SCIENTIFIC AQUATIC SERVICES

Freshwater Scoping Report

AS PART OF THE PROPOSED TOURNÉE 2 SOLAR PHOTO VOLTAICS (PV) PARK, NEAR THUTHUKANI, MPUMALANGA PROVINCE.

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GLOSSARY

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.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animals 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, ocean or contributes to the groundwater system.
Chroma:	The relative purity of the spectral colour which decreases with increasing greyness.
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".
Episodic:	Highly flashy systems that flow or flood only in response to extreme rainfall events, usually high in their catchments. May not flow in a five-year period or may flow only once in several years**.** Flow is absent for 76% of the year.
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
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 soils).
Obligate species:	Species that are almost always found in wetlands (>99% of occurrences).
Freshwater ecosystem:	In terms of the definition contained within the National Water Act, a freshwater ecosystem means: • A river or spring; • A natural channel in 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 freshwater ecosystem; • and a reference to a freshwater ecosystem includes, where relevant, its bed and banks
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in the regional context, such as geology, climate, and soils, which may in turn have an influence on the ecological characteristics and functioning of wetlands.

ACRONYMS

°C	Degrees Celsius.
BESS	Battery Energy Storage System
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
CSIR	Council of Scientific and Industrial Research
CVB	Channelled Valley Bottom
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation (formerly known as DWA, DWAF, see above)
EAP	Environmental Assessment Practitioner
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EI/ES	Ecological Importance/ Ecological Sensitivity
EMC	Ecological Management Class
EMP	Environmental Management Program
ESA	Ecological Support Area
EWR	Ecological Water Requirements
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	hectare
HGM	Hydrogeomorphic
IFC	International Finance Corporations
IPP	Independent Power Producer
kV	kilovolt
LN	Listing Notice
m	Meter
m.a.m.s.l	Meters Above Mean Sea Level
MAP	Mean Annual Precipitation
MPHW	Mpumalanga Highveld Wetlands
MW	MegaWatt
MWh	MegaWatt-hour
NA	Not Applicable
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
ONA	Other Natural Areas
O&M	Operations and Maintenance
PES	Present Ecological State
PS	Performance Standards
PV	Photo Voltaics
PVSEF	Photovoltaic Solar Energy Facility
O&M	Operations and Maintenance
PVSEF	Photovoltaic Solar Energy Facility
REC	Recommended Ecological Category
RIVERCON	River Condition
RMO	Recommended Management Objective
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SA RHP	South African River Health Programme
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services

SQR	Sub-Quaternary Catchment Reach
subWMA	Sub-Water Management Area
WETCON	Wetland Condition
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WMS	Hydro Water Management system
WRC	Water Research Commission
ZoR	Zone of Regulation

1. INTRODUCTION

1.1. Background

Scientific Aquatic Services (Pty) Ltd. (SAS) was appointed by Tournée 2 Solar (Pty) Ltd to conduct a freshwater scoping assessment as part of the environmental authorisation process for the proposed Tournée 2 Solar PV Park near Thuthukani, in the Mpumalanga Province. The proposed Tournée 2 Solar PV Park forms part of the larger Tournée Solar PV Cluster which will include two (2) 150 MW Solar Energy Facilities (SEFs).

The proposed Tournée 2 Solar PV Park is located within the Lekwa Local Municipality, which is under the administration of the Gert Sibande District Municipality. The proposed Tournée 2 Solar PV is located approximately 32 km north-east of Standerton and is situated adjacent to the Eskom Tutuka Power Station ash fallout facility. Tournée 2 Solar PV Park is located on the remaining portion of portion 3 of the Farm Dwars-In-De-Weg 350 IS and portion 6 of the Farm Dwars-In-De-Weg 350 IS. The location and extent of the proposed Tournée 2 Solar PV Park is depicted in Figures 1 to 3.

To identify all possible freshwater ecosystems that may potentially be impacted, a 500 m "zone of investigation" around the proposed Tournée 2 Solar PV Park, in accordance with Government Notice 509 (GN 509) of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) (as amended), was used as a guide to assess possible sensitivities of the receiving environment. This area – *i.e.*, the 500 m zone of investigation around the proposed Tournée 2 Solar PV Park- will henceforth be referred to as the "investigation area".

The purpose of this report was to investigate and provide detail on a desktop level and verify national and provincial databases available associated with the proposed Tournée 2 Solar PV Facilities. This desktop assessment was used in the preparation of the field assessment to verify and assist in the report findings that will be discussed in the Environmental Impact Assessment (EIA) report. The scoping report does, however, provide a brief description of field assessment findings as well as the plan of study for the EIA report and methodologies used.

1.2. Project Description

The proposed Tournée 2 Solar PV Park will have a generating capacity of no more than 150 Megawatts (MW) and battery energy storage systems (BESS) of 600 megawatt-hours (MWh). Tier-1 bi-facial, single axis trackers are considered for the panels. The proposed Tournée 2 Solar PV Park will also include an on-site Independent Power Producer (IPP), which includes a substation. It is proposed that Lithium Battery Technologies such as Lithium-Ion Phosphate or Lithium Nickel Manganese Cobalt oxides will be considered as the preferred battery technology.

The purpose of the facility is to generate clean electricity from a renewable energy source (i.e., solar radiation) to contribute to the National Energy Grid. Table 1 below indicates a summary of the project details. It should be noted that the details provided below is subject to change during the EIA phase.

Table 1: Project details for the proposed Tournée 2 Solar PV Park.

Farm Potions Combined Extent	505.15 hectares (ha)
Buildable Area (subject to finalisation)	~297 ha
Contracted Capacity of PVSEF	Up to 150 MW/600MWh.
Associated Infrastructure	Internal Roads 4-5 m wide and up to 8km long.
	Independent Power Producer (IPP) site, (includes Back-to-back substation including IPP side and Eskom side)
	Battery Energy Storage System (BESS) (Including 132 kV feeder bays, transformers, control building and telecommunication infrastructure).
	Paved areas (m²) - 2 200.
	O&M building (m²) - 1 500.
	Construction phase: Construction camp area (m²) - 5,000 Laydown area (m²) - 20,000 Septic tanks, and portable toilets.
	PV Modules (229 Ha).
Technical Specifications	Tier 1 bi-facial, single axis trackers.

Figure 1: A digital satellite image depicting the location of the proposed Tournée 2 Solar PV Park in relation to the surrounding area.

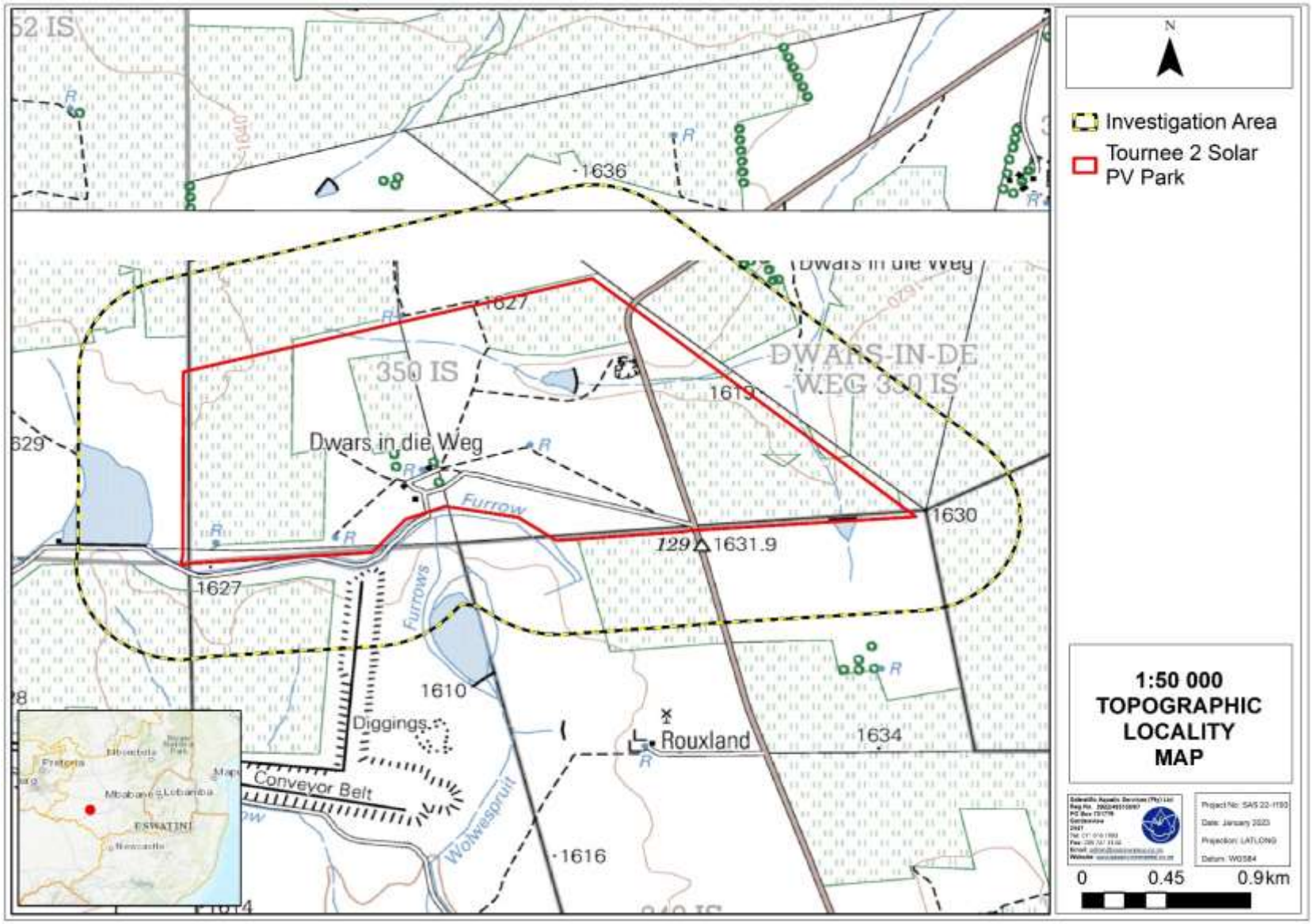


Figure 2:The proposed Tournée 2 Solar PV Park depicted on a 1:50 000 topographical map in relation to the surrounding area.

Figure 3: A digital satellite image depicting the draft development and exclusion areas of the proposed Tournée 2 Solar PV Park in relation to the surrounding area.

1.3. Assumptions and Limitations

For the purpose of this assessment, the following assumptions and limitations are applicable:

- The identification and delineation of the freshwater ecosystems are confined to the proposed Tournée 2 Solar PV Park and its associated 500 m investigation area as depicted in Figures 1 to 3 above, and was undertaken using desktop-based methods, and refined during the field assessment;
- This scoping phase study was largely undertaken as a desktop assessment with some reliance on on-site observations prior to data processing, and as such, the information gathered must be considered with caution, as inaccuracies and data-capturing errors are often present within national and provincial databases. Since this information forms part of the scoping phase, this desktop assessment is considered to provide adequate information for informed decision-making and to inform the plan of study for the EIA phase; and
- The field assessment was undertaken during late summer (6 – 8 February 2023). The field assessment aimed to determine the ecological status of the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park and to "ground-truth" the results of the desktop assessment which will be discussed in detail in the EIA report.

1.4. 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;
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) (as amended);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA) (as amended);
- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998); and
- Government Notice 320 as published in the Government Gazette 43110 of 2020 as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) – Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (dated 20 March 2020).

2. METHOD OF ASSESSMENT

2.1. Desktop Study

A desktop-based study was compiled with all relevant information as presented by the South African National Biodiversity Institute (SANBI)'s Biodiversity GIS website (http://bgis.sanbi.org.za). Relevant databases and documentation that were considered during the assessment of the Tournée 2 Solar PV Park included the following:

- National Freshwater Ecosystem Priority Area (NFEPA, 2011);
- Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database;
- National Biodiversity Assessment: South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (NBA, 2018);
- Mpumalanga Biodiversity Sector Plan (2019);
- Mpumalanga Highveld Wetlands (MPHW), (2014); and
- The National Web-based Environmental Screening Tool (Accessed 2023).

3 RESULTS OF THE DESKTOP ASSESSMENT

3.1. Ecological Importance and Sensitivity of The Tournée 2 Solar PV Park Based on National and Provincial Datasets

The following section contains data accessed as part of the desktop assessment which is presented as a "dashboard-style" report below (Table 2). 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 to provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual field characteristics associated with the proposed Tournée 2 Solar PV Park at the scale required to inform the EIA 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 verification. It must, however, be noted that field verification of key areas may potentially contradict the information contained in the relevant databases, in which case the field-verified information must carry more weight in the decision-making process.

Table 2: Desktop data indicating the characteristics of the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park and associated investigation area.

Aquatic ecoregion and sub-regions in which Tournée 2 Solar PV Park is located	
Ecoregion	Highveld
Catchment	Vaal
Quaternary Catchment (Figure 4)	C11H, and C11L
WMA	Upper Vaal
subWMA	Upstream Vaal Dam
Dominant characteristics of the Highveld (11.05) Ecoregion Level 2 (Kleynhans *et al.*, 2007).	
Dominant primary terrain morphology	Plains: low relief. Plains; moderate relief
Dominant primary vegetation types	Moist Clay Highveld Grassland.
Altitude (m a.m.s.l)	1300 to 1900
MAP (mm)	500 to 800
Coefficient of Variation (% of MAP)	20 to 29
Rainfall concentration index	55 to 64
Rainfall seasonality	Early summer
Mean annual temp. (°C)	14 to 16
Winter temperature (July)	0 to 18
Summer temperature (Feb)	12 to 26
Median annual simulated runoff (mm)	20 to 150
Ecological Status of the most proximal sub-quaternary reach (DWS, 2014) (Figure 13)	
Sub-quaternary reach	C11L-01825 (Unnamed Tributary of the Vaal River)
Proximity to Tournée 2 Solar PV Park	~7.6 km south
Assessed by expert?	Yes
PES Category Median	Largely Modified (D)
Mean Ecological Importance (EI) Class	Moderate
Mean Ecological Sensitivity (ES) Class	Moderate
Stream Order	1
Default Ecological Class	Moderate (C)

Details of Tournée 2 Solar PV Park in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database.	
FEPA CODE	Tournée 2 Solar PV Park and investigation areas fall within the Upstream Catchment Management (FEPA CODE 4) catchment. Upstream Management Areas (4) are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. Upstream Management Areas do not include management areas for wetland FEPAs, which need to be determined at a finer scale.
NFEPA Wetlands (Figure 5 and 6)	According to the NFEPA (2011) database, 6 seep wetlands, a depression wetland, and 2 flat wetlands are indicated within the proposed Tournée 2 Solar PV Park and proposed investigation area. The seep wetlands east of the proposed Tournée 2 Solar PV Park and the depression wetland are indicated to be in a moderately modified (WETCON C) ecological condition. The remaining seeps and the 2 flat wetlands are indicated to be in a heavily to critically modified (WETCON Z1-Z3) ecological condition. Z1 wetlands overlap with an artificial waterbody, Z2 wetlands are majority artificial, and Z3 wetlands have <25% natural land cover.
NFEPA Rivers (Figure 5 and 6)	According to the NFEPA (2011) database, no rivers are indicated to be within the proposed Tournée 2 Solar PV Park and its associated investigation area. An unnamed tributary of the Vaal River is indicated within the investigation area. This tributary is indicated by the database as not intact (River Condition Class Z)
Wetland Vegetation Type	The proposed Tournée 2 Solar PV Park and investigation areas fall within the Mesic Highveld Grassland Group 3 vegetation type (Wetveg). This vegetation type is considered to be least threatened (**LT**) according to Mbona *et al.* (2015).
National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Figure 7 and 8)	
According to the NBA database (2018), two (2) seep wetlands, one (1) CVB wetland, and one (1) depression wetland are indicated to be within the proposed Tournée 2 Solar PV Park and the associated investigation area. The 2 seep wetlands are indicated to be in a moderately modified (Wetland Condition Class C) ecological condition. The CVB wetland is indicated to be in a largely to critically modified (WETCON D/E/F) ecological condition. The depression wetland is indicated to be in a natural to a near natural (WETCON A/B) ecological condition. The artificial wetlands database indicates the presence of 6 dams within the proposed Tournée 2 Solar PV Park and associated investigation area, 3 of which occur within the CVB and seep wetlands. No rivers are indicated by the database to be within the proposed Tournée 2 Solar PV Park, but the Unnamed Tributary of the Vaal River is indicated to be within the associated investigation area. The tributary is indicated to be in a largely to critically modified ecological condition (RIVERCON Class D/F).	
Mpumalanga Highveld Wetlands (MPHW, 2014) (Figure 9 and 10)	
According to the MPHW (2014) database, a large seep wetland, and a channelled valley bottom wetland are indicated to be within the proposed Tournee 2 Solar PV Park. These are also indicated in the investigation area, along with several dams. The seep wetland is indicated by the database to be in a moderately modified ecological condition (WETCON C) and the channelled valley bottom to be in a natural/near natural ecological condition (WETCON A/B).	

National Web Based Environmental Screening Tool (Accessed 2023) (Figure 12)	Mpumalanga Biodiversity Sector Plan (MBSP, 2019) Freshwater Database (Figure 11)	
Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas.	Ecological Support Area (ESA)	According to the MBSP Freshwater database (2019), the wetlands indicated by the NFEPA (2011), NBA (2018) and MPHW (2019) databases are indicated as ESAs. ESAs are areas that are not essential for meeting targets, but that play an important role in supporting the functioning of CBAs and that deliver important ecosystem services.
The Screening Tool indicates that the proposed Tournée 2 Solar PV Park has **very high aquatic sensitivity** due to proximity to wetlands. This corresponds with the NBA (2018), MPHW (2014), and NFEPA (2011) databases.	Critical Biodiversity Area (CBA)	The database does not indicate any parts of the proposed Tournée 2 Solar PV Park and its associated investigation area as Critical Biodiversity Areas.
Details of the proposed Tournée 2 Solar PV Parkin terms of the Land Types Database	Other Natural Areas (ONA)	Majority of the proposed Tournée 2 Solar PV Park are indicated as ONAs. ONAs are areas that have been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.
The proposed Tournée 2 Solar PV Park is within the Ea17 land type grouping. Soils in this grouping are black and red clay, swelling soils and can be classified as consisting of one or more of vertic, melanic and/or red structured soils land types. In a terrain setting context – apart from streambeds which comprise 10% of the area of valley floors within the land type, the entirety of the area covered in valley floors is comprised of vertic soils in the form of the Rensburg Soil Form (70% of the area) – a wetland soil form and the Arcadia Soil Form. Footslopes and midslopes show a similar dominance of vertic soils, but the dominant soil form is the Arcadia Soil Form in these two terrain settings. The presence of the Rensburg Soil Form indicates the likely presence of wetlands, occurring primarily within valley floors.	Modified or Heavily Modified areas	The remaining portions of the proposed Tournée 2 Solar PV Park and investigation areas are identified as Heavily Modified areas. These are areas in which significant or complete loss of natural habitat and ecological functioning has taken place which is largely due to agricultural activities within the area.

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; PES = Present Ecological State; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; CVB =Channelled Valley Bottom; WMA = Water Management Area; WETCON = Wetland Condition; RIVERCON = River Condition.

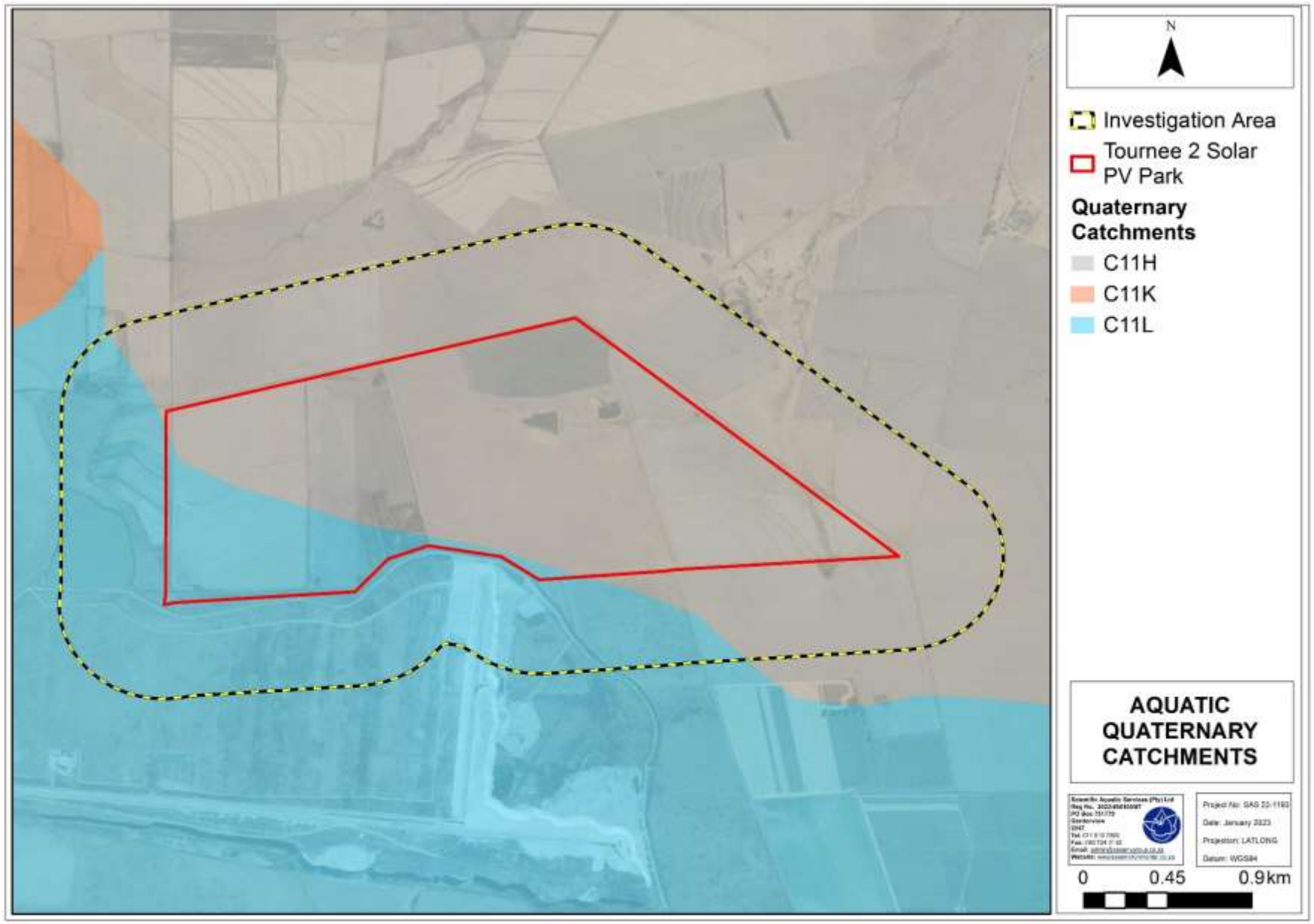


Figure 4: Aquatic Ecoregions and Quaternary Catchments associated with the proposed Tournée 2 Solar PV Park.

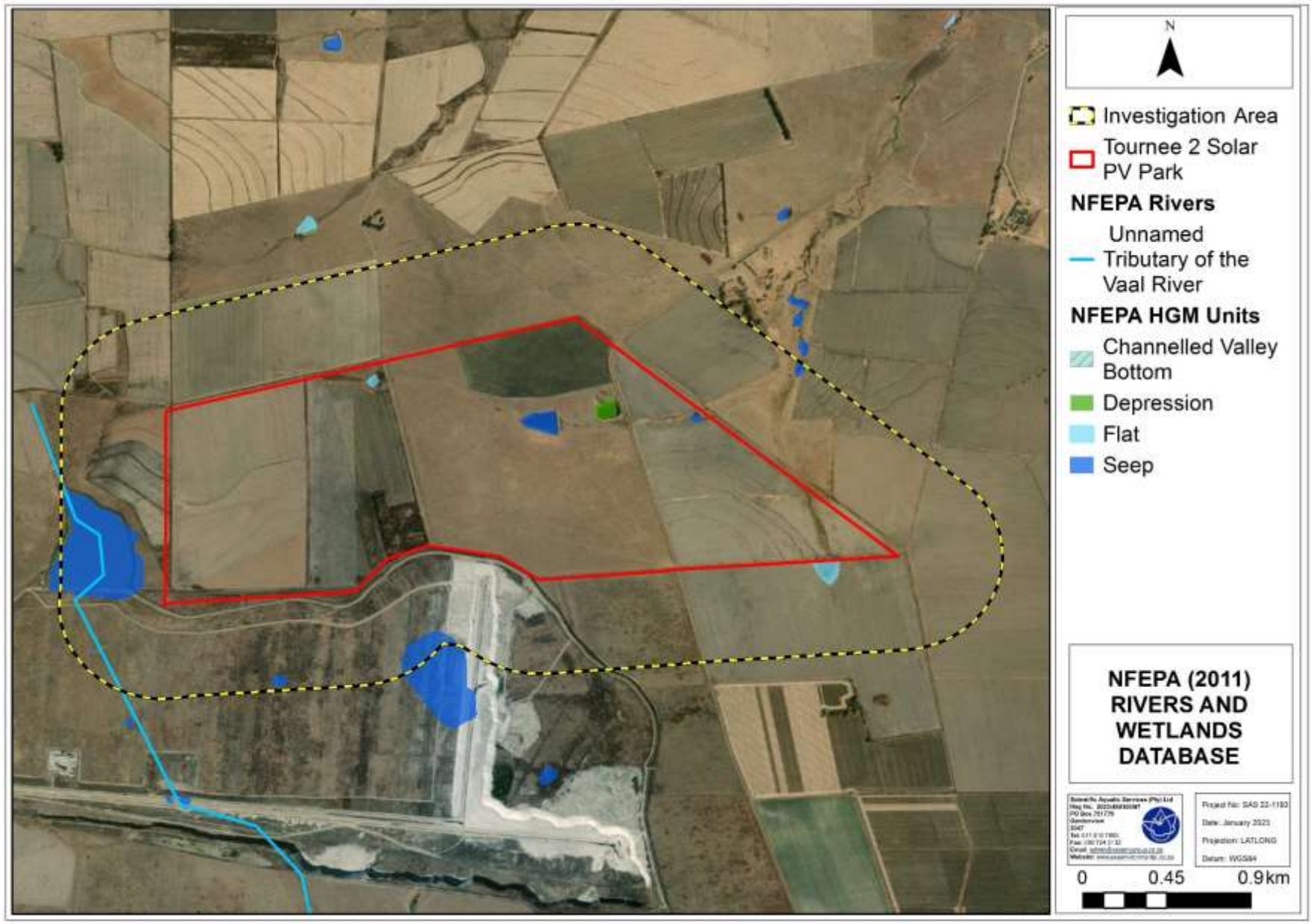


Figure 5: Wetland HGM units associated with the Tournée 2 Solar PV Park according to the NFEPA database (2011).

Figure 6: Condition of the wetlands associated with the Tournée 2 Solar PV Park according to the NFEPA database (2011).

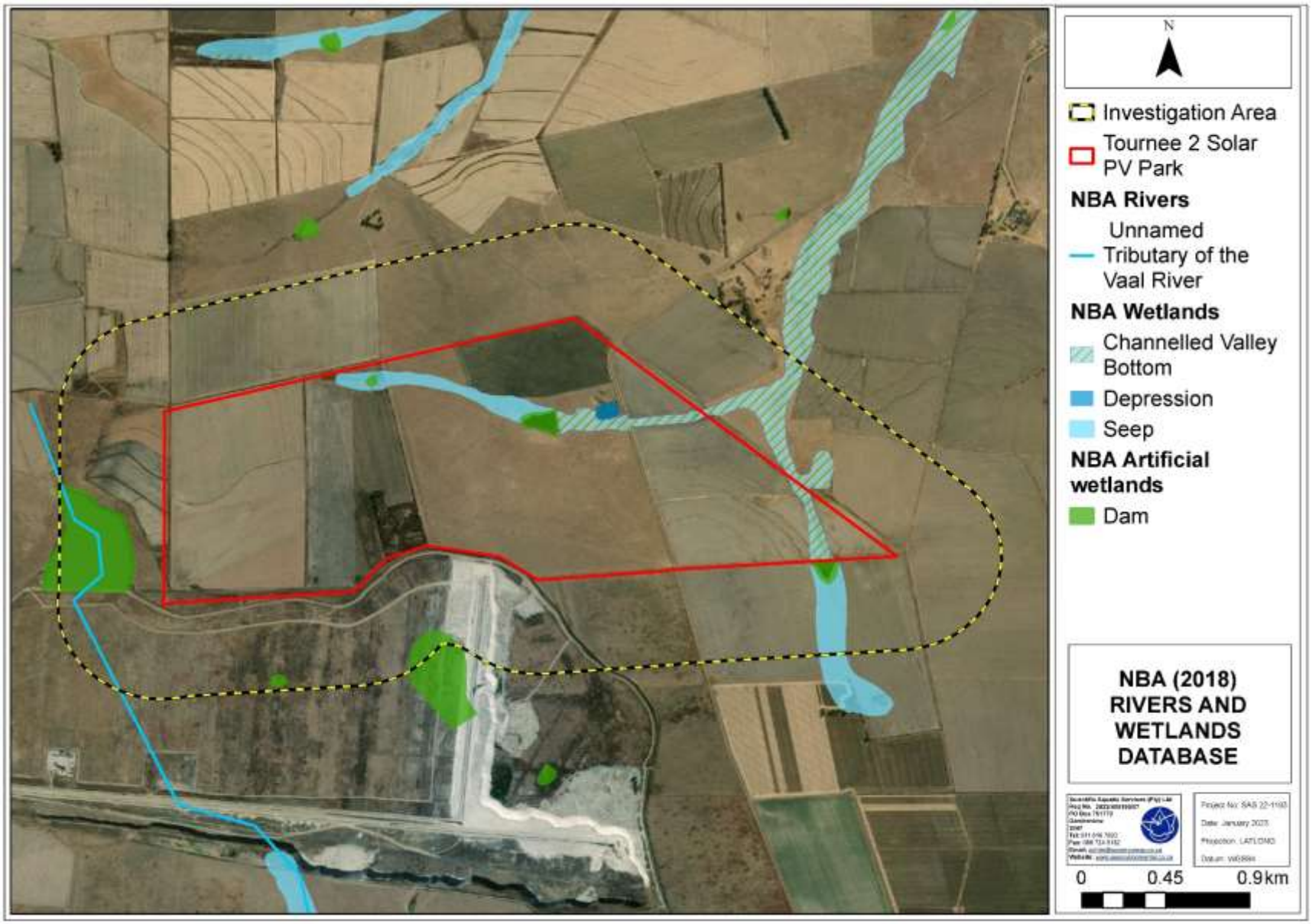


Figure 7: Dams and Rivers associated with the proposed Tournée 2 Solar PV Park according to the National Biodiversity Assessment database (2018).

Figure 8: The condition of the wetlands associated with the proposed Tournée 2 Solar PV Park according to the National Biodiversity Assessment database (2018).

Figure 9: Freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park according to the Mpumalanga Highveld Wetlands (2014).

Figure 10: The condition of the wetlands associated with the proposed Tournée 2 Solar PV Park according to the Mpumalanga Highveld Wetlands Database (2014).

Figure 11: Critical Biodiversity Areas associated with the Tournée 2 Solar PV Park according to the Mpumalanga Biodiversity Spatial Plan (2019).

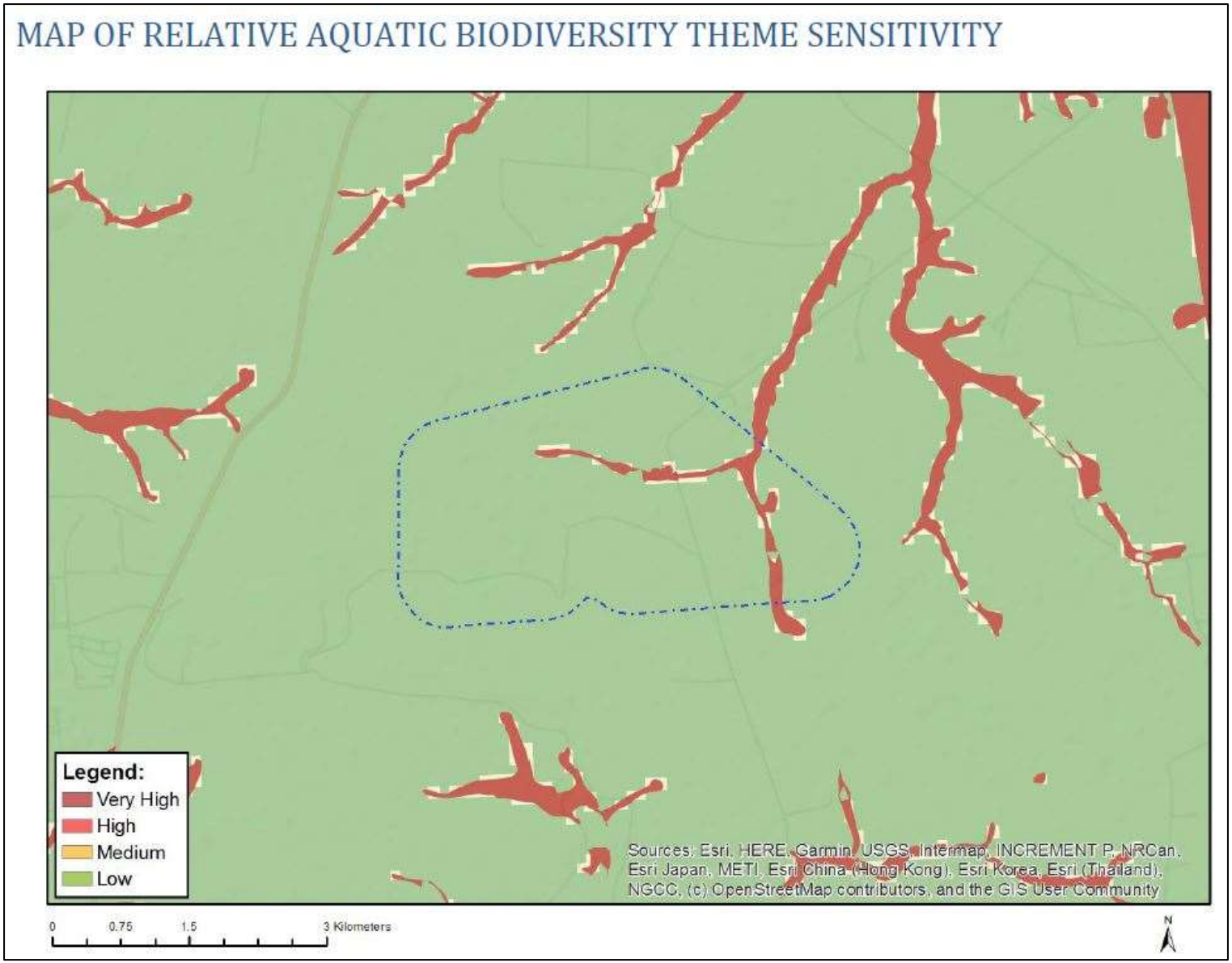


Figure 12: Aquatic Biodiversity Theme Sensitivity associated with the Tournée 2 Solar PV Park according to the National Web-based Screening Tool (Accessed 2023).

3.2 Ecological Status of Sub-Quaternary Catchments [Department of Water and Sanitation (DWS) Resource Quality Services (RQS) PES/EIS Database]

The PES/EIS database, as developed by the DWS RQIS department, was utilised to obtain additional background information on the project area. The information from this database is based on information at a sub-quaternary catchment reach (SQR) level. Descriptions of the aquatic ecology are based on information collated by the DWS RQIS department from available sources of reliable information, such as South African River Health Program (SA RHP) sites, Ecological Water Requirements (EWR) sites and Hydro Water Management system (WMS) sites. This C11L-01825 (Unnamed Tributary of the Vaal River) sub-quaternary catchment reach (SQRs) within the Highveld Aquatic Ecoregion is applicable (Figure 13 below).

Key information on fish species, invertebrates and background conditions associated with the C11L-01825 (Unnamed Tributary of the Vaal River) SQR point as contained in this database and pertaining to the Present Ecological State (PES), ecological importance (EI) and ecological sensitivity (ES) are described below.

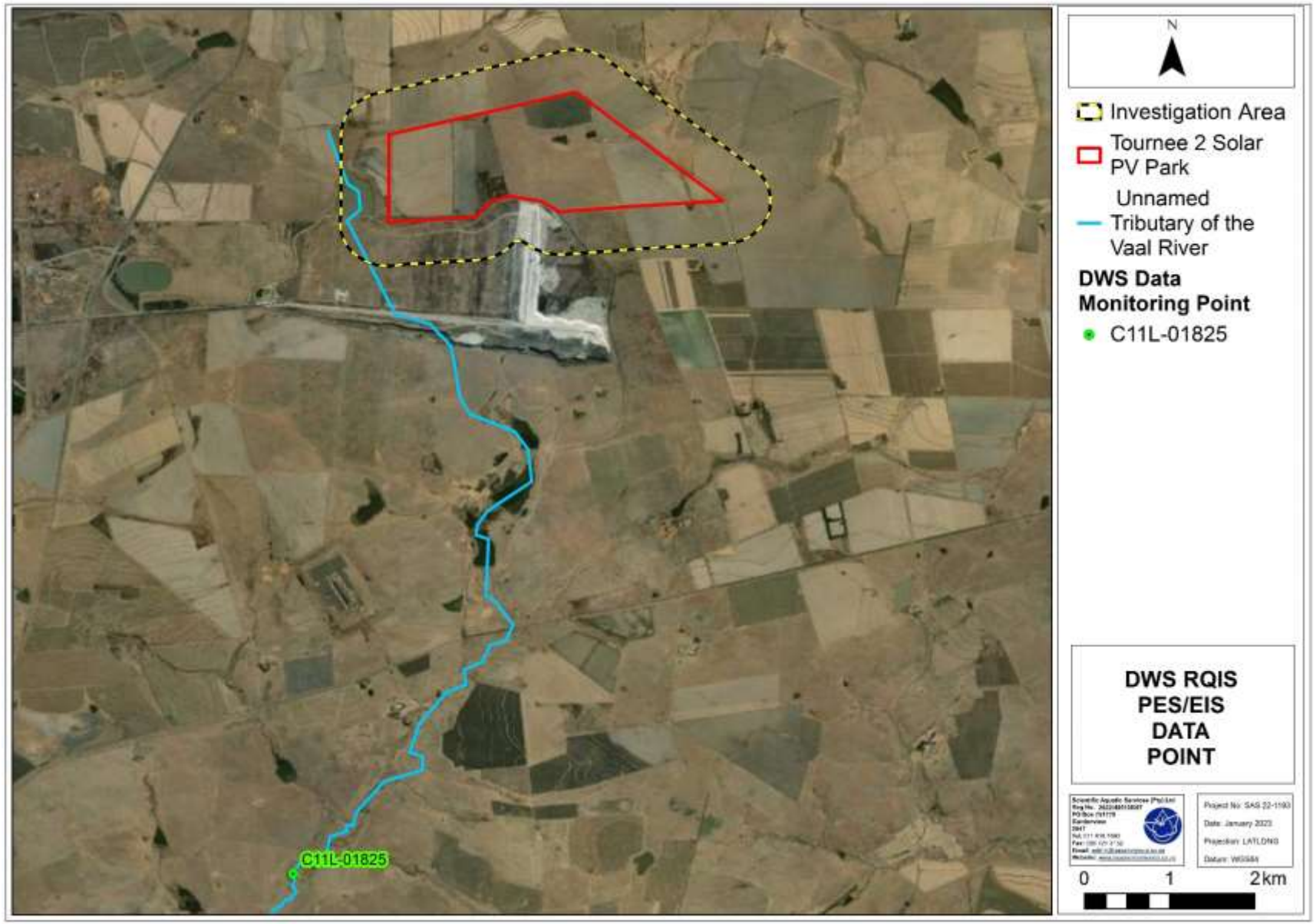


Figure 13: Relevant sub-quaternary catchment reach (SQR) associated with the proposed Tournée 2 Solar PV Park and investigation area according to the DWS database (2014).

Fish species previously collected from or expected in the C11L-01825 (Unnamed Tributary) SQR monitoring point associated with the proposed Tournée 2 Solar PV Park and investigation area.

Clarias gariepinus
Enteromius anoplus
Pseudocrenilabrus philander

Table 3: Invertebrates previously collected from or expected at C11L-01825 (Unnamed Tributary of the Vaal River) SQR monitoring point associated with the proposed Tournée 2 Solar PV Park and investigation area.

Aeshnidae	Corixidae	Hydrophilidae	Oligochaeta
Ancylidae	Culicidae	Hydropsychidae 1 Sp	Physidae
Atyidae	Dytiscidae	Hydroptilidae	Planorbinae
Baetidae > 2 Sp	Elmidae/Dryopidae	Leptoceridae	Pleidae
Belostomatidae	Gerridae	Leptophlebiidae	Potamonautidae
Caenidae	Gomphidae	Libellulidae	Simuliidae
Ceratopogonidae	Gyrinidae	Muscidae	Sphaeriidae
Chironomidae	Hirudinea	Naucoridae	Tabanidae
Coenagrionidae	Hydracarina	Nepidae	Turbellaria
Corbiculidae	Hydrometridae	Notonectidae	Veliidae/Mesoveliidae

Table 4: Summary of the ecological status of the sub-quaternary catchment (SQ) reach associated with the proposed Tournée 2 Solar PV Park based on the DWS RQS PES/EIS database.

Synopsis SQ reach - C11L-01825 (Unnamed Tributary of the Vaal River)					
PES[1] category median	**Mean EI[2] class**	**Mean ES[3] class**	**Length**	**Stream order**	**Default EC[4]**
D (Largely Modified)	Moderate	Moderate	13.25 km	1	C
PES details					
Instream habitat continuity MOD		Large	**Riparian/wetland zone MOD**		Moderate
RIP/wetland zone continuity MOD		Large	**Potential flow MOD activities**		Large
Potential instream habitat MOD activities		Large	**Potential physico-chemical MOD activities**		Moderate
EI details					
Fish spp/SQ		3.00	**Fish average confidence**		1.00
Fish representativity per secondary class		Low	**Fish rarity per secondary class**		Low
Invertebrate taxa/SQ		40.00	**Invertebrate average confidence**		1.00
Invertebrate representativity per secondary class		High	**Invertebrate rarity per secondary class**		Moderate
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating		High	**Habitat diversity class**		Low
Habitat size (length) class		Low	**Instream migration link class**		Moderate
Riparian-wetland zone migration link		Low	**Riparian-wetland zone habitat integrity class**		Very High
Instream habitat integrity class		Moderate	**Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500 m**		High
Riparian-wetland natural vegetation rating based on expert rating					Low
ES details					
Fish physical-chemical sensitivity description		Moderate	**Fish no-flow sensitivity**		Moderate
Invertebrates physical-chemical sensitivity description		Very High	**Invertebrate velocity sensitivity**		Very High
Riparian-wetland-instream vertebrates (excluding fish) intolerance water level/flow changes description					High
Stream size sensitivity to modified flow/water level changes description					Low
Riparian-wetland vegetation intolerance to water level changes description					High

[1] PES = Present Ecological State; confirmed in database that assessments were performed by expert assessors;

[2] EI = Ecological Importance;

[3] ES = Ecological Sensitivity

[4] EC = Ecological Category; default based on median PES and highest of EI or ES means.

4 PRELIMINARY FIELD ASSESSMENT RESULTS

4.1 Delineation and Classification of The Freshwater Ecosystems Associated with the Focus and Investigation Areas Using Desktop Analysis

The National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA) is aimed at the protection of the country's water resources, defined in the Act as "a watercourse, surface water, estuary or aquifer". According to the NWA, a **watercourse** means:

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake, or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the *Gazette,* declare a watercourse.

It should be noted that in this report "freshwater ecosystem" is often used and it carries the same meaning as "watercourse" as defined by the NWA.

The Act further provides definitions of wetland and riparian habitats as follows:
Wetland habitat is "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

The delineation of the freshwater ecosystems was undertaken during the single site visit undertaken by SAS (February 2023) in conjunction with desktop analysis, taking into consideration the desktop database information as per Section 3 above to identify features displaying a diversity of digital signatures. In this regard, specific mention is made of the following:

- Linear features: since water flows/moves through the landscape, freshwater ecosystems often have a distinct linear element to their signature which makes them discernible on aerial photography or satellite imagery;
- Vegetation associated with freshwater ecosystems: a distinct increase in density as well as shrub size near flow paths;
- Hue: with water flow paths often showing as white/grey or black and outcrops or bare soils displaying varying chroma created by varying vegetation cover, geology, and soil conditions. Changes in the hue of vegetation, with freshwater ecosystem vegetation often indicated on black and white images as areas of darker hue (dark grey and

black). In colour imagery, these areas mostly show up as darker green and olive colours or brighter green colours in relation to adjacent areas, where there is less soil moisture or surface water present; and

- Texture: with areas displaying various textures which are distinct from the adjacent terrestrial areas, created by varying vegetation cover and soil conditions within the freshwater ecosystems.

The freshwater ecosystem associated with the proposed Tournée 2 Solar PV Park was identified as a single channelled Valley Bottom (CVB) wetland (Figure 14). Agricultural activities in the area have affected the integrity of the CVB wetland. The freshwater ecosystem's characteristics and ecology will be further discussed during the EIA phase.

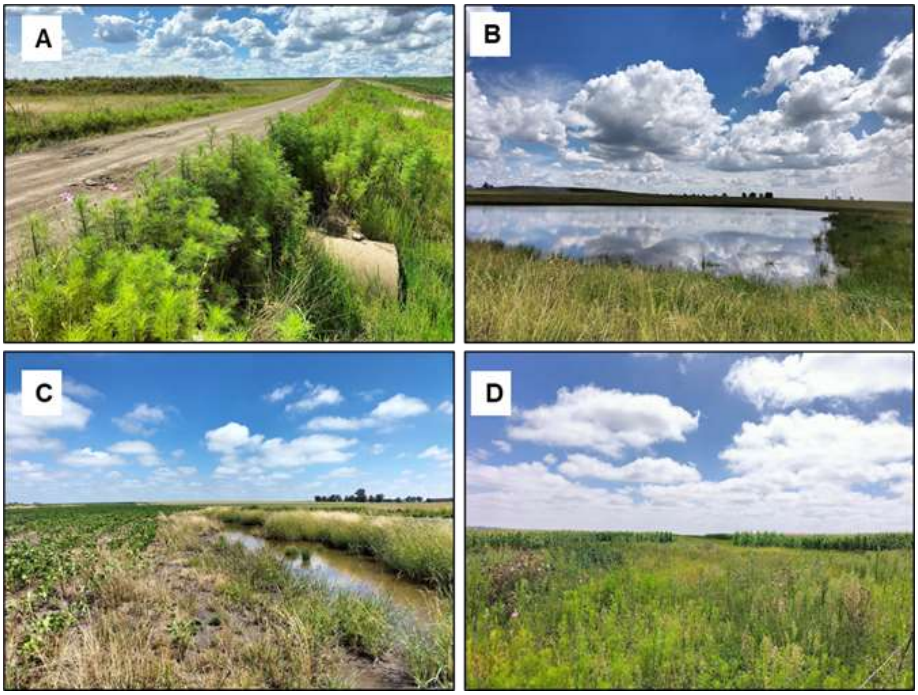
Figure 14: Freshwater ecosystem delineations (field-verified) associated with the proposed Tournée 2 Solar PV Park.

4.2 Pre-liminary Field Verification Results

During the site visit conducted during the late summer season in February 2023, a single Channelled Valley Bottom (CVB) wetland as discussed earlier in Section 4.1 was identified. More information pertaining to the PES, EIS, and ecological service provision of the identified wetland system will be provided during the EIA phase when full biodiversity assessment reports will be developed.

The proposed Tournee 2 Solar PV Park is underlain by EA17 land type. Soils within EA land type groupings are dark brown / black or red coloured strongly to very strongly structured (topsoil and subsoil) of varying depths. These soils have high clay content, displaying a high water-holding capacity and mostly containing a high percentage of swelling clay minerals. Vertic and melanic soils commonly occur in EA land types. In the focus area, the vast majority of the terrain units in which wetlands are encountered – i.e., valley bottoms, footslopes and midslopes are characterised by vertic soils (occurring within two soil forms – the Arcadia and Rensburg Soil Forms). This is important in a freshwater (wetland) delineation context as the presence of vertic soils poses difficulties for delineation of wetlands as due to their high (alkaline) pH status ≥8, typical signs of wetness (such as mottling) are not typically present in the soils and the standard delineation procedure for wetlands in South Africa that relies mostly on soil wetness indicators cannot be applied. Wetland delineation in vertic settings is further complicated within the Rensburg soil form – the soil form that is typically associated with wetlands in the EA17 land type– by the potential occurrence of the gley (G) horizon at extreme depth (of up to 2m), with the soil horizon showing redoximorphic characteristics being well below the typical rooting depth of herbaceous plants. Accordingly, an adapted delineation methodology which was based on vegetation, terrain and hydrological indicators was applied.

Table 5: The CVB wetland within the eastern and central portions of the Tournée 2 Solar PV Park.

CVB wetland
The CVB wetland within the eastern and central portions of the study area have been subject to various impacts which have impacted on the ecological integrity and eco service provisioning of the wetland. Historically, the extent of the CVB wetland was much more extensive, however, agricultural activities have encroached upon the boundary of the wetland and is now considered remnant wetland areas. The hydraulic regime and geomorphological processes of the CVB wetland has been impacted by extensive cultivation activities, numerous impoundments, and a road crossing (Hendrikspan road). Although the wetland system is located in a catchment with extensive cultivation activities, no abstraction of water was noted during the site visit. However, these catchment wide activities have increased sediment laden runoff and have altered the water quality of the systems due to the use of herbicides and pesticides. Numerous Alien Invasive Plants (AIPs) were also noted within the CVB wetland which included, but are not limited to, *Tagetes minuta* (Southern Cone Marigold), *Bidens pilosa* (Black Jack), *Cosmos bipinnatus* (Common Garden Cosmos), and *Cirsium vulgare* (Creeping Thistle). As the wetland system is within an agricultural area, it is expected that the system would be of high biodiversity importance as they provide a natural habitat for numerous flora, fauna, and avifaunal species.  **Figure 15: Photographic representation of the impacts to the CVB wetland. (A) the Hendrikspan pad which traverses the wetland in the western portion. (B) example of the numerous impoundments within the active channel of the wetland. (C) encroachment of cultivation activities. (D) AIPs within the CVB wetland.**

5 APPLICATION OF LEGISLATIVE REQUIREMENTS

As part of the freshwater gap analysis assessment, a preliminary sensitivity map was developed incorporating all relevant legislative requirements applicable to the field-verified freshwater ecosystem delineations associated with the proposed Tournée 2 Solar PV Park.

A regulated zone is a legally stipulated area around the delineated freshwater ecosystems that:

a) may be considered a 'high sensitivity' area, as deemed necessary by the specialist; and/or
b) would require authorisation by the relevant authorities for any activities (both construction and operation) within the identified zone.

The definition and motivation for a regulated zone of activity that are applicable for the protection of the freshwater ecosystems are bolded and summarised as follows:

Table 6: Articles of legislation and the relevant regulated areas applicable to each article related to the National Water Act, 1998 (Act No. 36 of 1998).

Regulatory authorisation required	Zone of applicability
Water Use Authorisation Application for water uses as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (as amended).	**Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)** In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21 (c) and 21 (i) is defined as: • the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or a **500 m radius from the delineated boundary (extent) of any wetland** or pan in terms of this regulation.
Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended (2017). The activities which might trigger the required authorisations must be determined by the EAP in consultation with the relevant authorities.	**Activity 12** of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended in 2017) states that: *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* ***(ii) infrastructure or structures with a physical footprint of 100 square metres or more;*** *where such development occurs—;* *a) within a watercourse;* *b) in front of a development setback; or* *c)* ***if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. Excluding where such development occurs within an urban area.*** **Activity 10** of Listing Notice 3 (GN 324) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended in 2017) states that:

Regulatory authorisation required	Zone of applicability
	Mpumalanga *i. In an estuary* ***ii. Outside urban areas:*** *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* ***(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*** *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve;* *(hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined;* ***(ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or*** *(jj) Within 500 metres of an estuary.* *iii. Inside urban areas:* *(aa) Areas zoned for use as public open space; or* *(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.* **Activity 14** of Listing Notice 3 (GN 324) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended in 2017) states that: **Mpumalanga** ***i. Outside urban areas:*** *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Sites or areas identified in terms of an international convention;* ***(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*** *(gg) Core areas in biosphere reserves; or* *(hh) Areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or* *(ii) Inside urban areas:* *(cc) Areas zoned for use as public open space; or* *Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose.*
Specific guidelines for meeting minimum requirements for ESA wetlands (MBSP, 2014).	• All wetlands are protected under the National Water Act, 1998 (Act No. 36 of 1998). • In terms of the National Water Act, 1998 (Act No. 36 of 1998), freshwater ecosystems (all wetlands included) should not be allowed to degrade to an unacceptably modified condition (E or F ecological category).

Regulatory authorisation required	Zone of applicability
	• Conduct a buffer determination assessment around all wetlands, regardless of ecological condition or ecosystem threat status. • Any further loss of area or ecological condition must be avoided, including if needed, a 100 m generic buffer around the wetlands.

The proponent needs to consider Listing Notice (LN) 3 Activity 10 and the MBSP minimum requirements and guideline for a 100 m generic buffer around the wetlands for the proposed Tournée 2 Solar PV Park, and this must be confirmed in the EIA Phase when the layout is provided.

In accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998), the fowling Zones of Regulations (ZoR) are applicable for the scoping report (Figure 17):

- a 32 m ZoR in accordance with National Environmental Management Act, 1998 (Act No. 107 of 1998); and
- A 500 m ZoR in accordance with GN509 of the National Water Act, 1998 (Act No. 36 of 1998).

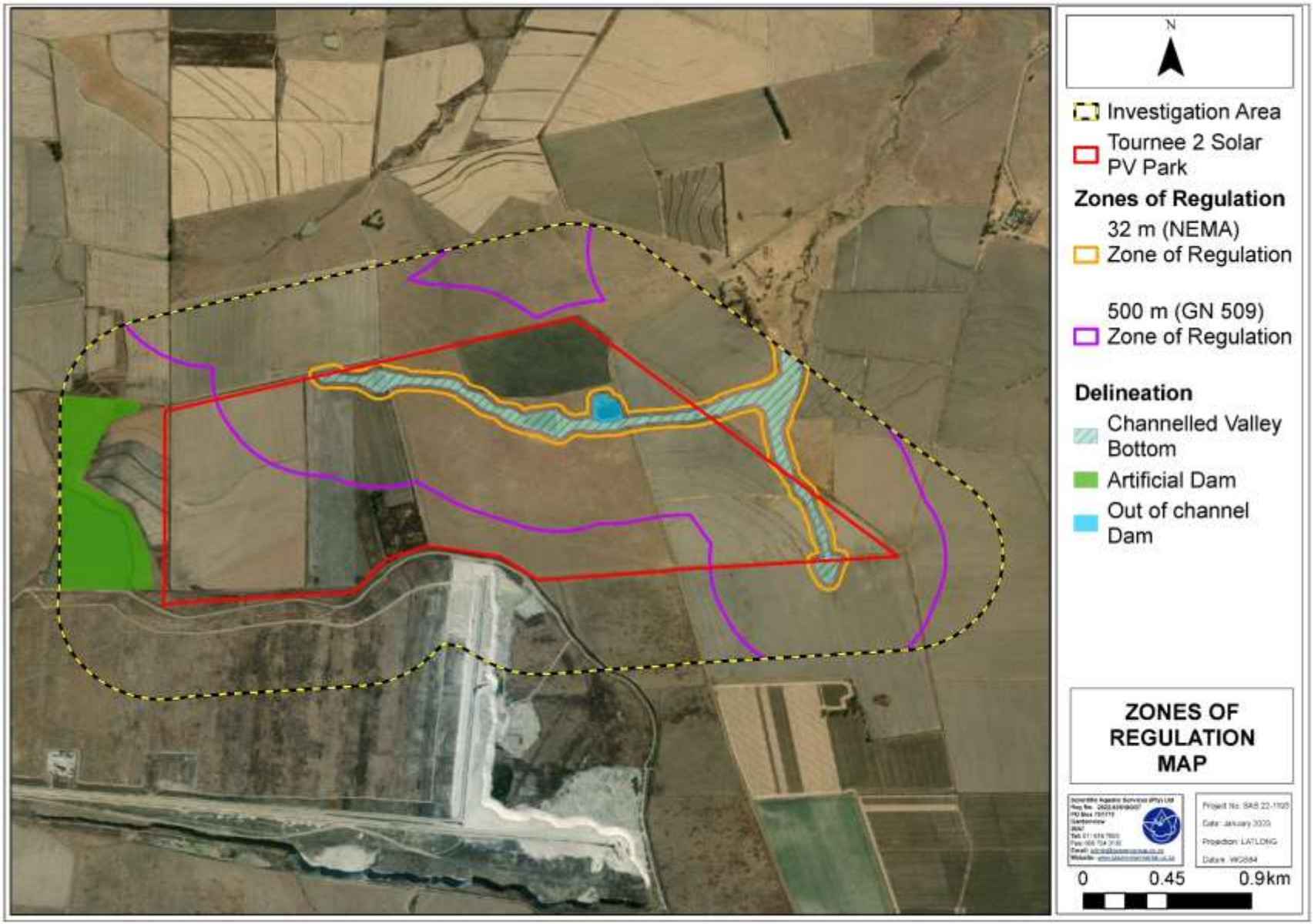


Figure 16: The applicable Zones of Regulation related to the proposed Tournée 2 Solar PV Park according to the GN 509 and NEMA.

6 IFC PERFORMANCE STANDARDS ON ENVIRONMENTAL AND SOCIAL SUSTAINABILITY

The International Finance Corporations (IFC) Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The sustainability framework comprises IFC's Policy and Performance standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The IFC Performance Standards (PS) are designed to assist the client in designing and implementing a project in a manner where risks and impacts associated with the project are identified and mitigated to ensure the project is completed sustainably. The applicant deemed it necessary that the environmental assessment had to consider, where applicable, and/or include the Equator Principles as well as Performance Standards. For a detailed description of the Performance Standards please see **Appendix F**.

In the context of the freshwater assessment the following IFC Performance Standards are applicable:

- Performance Standard 1 (IFC PS1) – Assessment and Management of Environmental and Social Risks and Impacts; and
- Performance Standard 6 (IFC PS6) – Biodiversity Conservation and Sustainable Management of Living Natural Resources.

IFC PS1 is applicable to all projects which pose potential risk and may have an impact on the receiving environment. IFC PS1 (2012) states that, should the host country have legislative control for the management of the environment that overlaps with the guidelines of the IFC standards, the more stringent measure should be implemented for the project. The objectives of IFC PS1 (2012), where applicable to the freshwater assessment, are summarised as follows:

- The identification and quantification of environmental risks and impacts associated with the proposed Tournée 2 Solar PV Park, as well as the identification of -mitigation measures to be implemented at the site to minimise or avoid said risks and impacts (Please see Section 7 for the risks and mitigation measures pertaining to the proposed Tournée 2 Solar PV Park);
- To encourage and ensure that the client runs the project as sustainably as possible using efficient and effective environmental management plans; and

- To ensure that relevant stakeholders (e.g., local communities, government, etc.) are aware of the project and their respective communications and queries are responded to and managed effectively.

IFC PS6 recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The objectives of IFC PS6 are:

- To protect and conserve biodiversity;
- To maintain the benefits from ecosystem services; and
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

In a development context, IFC PS 6 states that the client (a developer) will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and
- Any conversion or degradation is mitigated according to the ***mitigation hierarchy***.

The IFC PS 6 stipulates that in areas of natural habitat, mitigation measures will be designed to achieve ***no net loss of biodiversity*** where feasible. No net loss of biodiversity is defined in the PS as:

the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale.

Appropriate actions to ensure no net loss of biodiversity include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;
- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

The proposed Tournée 2 Solar PV Park development has indicated the proposed awarded development area and exclusion areas (as in Figure 3) that avoid freshwater ecosystems within the proposed Tournée 2 Solar PV Park. These areas together with their scientifically defined buffers as indicated in Section 5 will thereby assist in ensuring no net-loss of freshwater biodiversity and avoid potential impacts in line with the mitigation hierarchy. The final layout in the EIA phase will emphasise the avoidable areas, their characteristics and amend any changes in project description and layout based on their impact/risk and final mitigation measures.

The freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park were also categorised according to the relevant IFC-defined habitat categories. For a detailed discussion of the habitat categories please see **Appendix F**.

The CVB wetland freshwater ecosystem falls within the ***modified habitat*** category as the freshwater ecosystems are "*contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture… and reclaimed wetlands*". The client will minimise impacts on the biodiversity and implement mitigation measures as appropriate as set out in Section 7.

7 POTENTIAL IMPACTS AND PRELIMINARY PROPOSED MITIGATION MEASURES

At the time of the assessment (February 2023) and compilation of this report, no project layout, method statements, proposed construction works or infrastructure overlays besides the footprint of the Tournée 2 Solar PV Park and the preliminary "awarded and exclusion" sites were provided. Thus, at this time a high-level screening of impacts and general mitigation measures were provided. The finalised risk/ impact assessment will be applied during the EIA phase when the finalised layout has been received to determine the nature and significance of possible impacts arising from the proposed Tournee 2 Solar Park.

Potential risks pertaining to activities during construction and operational phases are anticipated. A general assessment of future impacts has been developed based on the extent of the Tournee 2 Solar Park, taking into account basic good practice principles for construction and assumptions based on the site conditions. It is imperative that when a finalised layout plan is received that the risk assessment as defined in Appendix A of GN509 of 2016 be completed. Strict mitigation measures must be implemented throughout all phases of the proposed

Tournée 2 Solar PV Park development, particularly during construction and operation phases in order to reduce the impact significance of activities on the identified CVB wetland and thus, prevent further degradation to the wetland system. The potential risks are briefly presented below:

- The potential pre-construction and construction of the Tournée 2 Solar PV Park may result in potential encroachment of the CVB wetland. In addition, the development activities may result in an increased ingress of hydrocarbons, toxicants, and sediment runoff into the wetland systems. This may have a cumulative impact on the health, functionality, and water quality of the wetland;
- Pollutants from pre-construction and construction activities (sediment, contaminated runoff, and hydrocarbons) and spills during the operational phase may contaminate wetland system and/or groundwater reserves;
- Potential changes to the pattern, flow, and timing of water in the landscape due to clearing of vegetation and changes to the soil characteristics under the solar arrays, especially since bi-facial panels are being envisaged for the project;
- Potential exposure of soil, leading to increased runoff (transporting toxicants and sediment from road surfaces) and erosion, and thus increased sedimentation of the wetland;
- Increased risk of erosion and incision of the wetlands as a result of higher water volumes entering the wetland due to increased impermeable surface areas, especially since bi-facial panels are being envisaged for the project;
- Alterations to vegetation community composition as a result of increased alien vegetation proliferation arising from disturbance to soil profiles and clearing of vegetation in the construction footprint. This impact will continue especially since bi-facial panels are being envisaged for the project;
- Soil and water contamination from oil and hydrocarbons resulting from vehicular transport;
- Loss of wetland and /freshwater ecosystem drivers;
- Potential for deterioration in water quality, including increased likelihood of dust generation, turbidity, and sedimentation within the wetland; and
- Noise disturbance to avifauna and aquatic biota associated with the wetland system.

The high-level screening of impacts methods (Appendix D), as provided by the proponent, was implemented to the CVB wetland. It is recommended that the final layout of the proposed Tournée 2 Solar PV Park take into consideration the delineated boundary of the CVB wetland and the associated scientifically derived buffer which will be determined in the EIA phase using

the “Preliminary Guideline for the Determination of Buffer zones for Rivers, Wetlands and Estuaries” as developed by Macfarlane et al. (2015). By zoning these areas as “no-go” for development, the potential direct and indirect loss of the freshwater ecosystem are greatly reduced in line with the mitigation hierarchy.

Table 7: High level screening of Impacts and Mitigation for the CVB wetland.

	Probability	Consequence	Significance
Loss of wetland habitat and ecological structure	2	3	Medium
Changes to sociocultural and service provision	2	2	Low
Impacts on hydrology and sediment balance	2	3	Medium
Impacts on water quality	2	3	Medium

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible. The general 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 section below provides a description of general management measures related to the activities anticipated during the construction and operational phases and may lead to impacts on the identified CVB wetland.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts on the freshwater ecosystems arising from the proposed Tournée 2 Solar PV Park development may be appropriately reduced during both the construction and operational phases. Based on the findings of the freshwater ecosystem assessment, several recommended preliminary mitigation measures are made to minimise the impact on the freshwater ecology:

- The footprint of the proposed Tournée 2 Solar PV Park development needs to take cognisance of the delineated CVB wetland and the associated NEMA 32m ZoR and impacts must be mitigated in line with the requirements of the mitigation hierarchy (DEA *et al.,* 2013). It is recommended that the three (3) wetlands and the associated NEMA 32 m ZoR be demarcated as “no-go areas” for development activities. This area has been demarcated as such to avoid direct impacts on the wetlands and is an important mitigation measure. Development activities such as linear infrastructure (including cabling and roads) within the 32 m ZoR would require authorisation in terms of the EIA process. The “no go” area must be allocated as open space and should be maintained as such as part of the proposed Tournée 2 Solar PV Park development. This will greatly reduce the significance of impacts which may occur on the freshwater

ecosystems. Should encroachment within the freshwater ecosystems be unavoidable, then the applicant will be required to undertake an appropriate wetland offset and must obtain a Water Use Licence (WUL) from the Department of Water and Sanitation (DWS) prior to commencement of the construction and related activities;

- The footprint of construction and operational phase activities of the proposed Tournée 2 Solar PV Park development must be kept as small as possible to minimise impact on the surrounding environment and loss of catchment yield;
- Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste disposal facility. No indiscriminate disposal of waste should take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility;
- Areas which are to be cleared of vegetation, including contractor laydown areas and development footprints must remain as small as possible to reduce the risk of proliferation of alien vegetation, and in order to retain a level of protection to the wetland systems during both construction and operation (e.g., sediment trapping, slowing of stormwater runoff etc.). Contractor laydown areas and development footprints are recommended to remain outside of the delineated wetland and the associated NEMA 32m buffer, and as much as feasible no natural/indigenous hydrophytic vegetation is to be cleared;
- It must be ensured that all recruited alien vegetation present as a result of disturbance caused by construction activities is eradicated, and that ongoing alien vegetation control is implemented. It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction. Small scale rehabilitation and post construction monitoring of wetland health and functioning is also recommended to be conducted subsequent to Tournée 2 Solar PV Park.

8 PLAN OF STUDY FOR EIA PHASE

The following points highlight the envisaged activities during the next phase of the project:

- The Ecological Importance and Sensitivity (EIS) of the CVB must be determined according to the method described by Rountree and Kotze, (2013);
- The Ecoservices provided by the CVB associated with the proposed Tournée 2 Solar PV Park must be assessed according to the method of Kotze *et al* (2020) in which services to the ecology of the Tournée 2 Solar PV Park as well as services to the people of the area were defined;

- The Present Ecological State (PES) of the CVB must be assessed according to the resource directed measures guideline as advocated by Macfarlane *et al*., (2008) or DWAF (2007) as well as the various aquatic ecostatus tools as applicable;
- The CVB should be mapped according to the ecological sensitivity of each hydrogeomorphic unit in relation to Tournée 2 Solar PV Park. In addition to the CVB boundary, buffers must be generated, and the applicable zones of regulation must be refined and depicted just as in Section 4.1 and Section 5 of the scoping report;
- Allocation of a suitable Recommended Management Objective (RMO), Recommended Ecological Category (REC) and Best Attainable State (BAS) of the freshwater ecosystems must be assigned based on the results obtained from the PES and EIS assessments;
- Expected impacts on the CVB will be assessed according to the impact assessment provided by the EAP, as well as the DWS approved Risk Matrix (2016); and
- Applicable mitigation measures must be provided.

The details of the various methodologies that should be employed in the EIA phase are provided in **Appendix C & D** of this report.

9 CONCLUSION

Significant baseline data exists for the proposed Tournée 2 Solar PV Park. The national and regional databases provided useful information about the freshwater aspects related to the portions proposed as Tournée 2 Solar PV Park. Although these datasets provided useful and high-quality data, they do not necessarily provide an entirely accurate indication of the actual site characteristics at the scale required to inform the risk assessment and risk mitigation required for the proposed Tournée 2 Solar PV Park. The CVB delineated in section 4 are field verified and provide useful sensitivity areas as outlined in Section 5. However, the present ecological state of the CVB must still be discussed in detail, with impact assessment and mitigation measures that must be implemented based on a layout from the proponent.

Given these findings, in the assessment phases that will follow this scoping study, the Present Ecological State and extent of the CVB associated with the proposed Tournée 2 Solar PV Park will be assessed and characterised to compliment and to verify the background data obtained from the existing studies and various databases, expand on the delineated CVB and its sensitivity, and to draw appropriate conclusions with reference to the impacts that the proposed Tournée 2 Solar PV Park will have on the receiving environment.

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APPENDIX A - TERMS OF USE AND INDEMNITY

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 (Pty) Ltd and its staff reserve the right, at their sole discretion, 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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APPENDIX B - LEGISLATIVE REQUIREMENTS

The Constitution of the Republic of South Africa, 1996	The Constitution of the Republic of South Africa in accordance to the environment and the health and wellbeing of people: ➢ Section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. ➢ Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.
The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment 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.
The National Water Act, 1998 (Act No. 36 of 1998) (NWA) (as amended)	The National Water Act, 1998 (Act No. 36 of 1998) (NWA) 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 freshwater ecosystem 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) of the NWA.
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)	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 a regulated area of a freshwater ecosystem is defined 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 freshwater ecosystem 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 freshwater ecosystem where the edge of the freshwater ecosystem is the first identifiable annual bank fill flood bench; or c) A 500 m radius from the delineated boundary (extent) of any wetland or pan. 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 stormwater management activities as contained in a river management plan; v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix; and vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol. 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 - FRESHWATER ECOSYSTEM METHOD OF ASSESSMENT

The assessment of the freshwater ecosystems was undertaken through a comprehensive dual approach consisting of indices aimed and wetland ecological integrity, importance and present state assessment as well as a suite of aquatic eco status assessment tools aimed at defining the ecostatus of rivers based on instream and riparian ecological structure function and state. The sections below define these methods in detail which will be used to define the ecology of the system.

1. Desktop Study

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

1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

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

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

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

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

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

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

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

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

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

Level 1: Inland systems

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean[1] (i.e., characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

Level 2: Ecoregions & NFEPA Wetland Vegetation Groups

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

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

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

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

Level 3: Landscape Setting

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

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

Level 4: Hydrogeomorphic Units

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

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

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

3. WET-Health

Healthy wetlands are known to provide important habitats for wildlife and to deliver a range of important goods and services to society. Management of these systems is therefore essential if these attributes are to be retained within an ever-changing landscape. The primary purpose of this assessment is to evaluate the eco-physical health of wetlands, and in so doing to promote their conservation and wise management.

Level of Evaluation
Two levels of assessment are provided by WET-Health:

- Level 1: Desktop evaluation, with limited field verification. This is generally applicable to situations where a large number of wetlands need to be assessed at a very low resolution; or
- Level 2: On-site evaluation. This involves structured sampling and data collection in a single wetland and its surrounding catchment.

Framework for the Assessment
A set of three modules has been synthesised from the set of processes, interactions and interventions that take place in wetland systems and their catchments: hydrology (water inputs, distribution and retention, and outputs), geomorphology (sediment inputs, retention and outputs) and vegetation (transformation and presence of introduced alien species).

Units of Assessment
Central to WET-Health is the characterisation of HGM Units, which have been defined based on geomorphic setting (e.g., hillslope or valley-bottom; whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated) and pattern of water flow through the wetland unit (diffusely or channelled) as described under the Classification System for Wetlands and other Aquatic Ecosystems above.

Quantification of Present State of a wetland
The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. This takes the form of assessing the spatial *extent* of the impact of individual activities and then separately assessing the *intensity* of the impact of each activity in the affected area. The extent and intensity are then combined to determine an overall *magnitude* of impact. The impact scores, and Present State categories are provided in the table below.

Table C3: Impact scores and categories of Present State used by WET-Health for describing the integrity of wetlands.

Impact category	Description	Impact score range	Present State category
None	Unmodified, natural	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable.	6-7.9	E
Critical	Modifications have reached a critical level and the ecosystem processes have been completely modified with an almost complete loss of natural habitat and biota.	8-10	F

Assessing the Anticipated Trajectory of Change

As is the case with the Present State, future threats to the state of the wetland may arise from activities in the catchment upstream of the unit or within the wetland itself or from processes downstream of the wetland. In each of the individual sections for hydrology, geomorphology and vegetation, five potential situations exist depending upon the direction and likely extent of change (table below).

Table C4: Trajectory of Change classes and scores used to evaluate likely future changes to the present state of the wetland.

Change Class	Description	HGM change score	Symbol
Substantial improvement	State is likely to improve substantially over the next 5 years	2	↑↑
Slight improvement	State is likely to improve slightly over the next 5 years	1	↑
Remain stable	State is likely to remain stable over the next 5 years	0	→
Slight deterioration	State is likely to deteriorate slightly over the next 5 years	-1	↓
Substantial deterioration	State is expected to deteriorate substantially over the next 5 years	-2	↓↓

Overall health of the wetland

Once all HGM Units have been assessed, a summary of health for the wetland as a whole needs to be calculated. This is achieved by calculating a combined score for each component by area-weighting the scores calculated for each HGM Unit. Recording the health assessments for the hydrology, geomorphology and vegetation components provide a summary of impacts, Present State, Trajectory of Change and Health for individual HGM Units and for the entire wetland.

4. Wetland Function Assessment

"The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class".[2] The assessment of the ecosystem services supplied by the identified freshwater features was conducted according to the guidelines as described by Kotze *et al.* (2020). An assessment was undertaken that examines and rates 16 different ecosystem services, selected for their specific relevance to the South African situation, as follows:

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Phosphate assimilation;
- Nitrate assimilation;
- Toxicant assimilation;
- Erosion control;
- Carbon storage;
- Biodiversity maintenance;
- Provision of water for human use;
- Provision of harvestable resources;
- Food for livestock;
- Provision of cultivated foods;
- Cultural and spiritual experience;
- Tourism and recreation; and
- Education and research.

For each ecosystem service, indicator scores are combined automatically in an algorithm given in the spreadsheet that has been designed to reflect the relative importance and interactions of the attributes represented by the indicators to arrive at an overall supply score. In addition, the demand for the ecosystem service is assessed based on the wetland's catchment context (e.g. toxicant sources upstream), the number of beneficiaries and their level of dependency, which are also all rated on a five-

[2] Department of Water Affairs and Forestry, South Africa Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999

point scale. Again, an algorithm automatically combines the indicator scores relevant to demand to generate a demand score.
*It is important to note that when assessing riparian zones associated with riverine habitats, the contribution of the riparian zone to streamflow regulation is omitted, owing to a lack of relevant studies (Kotze *et al*, 2020).

Table C3: Integrating scores for supply and demand to obtain and overall importance score

Integrating scores for supply & demand to obtain an overall importance score						
		Supply				
		Very Low	Low	Moderate	High	Very High
Demand		0	1	2	3	4
Very Low	0	0,0	0,0	0,5	1,5	2,5
Low	1	0,0	0,0	1,0	2,0	3,0
Moderate	2	0,0	0,5	1,5	2,5	3,5
High	3	0,0	1,0	2,0	3,0	4,0
Very High	4	0,5	1,5	2,5	3,5	4,0

A single overall importance score is generated for each ecosystem service by combining the supply and demand scores. This aggregation therefore places somewhat more emphasis on supply than demand, with the supply score acting as the starting score for a “moderate” demand scenario. The importance score is, however, adjusted by up to one class up where demand is “very high” and by up to one class down where demand is “very low”. The overall importance score can then be used to derive an importance category for reporting purposes.

Table C4: Classes for determining the likely extent to which a benefit is being supplied.

Importance Category		Description
Very Low	0-0.79	The importance of services supplied is very low relative to that supplied by other wetlands.
Low	0.8 – 1.29	The importance of services supplied is low relative to that supplied by other wetlands.
Moderately-Low	1.3 – 1.69	The importance of services supplied is moderately-low relative to that supplied by other wetlands.
Moderate	1.7 – 2.29	The importance of services supplied is moderate relative to that supplied by other wetlands.
Moderately-High	2.3 – 2.69	The importance of services supplied is moderately-high relative to that supplied by other wetlands.
High	2.7 – 3.19	The importance of services supplied is high relative to that supplied by other wetlands.
Very High	3.2 - 4.0	The importance of services supplied is very high relative to that supplied by other wetlands.

5. Ecological Importance and Sensitivity (EIS) (Rountree & Kotze, 2013)

The purposed of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term (Rountree & Kotze, 2013).
In order to align the outputs of the Ecoservices assessment (i.e. ecological and socio-cultural service provision) with methods used by the DWA (now the DWS) used to assess the EIS of other watercourse types, a tool was developed using criteria from both WET-Ecoservices (Kotze, *et, al,* 2009) and earlier DWA EIA assessment tools. Thus, three proposed suites of important criteria for assessing the Importance and Sensitivity for wetlands were proposed, namely:

- Ecological Importance and Sensitivity, incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWA and thus enabling consistent assessment approaches across water resource types;
- Hydro-functional importance, taking into consideration water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and

- Importance in terms of socio-cultural benefits, including the subsistence and cultural benefits provided by the wetland system.

The highest of these three suites of scores is then used to determine the overall Importance and Sensitivity category (Table C8) of the wetland system being assessed.

Table C6: Ecological Importance and Sensitivity Categories and the interpretation of median scores for biota and habitat determinants (adapted from Kleynhans, 1999).

EIS Category	Range of Mean	Recommended Ecological Management Class
Very high Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications.	>3 and <=4	A
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications.	>2 and <=3	B
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications.	>1 and <=2	C
Low/marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.	>0 and <=1	D

6. Recommended Management Objective (RMO) and Recommended Ecological Category (REC) Determination

"A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability but carries a higher risk of ecosystem failure" (DWA, 1999).

The RMO (table below) was determined based on the results obtained from the PES, reference conditions and EIS of the freshwater resource (sections above), with the objective of either maintaining, or improving the ecological integrity of the freshwater resource in order to ensure continued ecological functionality.

Table C7: Recommended management objectives (RMO) for water resources based on PES & EIS scores.

PES			Ecological and Importance Sensitivity (EIS)			
			Very High	High	Moderate	Low
	A	Pristine	A Maintain	A Maintain	A Maintain	A Maintain
	B	Natural	A Improve	A/B Improve	B Maintain	B Maintain
	C	Good	A Improve	B/C Improve	C Maintain	C Maintain
	D	Fair	C Improve	C/D Improve	D Maintain	D Maintain
	E/F	Poor	D* Improve	E/F* Improve	E/F* Maintain	E/F* Maintain

***PES Categories E and F are considered ecologically unnacceptable (Malan and Day, 2012) and therefore, should a freshwater resource fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category.**

A freshwater resource may receive the same class for the REC as the PES if the freshwater resource is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as enhance the PES of the freshwater resource.

Table C8: Description of Recommended Ecological Category (REC) classes.

Class	Description
A	Unmodified, natural
B	Largely natural with few modifications
C	Moderately modified
D	Largely modified

APPENDIX D – IMPACT ASSESSMENT METHODOLOGY

Impact Assessment as provided by Red Rocket South Africa (Pty) Ltd (South Africa)

The assessment of impacts was based on Red Rocket's professional judgement, field observations and desk-top analysis and, where conducted, specialist studies. The significance of potential risks that may result from the proposed project was determined to assist decision-makers (e.g., government authorities) but in some instances, the proponent).

SCOPING PHASE

Reporting Requirements

- Project Description;
- Legislative Context (as applicable);
- Assumptions and limitations;
- Description of Baseline Environment;
- Site Verification Assessment (including sensitivity mapping) (as applicable);
- Identification and high-level screening of impacts; and
- Plan of Study for EIA.

High-Level Screening of Impacts and Mitigation

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence, where the latter is based on general consideration to the intensity, extent, and duration.

Table D1: Probability Scores and Descriptions

SCORE	DESCRIPTIONS
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table D2: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

Table D3: Significance Screening Tool

		Consequence Scale			
PROBABILITY SCALE		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e., beneficial) or negative (-ve) (i.e., harmful) to the receiving environment/receptor. For ease of reference, a colour reference system has been applied according to the nature and significance of the identified impacts.

Table D4: Impact Significance Colour Reference System to Indicate the Nature of the Impact.

Negative Impacts (-VE)	Positive Impacts (+VE)
Negligible	Negligible
Very Low	Very Low
Low	Low
Medium	Medium
High	High

EIA PHASE

Reporting Requirements

- Project Description;
- Legislative Context (as applicable);
- Assumptions and limitations;
- Description of methodology (as required);
- Update and/or confirmation of Baseline Environment – including update and / or confirmation of sensitivity mapping;
- Identification and description of Impacts;
- Full impact assessment (including Cumulative);
- Mitigation measures; and
- Impact Statement.

ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors

to provide a detailed discussion of impacts. The assessment considers direct[3], indirect[4], secondary[5] as well as cumulative[6] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e., residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[7] presented below.

Table D5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				

[3] Impacts that arise directly from activities that form an integral part of the Project.

[4] Impacts that arise indirectly from activities not explicitly forming part of the Project.

[5] Secondary or induced impacts caused by a change in the Project environment.

[6] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

[7] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Table D5: impact significance rating

TOTAL SCORE	4 TO 15	16 TO 30	31 TO 60	61 TO 80	81 TO 100
Environmental Significance Rating (Negative (-))	Very low	Low	Moderate	High	Very High
Environmental Significance Rating (Positive (+))	Very low	Low	Moderate	High	Very High

Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure D1 below.

Avoidance / Prevention	Refers to considering options in project location, nature, scale, layout, technology and phasing to **avoid** environmental and social impacts. Although this is the best option, it will not always be feasible, and then the next steps become critical.
Mitigation / Reduction	Refers to considering alternatives in the project location, scale, layout, technology and phasing that would **minimise** environmental and social impacts. Every effort should be made to minimise impacts where there are environmental and social constraints.
Rehabilitation / Restoration	Refers to the **restoration or rehabilitation** of areas where impacts were unavoidable and measure are taken to return impacted areas to an agreed land use after the activity / project. Restoration, or even rehabilitation, might not be achievable, or the risk of achieving it might be very high. Additionally it might fall short of replicating the diversity and complexity of the natural system. Residual negative impacts will invariably still need to be compensated or offset.
Compensation / Offset	Refers to measures over and above restoration to remedy the residual (remaining and unavoidable) negative environmental and social impacts. When every effort has been made to avoid, minimise, and rehabilitate remaining impacts to a degree of no net loss, **compensation / offsets** provide a mechanism to remedy significant negative impacts.
No-Go	Refers to 'fatal flaw' in the proposed project, or specifically a proposed project in and area that cannot be offset, because the development will impact on strategically important ecosystem services, or jeopardise the ability to meet biodiversity targets. This is a **fatal flaw** and should result in the project being rejected.

APPENDIX E – SITE SENSITIVITY VERIFICATION

FRESHWATER ECOSYSTEM SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED TOURNÉE 2 SOLAR PV PARK NEAR THE THUTHUKANI AREA, MPUMALANGA PROVINCE.

Introduction

According to the "Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes ("the Protocols") published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the Environmental Assessment Practitioner (EAP) must verify the current use of the site in question and its environmental sensitivity as identified by the Screening Tool to determine the need for specialist inputs in relation to the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). The Protocols must be complied with for every new application for Environmental Authorisation that is submitted after 9 May 2020.

This document serves as the Freshwater Ecosystem Site Sensitivity Verification Report for the proposed Tournée 2 Solar PV Park near Thuthukani, Mpumalanga Province. The proposed Tournée 2 Solar PV Park requires environmental authorisation in terms of the NEMA EIA Regulations (2014), as amended and a Water Use Authorisation (WUA).

Study Area

The proposed Tournée 2 Solar PV Park is located within the Lekwa Local Municipality, which is under the administration of the Gert Sibande District Municipality. The proposed Tournée 2 Solar PV is located approximately 32 km north-east of the town of Standerton and is situated adjacent to the Eskom Tutuka Power Station ash fallout facility. Tournée 2 Solar PV Park is located on the remainder of portion 3 of the Farm Dwars-In-De-Weg 350 IS and on portion 6 of the Farm Dwars-In-De-Weg 350 IS.

Figure E1: Digital satellite image depicting the location of the proposed Tournée 2 Solar PV Park and associated investigation area in relation to the surrounding area.

This Freshwater Ecosystem site sensitivity verification report relates to a Screening Tool Report (STR) completed for the site in February 2023.

Site Verification Methodology

A site visit was conducted by the specialist to inform the specialist reports required for the proposed project.

Aquatic Biodiversity Site Verification

The table below provides information regarding the outcome of the Screening Tool in terms of the aquatic biodiversity theme sensitivity associated with the proposed project as well as a brief summary of the outcome of the freshwater ecosystem specialist report in response.

Table E1: Aquatic Biodiversity Theme Sensitivity analysis for the proposed Tournée 2 Solar PV Park.

Environmental Theme	Applicable Protocol	Response
Aquatic Biodiversity Sensitivity Rating: The proposed Tournée 2 Solar PV Park and associated investigation area shows **very high sensitivity.** These areas of very high sensitivity relate to the presence of **wetlands.** Requiring a Freshwater Ecosystem Impact Assessment. **Actual Sensitivity: All freshwater ecosystems – very high;** **Remainder of study and investigation areas: low.**	3(b) Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity (GG 43110 of 20/03/2020).	A detailed study is required to support both the authorization process required in terms of NEMA as well as the National Water Act (act 36 of 1998) as amended. The study and associated comprehensive report from the site visit in February 2023 must provide a detailed description of the freshwater ecosystems associated with the proposed project and consider the potential impacts applicable to the freshwater ecosystems and provide suitable mitigation measures to best minimise the potential impact on the freshwater ecosystems. The report should also guide the proposed project footprint to avoid the delineated freshwater ecosystems.

APPENDIX F- IFC PERFORMANCE STANDARDS

There are eight (8) Performance Standards which has to be implemented throughout the life of an investment by the IFC. The Performance Standards include:

1 Assessment and Management of Environmental and Social Risk and Impacts;
2 Labour and Working Conditions;
3 Resource Efficiency and Pollution Prevention;
4 Community Health, Safety, and Security;
5 Land Acquisition and Involuntary Resettlement;
6 Biodiversity Conservation and Sustainable Management of Living Natural Resources;
7 Indigenous Peoples; and
8 Cultural Heritage.

The applicant deemed it necessary that the environmental assessment considers the applicable and/or include the Equator Principles and the following IFC Performance Standards (PS):

- PS 1: the product must meet the requirements of a bankable IFC environmental and social impact assessment as they relate to the terms of reference;
- PS3: must be considered where relevant in terms of water consumption, pollution prevention, wastes, hazardous material management and pesticide use and management;
- PS4: must be considered, if applicable, in terms of ecosystem services; and
- PS6: must be included in terms of protection and conservation of biodiversity and habitat (modified, natural and critical).
- PS8: must be included as cultural heritage must be protected as it relates to the terms of reference.

PS 1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of the project; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the clients' management of environmental and social performance throughout the life of the project. The objectives of PS1 are to identify and evaluate environmental and social risks and the impact of the project as well as to adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected communities, and the environment. This assessment focused on the impact that the proposed development will have on the freshwater ecosystems related to the proposed Tournée 2 Solar PV Park and associated investigation area by implementing the Red Rocket Impact Assessment (Section 7). The impact assessment is based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. When impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always

feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development, for example, so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

PS 3 recognizes that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. The objectives of PS 3 are to (i) avoid or minimise adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities, (ii) to promote more sustainable use of resources, including energy and water and (iii) to reduce project-related greenhouse gases (GHG) emissions. This assessment focused on the impact that the proposed development will have on the freshwater ecosystems related to the proposed Tournée 2 Solar PV Park and associated investigation area by implementing the Red Rocket Impact Assessment and providing potential impacts and mitigation measures (Section 7).

PS 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. The objectives of PS 4 are to anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. As well as to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities. The overall ecoservice provisioning by the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park will be calculated in the EIA report.

PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The objectives of PS 6 are to protect and conserve biodiversity, maintain the benefits of ecosystem services, and promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities. The assessment of the freshwater ecosystems related to the proposed Tournée 2 Solar PV Park's ecoservice provision, ecosystem importance and sensitivity (EIS) as well as the Present Ecological State (PES) of the systems will be calculated in the EIA report. The possible impacts associated with the proposed Tournée 2 Solar PV Park on the associated CVB freshwater system, were identified and described in Section 7, along with mitigation measures in order to best protect, conserve and maintain the benefits of the system. These will be expanded further in the EIA report.

PS 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, PS 8 aims to

ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. The objectives of PS 8 are to protect cultural heritage from the adverse impacts of project activities and support its preservation. And to promote the equitable sharing of benefits from the use of cultural heritage. The effect that the proposed Tournée 2 Solar PV Park might have on cultural heritage was not assessed in the freshwater report as it is not part of the scope of work for this report. The Wet-Ecoservices in the EIA report will, however, briefly touch on the cultural and spiritual experience people receive from the freshwater ecosystems (if any) by comparing the supply of this cultural and spiritual ecoservice to its demand in the area.

The IFC habitat categories are defined as follows:

Modified Habitat

Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

This Performance Standard applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in PS 1. The client should minimize impacts on such biodiversity and implement mitigation measures as appropriate.

Natural Habitat

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;
- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

Critical Habitat

Critical habitats are areas with high biodiversity value, including (i) habitats of significant importance to Critically Endangered and/or Endangered species; (ii) habitats of significant importance to endemic and/or restricted-range species; (iii) habitats supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for the development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on the biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program are integrated into the client's management program.

In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated.

In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

GN9. The requirements for the baseline study will vary depending on the nature and scale of the project. For sites with potentially significant impacts on natural and critical habitats and ecosystem services, the baseline should include field surveys over multiple seasons, to be undertaken by competent professionals and with the involvement of external experts, as necessary. Field surveys and assessments should be recent, and data should be acquired for the direct project footprint, including related and associated facilities, the project's area of influence, and potentially beyond.

GN22. For projects located in critical habitats (including legally protected and internationally recognized areas), clients must ensure that external experts with regional experience are involved in the biodiversity and/or critical habitat assessment. If the habitat is critical due to the presence of critically endangered or endangered species, recognized species specialists must be involved (for example, including individuals from IUCN Species Survival Commission Specialist Groups). In areas of critical habitat, clients will benefit from establishing a mechanism for external review of the project's risks and impacts identification process and proposed mitigation strategy. This is especially relevant where uncertainty is high, where potential impacts are complex and/or controversial, and/or where no precedent exists for

proposed mitigations (such as some types of offsets). Such a mechanism would also promote the sharing of good international practices between projects and improve transparency in decision making.

GN28. Both natural and modified habitats may contain high biodiversity values, thereby qualifying as critical habitats. Performance Standard 6 does not limit its definition of critical habitat to *critical natural* habitat. An area may just as well be *critical modified* habitat. The extent of human-induced modification of the habitat is therefore not necessarily an indicator of its biodiversity value or the presence of critical habitat.

GN36. Clients should endeavour to site the project in modified habitat rather than in natural or critical habitat and demonstrate this effort through a project alternatives analysis conducted during the risks and impacts identification process.

GN37. Performance Standard 6 requires that projects with significant biodiversity values in modified habitats minimize their impacts and implement mitigation and management measures as needed to conserve those values. Significant biodiversity values that might occur in modified habitats include species of conservation concern (for example, species that are threatened or otherwise identified as important by stakeholders) and remnant ecological features that persist in the modified landscape, especially those that perform important ecological functions. In some cases, significant biodiversity values may cause natural or critical habitat requirements to be applied, in which case they should be treated using the guidelines for those habitat designations.

GN58. *Relatively broad landscape and seascape units might qualify as critical habitat.* The scale of the critical habitat assessment depends on the biodiversity attributes particular to the habitat in question and the ecological patterns and processes required to maintain them. Even within a single site designated as critical habitat there might be areas or features of higher or lower biodiversity value. There also will be cases where a project is sited within a greater area recognized as critical habitat, but the project site itself has been highly modified. *A critical habitat assessment therefore must not focus solely on the project site.* The client should be prepared to conduct desktop assessments, consult with experts and other relevant stakeholders to obtain an understanding of the relative importance or uniqueness of the site with respect to the regional and even the global scale, and/or conduct field surveys beyond the boundaries of the project site. These considerations would form part of the landscape/seascape analyses as referred to in paragraph 6 of Performance Standard 6 and in paragraph GN17 of this note.

GN104. In many cases, invasive species will have already been established in the region in which the project is located. In these cases, the client has the responsibility to take measures to prevent the species from further spread into areas in which it has not already been established. For example, in the case of linear infrastructure, invasive weeds might be spread into forested habitats, especially if the forest canopy is not able to re-establish itself (due to maintenance of the right-of-way for operational purposes). This is exacerbated if opportunistic agricultural or logging activities further widen the right-of-way, thereby facilitating spread. In these cases, the client is expected to determine the severity of

the threat and the mode of spread of that species. The situation should be monitored as part of the overall ESMS, and the client should seek effective mitigation measures in coordination with local and national authorities.

GN106. Performance Standard 6 defines ecosystem services as “the benefits that people, including businesses, obtain from ecosystems” (paragraph 2), which is in line with the definition provided by the Millennium Ecosystem Assessment (GN23). As described in paragraph 2 and footnote 1 of Performance Standard 6, ecosystem services are organized into four major categories:

- Provisioning ecosystem services, include, among others, (i) agricultural products, seafood and game, wild foods, and ethnobotanical plants; (ii) water for drinking, irrigation, and industrial purposes; and (iii) forest areas, which provide the basis for many biopharmaceuticals, construction materials, and biomass for renewable energy;
- Regulating ecosystem services, include, among others, (i) climate regulation and carbon;
- storage and sequestration; (ii) waste decomposition and detoxification; (iii) purification of water and air; (iv) control of pests, disease, and pollination; and (v) natural hazard mitigation;
- Cultural services include, among others, (i) spiritual and sacred sites; (ii) recreational purposes such as sport, hunting, fishing, and ecotourism; and(iii) scientific exploration and education; and
- Supporting services, are the natural processes that maintain the other services, such as (i) nutrient capture and recycling, (ii) primary production, and (iii) pathways for genetic exchange.

APPENDIX G – GENERAL "GOOD HOUSEKEEPING" MITIGATION MEASURES

General construction management and good housekeeping practices

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

Development footprint

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

Vehicle access

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

Vegetation

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

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

Soil

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

Rehabilitation

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

APPENDIX H - DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

Stephen van Staden	MSc (Environmental Management) (University of Johannesburg)
Paul da Cruz	BA (Hons) (Geography & Environmental Studies) (University of the Witwatersrand)
Kristen Nienaber	BSc (Hons) (Environmental Science) (University of the Free State)
Faith Mamphoka	MA Geography & Environment Science (University of the Western Cape)

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:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc: Environmental Management (University of Johannesburg) BSc (Hons): Zoology (Aquatic Ecology (University of Johannesburg) BSc: Zoology, Geography and Environmental Management (University of Johannesburg)		
Registration / Associations	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)		

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

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Paul Da Cruz		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Cell:	084 224 0088
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	Paul@sasenvgroup.co.za		
Qualifications	BA (Hons) (Geography and Environmental Studies) (University of the Witwatersrand) BA (Geography) (University of the Witwatersrand)		

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

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Kristen Nienaber		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Cell:	076 720 5420
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	kristen@sasenvgroup.co.za		
Qualifications	BSc (Hons) Geography and Environmental Science (University of the Free State) BSc Geography and Environmental Science (University of the Free State)		

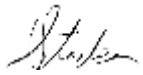
1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Faith Mamphoka		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Cell:	0735590175
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	Faith@sasenvgroup.co.za		
Qualifications	BSc Geography and Geology (University of the Witwatersrand) BA (Hon) (Geography and Environment Science) (University of the Western Cape) MA (Geography & Environment Science) (University of the Western Cape)		

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 (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Signature of the Specialist

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

I, Paul da Cruz, 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

I, Kristen Nienaber, 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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Signature of the Specialist

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

- I, Faith Mamphoka, 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 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

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

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

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation

4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

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

Freshwater Assessments

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

Biodiversity Assessments

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

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF PAUL DA CRUZ

PERSONAL DETAILS

Position in Company	Senior Ecologist
Joined SAS Environmental Group of Companies	2022

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Certificated Scientist at South African Council for Natural Scientific Professions (SACNASP)
Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA)
Member of the South African Wetland Society (SAWS)

EDUCATION

Qualifications

BA (Hons) (Geography and Environmental Studies) (University of the Witwatersrand)	1998
BA (Geography) (University of the Witwatersrand)	1997

Short Courses

Taxonomy of Wetland Plants (Water Research Commission)	2017
Advanced Grass Identification (Frits van Outshoorn)	2010
Grass Identification (Frits van Outshoorn),	2009
Soil Form Classification and Wetland Delineation; (TerraSoil Science)	2008

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana
International – United Kingdom (England and Scotland); USA

DEVELOPMENT SECTORS OF EXPERIENCE

1. Renewable energy (Wind and solar)
2. Linear developments (energy transmission, telecommunication, pipelines, roads, border infrastructure)
3. Nature Conservation and Ecotourism Development
4. Commercial development
5. Residential development
6. Environmental and Development Planning and Strategic Assessment
7. Industrial/chemical; Non-renewable power Generation

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- EIA / BA Applications
- Environmental Authorisation Amendments
- EMPr Compilation
- Environmental Compliance Monitoring (Environmental Auditing)
- Environmental Screening Assessments and Listing Notice 3 Trigger Identification / Mapping
- Strategic Environmental Assessments and Environmental Management Frameworks
- EIA / Specialist Study Peer Review

Freshwater Assessments

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Assessments in support of Environmental Screening Assessments, Precinct Planning & SEA
- Wetland Construction (Compliance) Monitoring

Biodiversity Assessments

- Avifaunal Assessments
- Strategic Biodiversity Assessment

Visual Impact Assessment

- Visual Impact Assessments

GIS / Spatial Analysis

- GIS Spatial Analysis and Listing Notice 3 mapping

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KRISTEN NIENABER

PERSONAL DETAILS

Position in Company	Junior Ecologist
Joined SAS Environmental Group of Companies	2021

EDUCATION

Qualifications

BSc (Hons) Environmental Science (University of the Free State)	2019
BSc Geography and Environmental Science (University of the Free State)	2018

AREAS OF WORK EXPERIENCE

South Africa – Free State, Northern Cape, Western Cape, Gauteng, Mpumalanga.

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

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

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF FAITH MAMPHOKA

PERSONAL DETAILS

Position in Company	Junior Field Ecologist & GIS Technician
Joined SAS Environmental Group of Companies	2021

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Wetland Society (SAWS) **#123202**

Member of the International Society of Wetland Scientists

Member of the Western Cape Wetlands Forum (WCWF)
SACNASP Candidate Natural Scientist (Environmental Science) **#129757**

EDUCATION

Qualifications

Master's Degree, Geography & Environment Science (UWC)	2018 - 2019
Honours Degree, Geography (UWC)	2017
BSc. Geology and Geography (Wits University)	2012 - 2014

Short Courses

Tools for Wetland Assessment (Rhodes University)	2020
Spatial Data Science (ESRI Online)	2020
Introduction to Spatial Analysis and Geoprocessing (ESRI Online)	2020
SWM2001x: Solid Waste Management (WBGx Online through EdX)	2020
Wetland Delineation (WC Wetlands Forum)	2019
Wetland Health (WC Wetlands Forum)	2019
Introduction to Earth Observation (Stellenbosch University)	2016

KEY DISCIPLINES

- Desktop Freshwater and Terrestrial Ecosystem Delineation
- Wetland Delineation and Assessment
- Wetland hydropedology
- Spatial analysis and geoprocessing
- Detail mapping and quality control
- WebApp Builder, ESRI Products, Planet GIS, Global Mapper
- AUTOCAD to shapefile conversion, geodatabase management
- Projections and SG Diagrams