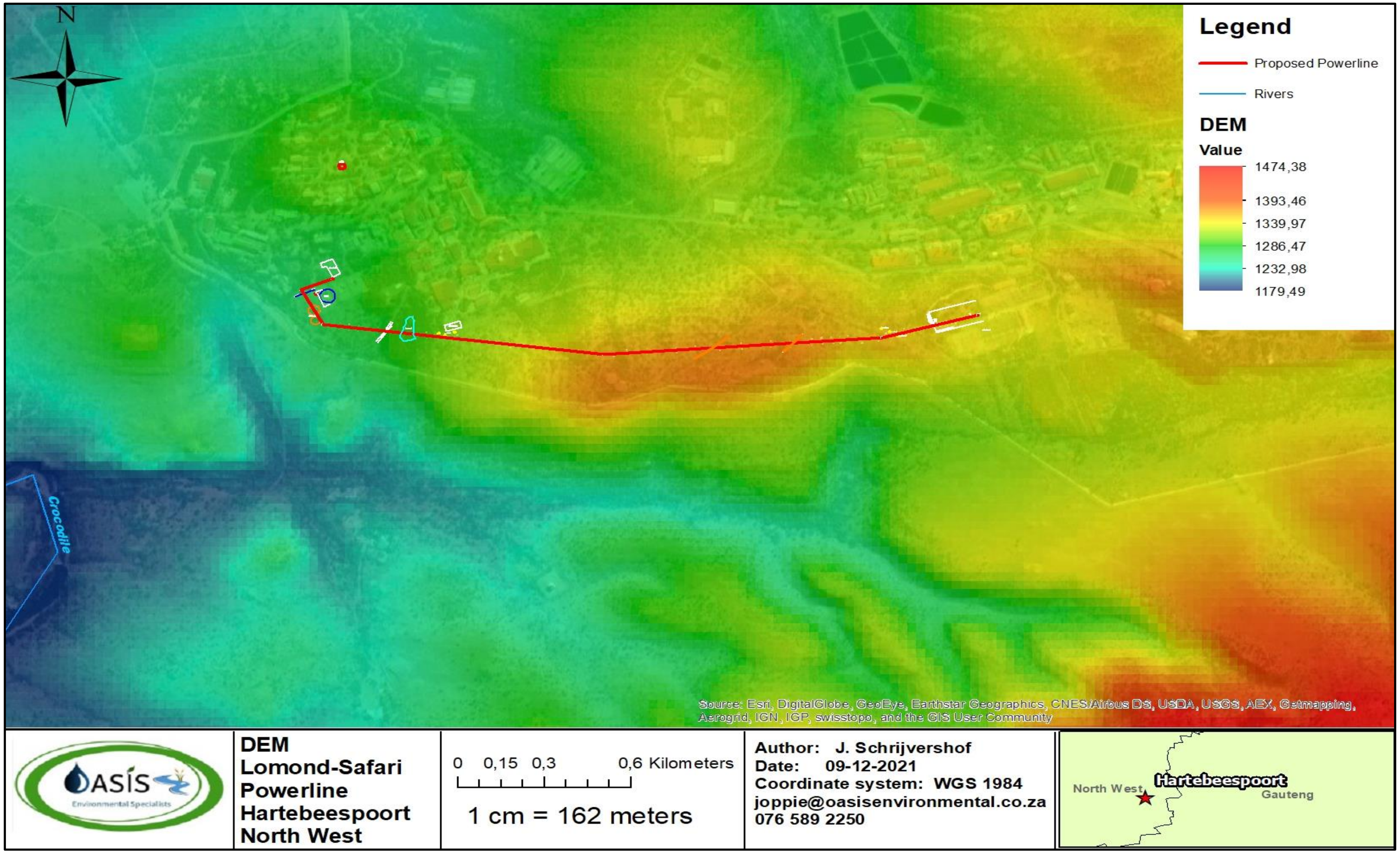

Figure 10: Proposed Eskom Powerline Lomond-Safari - Digital Elevation Model map.

4.3 Aquatic Critical Biodiversity Areas

According to SANBI (2022), the proposed powerline cuts through an Aquatic Critical Biodiversity area as shown in **Figure 11**. These Critical Biodiversity Areas (CBA's) can be terrestrial (land) and aquatic (water) areas which must be safeguarded in their natural or near-natural state because they are critical for conserving biodiversity and maintaining ecosystem functioning.

These areas were identified during the screening process and were surveyed during the site visit to groundtruth the findings from the screening assessment. The findings from the screening assessment did not corroborate the findings of the site visit and these areas were found to be non-perennial dry channel areas, dominated by *Sersia spp*. and alien invasive vegetation, therefore not being as highly ecological significant as found by the desktop findings.

The data from these areas list all drainage channels, streams, and rivers as very sensitive and is used a very generic delineation of these areas and therefore not always very accurate. The following section discusses these findings from the site survey in greater detail.

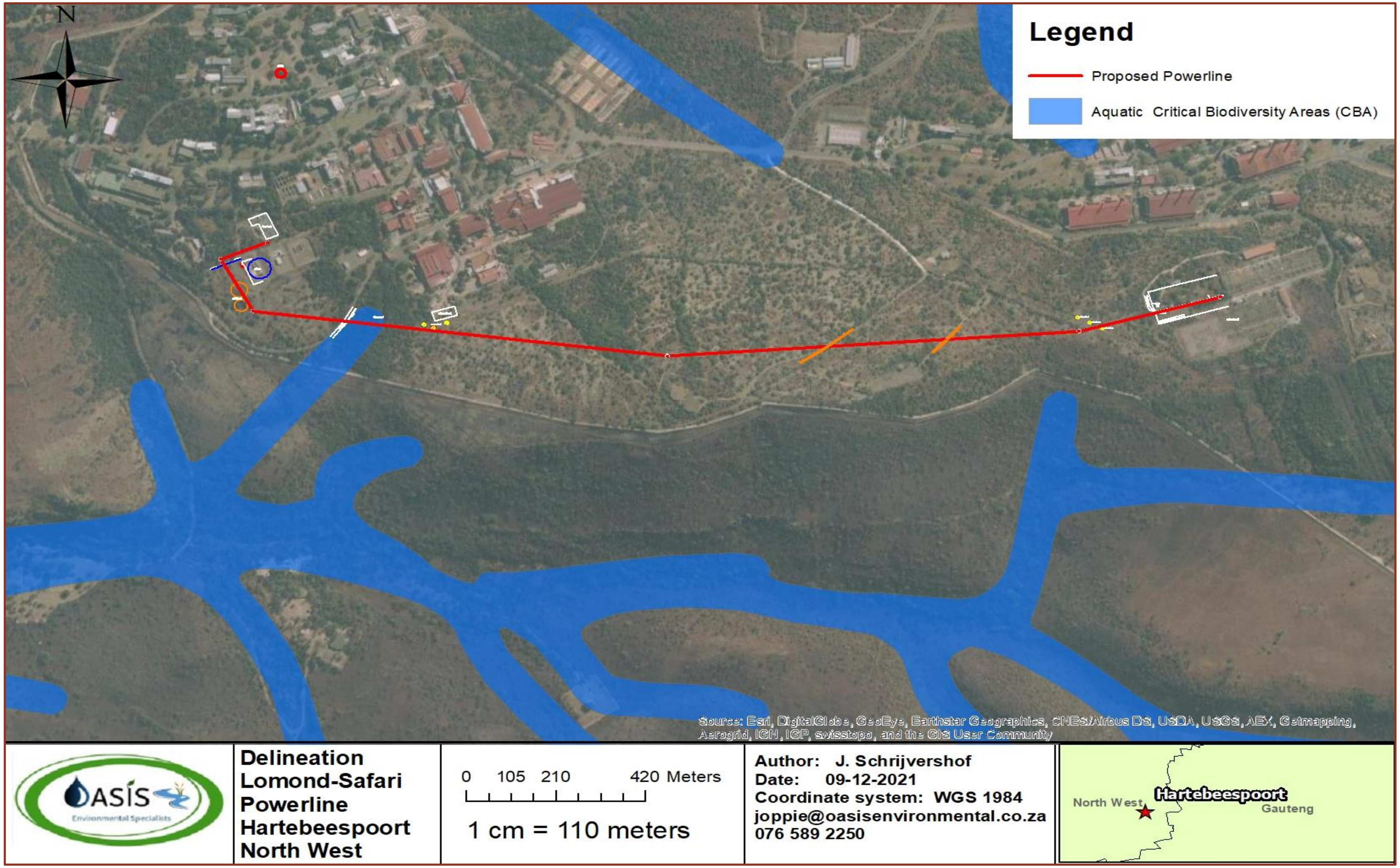

Figure 11: Proposed Eskom Powerline Lomond-Safari – Aquatic Critical Biodiversity map.

4.4 Delineation of Watercourses

According to DWAF (2005), vegetation is regarded as a key component to be used in the delineation procedure for wetlands. Vegetation also forms a central part of the wetland definition in the National Water Act, Act 36 of 1998. However, using vegetation as a primary wetland indicator requires an undisturbed condition (DWAF, 2005). Disturbances included the presence of alien invasive species, minor erosion, grazing and industrial activities within the area.

Although the scope of work were followed for the delineation of wetlands and channels as per Department Water and Sanitation guidelines, no hydrophytic vegetation or wetland/riparian soils were observed within wetland and channel areas assessed. The channel areas were classified as 'non-perennial A' section channels (**Figure 12**). 'A' section channels are those that do not have baseflow and convey surface runoff immediately after a storm event and are not associated with a riparian zone. The 100 m of the channel's regulated area and an artificial wetland overlaps with the proposed activity as per regulations of the NWA, 1998 (Act No 36 of 1998) (**Figure 14**).

The depression (''swamp'' area as referred to by Eskom) area on the western portion of the proposed powerline accumulates a small amount of storm water from the NECSA infrastructure after rainfall and as a result of anthropogenic activities within the area. This artificially created area does not illustrate any soil or vegetation characteristics associated with natural occurring wetlands, therefore this system is classified as an **artificial seasonal wetland system**. Through assessing historical imagery, this area had a historical dam and was linked with the drainage channel on the western portion (**Figure 13**). The proposed powerline will pose a very low risk to the artificial system, due to being already a manmade system. The findings from the avifaunal assessment stated that this system is unlikely to support any of the Red Listed species, therefore holding no ecological significance.

At the time of this assessment, the drainage channels and artificial wetland area comprised of mainly *Searsia spp.* and a dense tree layer of *Celtis africana, Vachellia karroo, V. robusta, Ziziphus mucronata* and *Searsia pyroides*. Alien invasive *Xanthium spinosum*, *Verbena brasiliensis* and *Persicaria* species were dominant within the channel areas. The main soils identified within these areas were dominated by a terrestrial Hutton soil form with a rocky composition.

Figure 12: **Overall view of the 'A' Section channel and artificial wetland areas.**

Figure 13: **Aerial image from 1969 illustrating the historical dam area, where the current artificial wetland area is situated.**

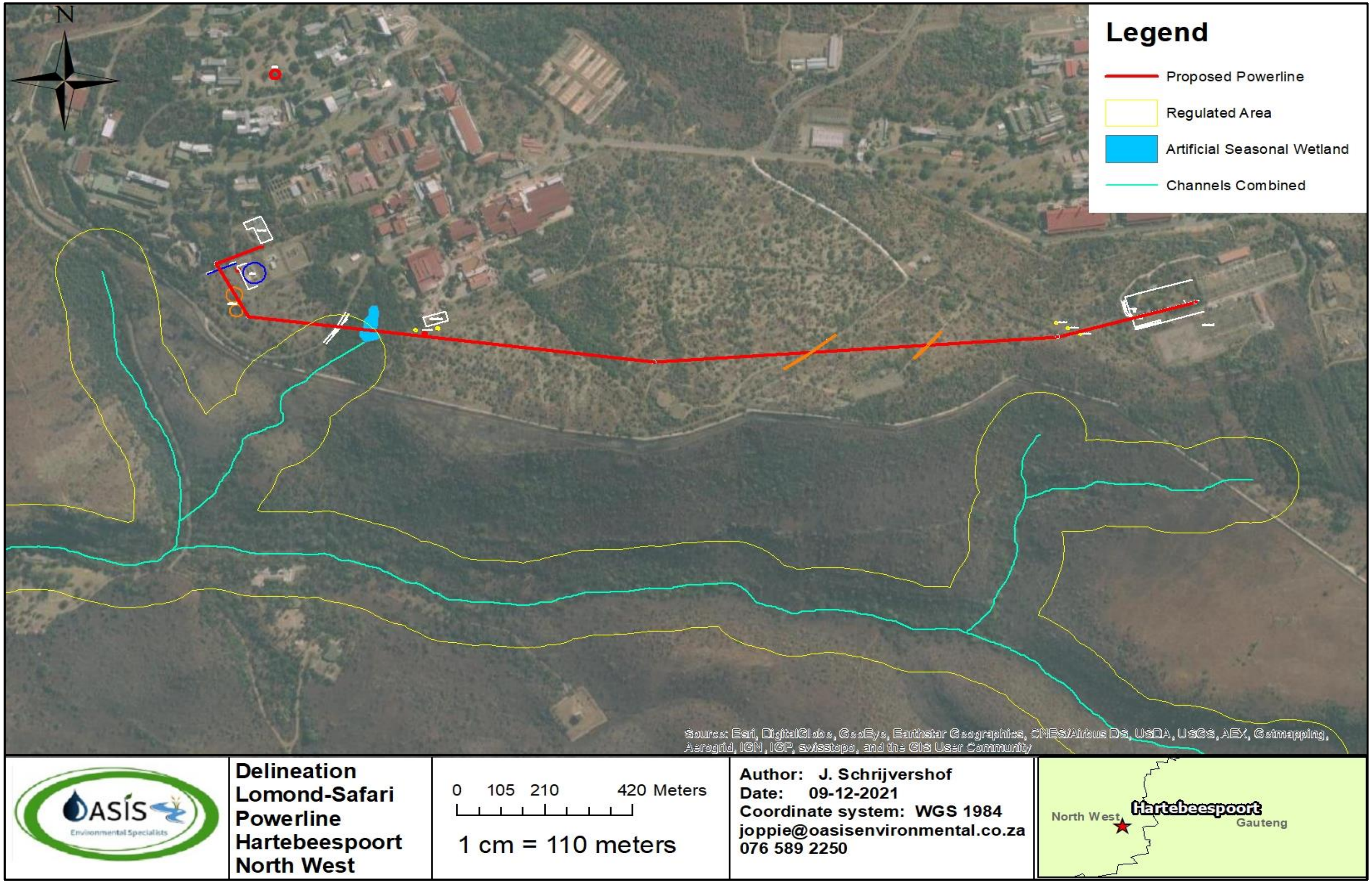
N
Legend
Proposed Powerline
Regulated Area
Artificial Seasonal Wetland
Channels Combined
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
OASIS Environmental Specialists
Delineation
Lomond-Safari
Powerline
Hartebeespoort
North West
0 105 210 420 Meters
1 cm = 110 meters
Author: J. Schrijvershof
Date: 09-12-2021
Coordinate system: WGS 1984
joppie@oasisenvironmental.co.za
076 589 2250
North West
Hartebeespoort
Gauteng

Figure 14: **Delineation of watercourses associated with the proposed powerline**

5 RISK ASSESSMENT

The risk assessment focussed on the construction and operational phases for the proposed Lomond-Safari powerline as mentioned above.

During the construction phase, possible sedimentation in the channels as well as altered flow patterns might occur. The machinery used has a risk of hydrocarbon spills into the channel. The impacts from the proposed Eskom powerline poses a **low risk** for the watercourses assessed within the regulated areas and includes the 'A' section channel and the artificial seasonal wetland (**Table 5 and Table 6)**.

Any development activity in a natural system will have an impact on the surrounding environment, usually in a negative way. The purpose of the impact assessment is to identify and assess the significance of the impacts likely to be caused by the proposed powerline to any biodiversity and to provide a description of the mitigation required in order to minimise or offset any such potential impacts on the natural environment.

Impacts that have been identified are predominantly associated with cumulative impacts include increased levels of erosion/sedimentation due to increased runoff, proliferation of alien invasive species and possible water quality alterations. Mitigation measures stated must be used to minimise the ecological impacts of the operational process.

It is therefore recommended that a trench from the artificial wetland system be created, feeding into the 'A' section channel as to avoid any further accumulation of rain water and to promote natural flow of rain water from the channels to the Crocodile River as this standing pocket of water could possibly get polluted by the construction activities from the proposed powerline.

5.1 Sedimentation and Erosion due to increased runoff

The construction phase of the powerline may transport sediment to the channel areas, during flooding events which will increase the sedimentation within the systems downstream. Increased sediments will settle on the substrate, which will restrict and displace substrate-dwelling species downstream, these impacts can be mitigated to a limited degree.

Stormwater management needs to take into consideration the deposition of silts transported after rainfall events into the surface water resources, again leading to smothering of the aquatic habitat, ultimately displacing aquatic species. Erosion must be strictly controlled through the utilisation of silt traps, silt fencing, gabions, etc. This is especially pertinent within areas of steeper gradients. Some impacts are inevitable due to the very nature of the impact for e.g. grazing. The most significant impacting features will result from the further fragmentation of the habitat and the consequences to aquatic communities within the region.

5.2 Impacts on water quantity and quality

Without careful management and insufficient storm-water structures; there is a risk that hazardous materials may enter the environment and further contaminate downstream wetland and riverine areas, but this may be very limited or eradicated, when applying the correct mitigation measures as prescribed. Hazardous (oils and fuels) waste entering wetland/river areas will impact negatively on the integrity and functioning of the aquatic ecosystems (including vegetation and living organisms) and could have a negative impact on downstream water resources. (MacFarlane et al., 2014).

5.3 Loss of Indigenous Vegetation

Alien invasive plants present onsite have the ability to out-compete and replace indigenous flora, which will in turn impact on natural biodiversity. Edge habitat is characterised by a predominance of generalist and alien species that are usually highly competitive species which can invade areas of established vegetation, resulting in a loss of sedentary species of mature habitats which are normally considered sensitive. In addition, certain alien plants exacerbate soil erosion whilst others contribute to a reduction in stream flows. Although the impact is initiated during the construction phase, it is really an operational issue as recovery of vegetation community types is a long-term process. The significance of this impact is negated by the existing disturbance regime in the project area, characterised by already dense infestations of alien plants in riparian areas and wetlands (MacFarlane et al., 2014).

A suitable alien invasive eradication and management programme must be implemented to prevent any further spread of alien invasive plants.

5.4 Mitigation

5.4.1 Construction phase

- It is therefore recommended that a small trench/pipeline be created with the purpose of draining any water from the artificial wetland by Eskom. This will aid in the flow of the 'A' section channels and will avoid any further accumulation of rain water that could be affected by construction activities of the power line;
- Construction activities must take place during winter months (low flow season);
- Prevent spillage of construction material and other pollutants, contain, and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPr;
- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas
- Facilities may not be used as staff accommodation;
- No vehicles may be washed on the property, except in suitably designed and protected areas;
- No vehicles may be serviced or repaired on the property, unless it is an emergency in which case adequate spillage containment must be implemented;

- Ensure that all stockpiles are well managed and have measures such as to minimise the mobilisation of sediments by the use of sand bags, hessian sheets, etc.;
- Dumping of any excess rubble, construction material or refuse must be prohibited;
- Dumping of materials must only take place at designated and properly managed areas;
- Make use of existing infrastructure such as existing roads as to minimise impacts;
- Construction activities (excavations, etc.) must take place within the low flow period of the channels; and
- Building material, ablution facilities or construction vehicles should not be stored in areas containing natural vegetation but the disturbed areas adjacent to the study area should be used.

5.4.2 Operational phase

- Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation must be taken immediately to avoid exacerbation of the erosion;
- No stockpiling of any materials may take place adjacent to the channels and wetland areas;
- Ensure that all stockpiles are well managed and have measures to minimise the mobilisation of sediments such as the use of sand bags, hessian sheets, etc.;
- Erosion control measures must be implemented in areas sensitive to erosion and where erosion has already occurred such as edges of slopes, exposed soil etc. These measures include but are not limited to - the use of sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which are used in the protection of slopes;
- Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place;
- Maintenance vehicles may not deviate from dedicated roads.
- It is crucial that the contamination of the surface waters through deleterious effluents and runoff water be avoided;
- Maintenance of stormwater drains must be undertaken as sensitively as possible to prevent adverse impacts to the environment and any watercourses;
- Any disturbed areas should be rehabilitated in line with the rehabilitation guidelines, this includes the clearing of alien vegetation, following the guidelines of a suitable alien invasive plant management plan;
- The site must be regularly monitored for re-growth of alien invasive species, and any new seedlings etc. eradicated using methods appropriate for the particular species, whether mechanical, chemical or biological;
- Protect as much indigenous vegetation as possible; and
- Mitigation measures must be implemented with a suitable EMPr.

Table 5: Significance ratings matrix for the impacts on the channels without mitigation associated the proposed powerline.

No.	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	**Proposed Lomond-Safari Eskom Powerline**	Work Revetments Powerline structures Access routes for Powerline Vegetation clearing Use of heavy machinery	Flow alterations due to erosion and sedimentation	2	1	3	1	1,75	1	2	4,75	1	1	1	3	6	28,5	L	90
2	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Powerline structures Use of heavy machinery using oils and fuels during vegatation clearing Accidental spillages of cements, oils, etc.	Pollution of watercourse	1	3	1	2	1,75	1	2	4,75	1	1	1	3	6	28,5	L	90
3	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Access routes for Powerline construction Installation of drainage structures Use of heavy machinery Erosion and sedimentation	Spread of alien vegetation	1	1	3	1	1,5	1	2	4,5	1	1	1	3	6	27	L	70
4	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased runoff from hardened surfaces Powerline inspections and maintenance Erosion and sedimentation	Flow alterations due to erosion and sedimentation	2	1	1	1	1,25	1	4	6,25	1	1	1	3	6	37,5	L	70
5	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased traffic Increased road runoff during rainfall events	Pollution of watercourse	1	1	2	1	1,25	1	4	6,25	1	1	1	3	6	37,5	L	90
6	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased runoff from hardened surfaces Powerline inspections and maintenance	Spread of alien vegetation	1	1	2	1	1,25	1	4	6,25	1	1	1	3	6	37,5	L	70

Table 6: Significance ratings matrix for the impacts on the channels with mitigation associated the proposed powerline.

No.	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	**Proposed Lomond-Safari Eskom Powerline**	Powerline structures Access routes for Powerline Vegetation clearing Use of heavy machinery	Flow alterations due to erosion and sedimentation	2	1	1	1	1,25	1	2	4,25	1	1	1	1	4	17	L	90
2	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Use of heavy machinery using oils and fuels during vegetation clearing Accidental spillages of cements, oils, etc.	Pollution of watercourse	1	2	1	2	1,5	1	2	4,5	1	1	1	1	4	18	L	90
3	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Use of heavy machinery Erosion and sedimentation	Spread of alien vegetation	1	1	2	1	1,25	1	2	4,25	1	1	1	1	4	17	L	70
4	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Powerline inspections and maintenance Erosion and sedimentation	Flow alterations due to erosion and sedimentation	2	1	2	1	1,5	1	4	6,5	1	1	1	1	4	26	L	70
5	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased traffic Increased road runoff during rainfall events	Pollution of watercourse	1	2	1	1	1,25	1	4	6,25	1	1	1	1	4	25	L	90
6	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased runoff from hardened surfaces Powerline inspections and maintenance	Spread of alien vegetation	1	1	2	1	1,25	1	4	6,25	1	1	1	1	4	25	L	70

Table 7: Significance ratings matrix for the impacts on the artificial wetland system associated the proposed powerline.

No.	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	**Proposed Lomond-Safari Eskom Powerline**	Stream Diversion Powerline structures over the artificial wetland Access routes for Powerline Vegetation clearing within the artificial wetland Use of heavy machinery	Flow alterations due to erosion and sedimentation	2	1	2	1	1,5	2	2	5,5	1	1	1	1	4	22	L	90
2	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Accumulation of materials Use of heavy machinery using oils and fuels during vegatation clearing Accidental spillages of cements, oils, etc.	Pollution of watercourse	1	2	1	2	1,5	2	2	5,5	1	1	1	1	4	22	L	90
3	Construction phase	**Proposed Lomond-Safari Eskom Powerline**	Use of heavy machinery Erosion and sedimentation	Spread of alien vegetation	1	1	2	1	1,25	2	2	5,25	1	1	1	1	4	21	L	70
4	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Smothering of habitat Powerline inspections and maintenance Erosion and sedimentation	Flow alterations due to erosion and sedimentation	2	1	2	2	1,75	1	4	6,75	1	1	1	1	4	27	L	70
5	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased traffic Increased road runoff during rainfall events	Pollution of watercourse	1	2	1	2	1,5	1	4	6,5	1	1	1	1	4	26	L	90
6	Operational phase	**Proposed Lomond-Safari Eskom Powerline**	Increased runoff from hardened surfaces Powerline inspections and maintenance	Spread of alien vegetation	1	1	2	1	1,25	1	4	6,25	1	1	1	1	4	25	L	70

6 CONCLUSION & RECOMMENDATIONS

The site falls within the quaternary drainage region the A21H Quaternary Catchments, and forms part of the Limpopo Water Management Area (WMA) (DWS 2016). The Crocodile River passes the study site in the West (approximately 1 km from the nearest edges). The land use features within the study site are mainly agriculture in the form of subsistence farming, industry, bushveld crops and grazing.

According to the ecological importance classification for the quaternary catchments A21H; the Crocodile system is classified as a seriously modified system (Category E). The default ecological management class for the relevant quaternary catchments is considered to be moderate sensitive system in terms of ecological importance with a moderate ecological sensitivity. The attainable ecological management class for the system is a Category B (Largely natural).

A site assessment was conducted on the 8th of December 2021. During the site visit it was evident that there was no water input from the channels in the vicinity of the Proposed Eskom Powerline Lomond-Safari. It must be noted that these channels were dry and macroinvertebrate samples could not be obtained and therefore all watercourses were delineated within the regulated areas of the Proposed Eskom Powerline Lomond-Safari.

No NFEPA wetlands were identified within 500 m of the proposed powerline during the desktop assessment. The Bench wetlands were confirmed to be drying ponds on the NECSA property.The study site can be characterised as having rolling hills with relatively steep sloping topography. The site ranges in altitude from 1180 m to 1475 m above sea level. A Digital Elevation Model (DEM) of the aerial photography of the site revealed depression in landscape associated with the Crocodile River to the West associated with the A21H Quaternary Catchments

No hydrophytic vegetation or wetland/riparian soils were observed within wetland and channel areas assessed. The channel areas were classified as 'non-perennial A' section channels, where these channels do not have baseflow and convey surface runoff immediately after a storm event and lacks a riparian zone.

The artificially created wetland area does not illustrate any soil or vegetation characteristics associated with natural occurring wetlands, therefore this system is classified as an **artificial seasonal wetland system**. Through assessing historical imagery, this area had a historical dam and was linked with the drainage channel on the western portion

At the time of this assessment, the drainage channels and artificial wetland area comprised of mainly *Searsia spp.* and a dense tree layer of *Celtis africana, Vachellia karroo, V. robusta, Ziziphus mucronata* and *Searsia pyroides*. Alien invasive *Xanthium spinosum*, *Verbena brasiliensis* and *Persicaria* species were dominant within the channel areas. The main soils identified within these areas were dominated by a terrestrial Hutton soil form with a rocky composition.

The 100 m of the channel's regulated area and artificial seasonal wetland overlaps with the proposed activity as per regulations GN 509 dated August 2016 under the Section 21 c and i water uses of the NWA, 1998 (Act No 36 of 1998). The area is already impacted by industrial development, alien invasive plant species, and extensive pollution. The impacts of the proposed powerline on the artificial wetland and non-perennial channels will be **very low**, due to all the existing anthropogenic impacts and alterations within the area. The artificial wetland system is a manmade system and should not occur naturally in that specific area. The findings from the avifaunal assessment stated that this system is unlikely to support any of the Red Listed species, therefore holding no ecological significance.

Mitigation measures, aimed at minimising the afore-mentioned impacts, include (but are not limited to):

- Design and implementation of a suitable stormwater system;
- It is therefore recommended that a small trench/pipeline be created with the purpose of draining any water from the artificial wetland by Eskom.
- Construction activities must take place during winter months (low flow season);
- Limiting instream sedimentation;
- Minimising pollutants entering the watercourse;
- Correct managing of stockpiles and construction materials;
- Active stormwater management must be implemented to stop silt and sediments from entering the wetland systems;
- Disturbed soils and stockpiled soils must be protected from erosional features;
- The prevention of alien invasive vegetation encroachment;
- Any disturbed areas should be rehabilitated in line with the rehabilitation guidelines, this includes the clearing of alien vegetation, following the guidelines of a suitable alien invasive plant management plan;
- The site must be regularly monitored for re-growth of alien invasive species, and any new seedlings etc. eradicated using methods appropriate for the particular species, whether mechanical, chemical or biological;
- Protect as much indigenous vegetation as possible; and
- Mitigation measures must be implemented with a suitable EMPr.

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GLOSSARY

Catchment: The area where water from atmospheric precipitation becomes concentrated and drains downslope into a river, lake or wetland. The term includes all land surface, streams, rivers and lakes between the source and where the water enters the ocean.

Delineation: Refers to the technique of establishing the boundary of a resource such as a wetland or riparian area.

Invasive alien species: Invasive alien species means any non-indigenous plant or animal species whose establishment and spread outside of its natural range threatens natural ecosystems, habitats or other species or has the potential to threaten ecosystems, habitats or other species.

Mitigate/Mitigation: Mitigating wetland impacts refers to reactive practical actions that minimise or reduce *in situ* wetland impacts. Examples of mitigation include "changes to the scale, design, location, siting, process, sequencing, phasing, and management and/or monitoring of the proposed activity, as well as restoration or rehabilitation of sites". Mitigation actions can take place anywhere, as long as their effect is to reduce the effect on the site where change in ecological character is likely, or the values of the site are affected by those changes (Ramsar Convention, 2012).

Water course: Means a river or spring; a natural channel in which water flows regularly or intermittently: a wetland, lake or dam into which, or from which, water flows: und 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 (National Water Act, 1998).