Appendix H.4

FRESHWATER ASSESSMENT

SCIENTIFIC AQUATIC SERVICES

Freshwater Assessment

AS PART OF THE ENVIRONMENTAL AND WATER USE AUTHORISATION PROCESSES FOR THE PROPOSED TOURNÉE 2 SOLAR PHOTO VOLTAICS (PV) PARK, NEAR THUTHUKANI, MPUMALANGA

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EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem assessment as part of the Environmental Authorisation (EA) and Water Use Authorisation (WUA) processes for the proposed Tournée 2 Solar photovoltaic (PV) Park and associated infrastructure, near the Thuthukani Settlement, Mpumalanga Province. The proposed Tournée 2 Solar PV Park forms part of the larger Tournée Solar PV Cluster which will include two (2) 150 Megawatt (MW) Solar Energy Facilities (SEFs).

A field assessment was undertaken on the 7th and 8th of February 2023 during which a channelled valley bottom (CVB) wetland and a depression wetland was identified to be associated with the proposed Tournée 2 Solar PV Park and investigation areas (defined as a 500m radius around the proposed Tournée 2 Solar PV Park). As the depression wetland is exclusively associated with the investigation area, and unlikely to be directly impacted by the proposed Tournée 2 Solar PV Park, only the CVB wetland was assessed further. The results of the field assessment are summarised in the table below:

Freshwater ecosystems	PES	Ecoservices importance	EIS	REC / RMO / BAS
CVB wetland	D (largely modified)	Moderate – Very Low	Moderate	D/ Maintain/ D

Following the freshwater ecosystem assessment, the DWS Risk Assessment Matrix (2016) was applied to determine the significance of impacts arising from the proposed Tournée 2 Solar PV Park on the receiving freshwater environment. The activities associated with the construction, operation and decommissioning of the proposed Tournée 2 Solar PV Park and associated infrastructure pose a "Low" risk significance to the freshwater ecosystems, provided that all mitigation measures as detailed are implemented. Certain of the mitigation measures (as highlighted in red text in Table 8) are critical to ensuring that a medium impact is able to be reduced to a low impact – the DWS risk matrix allows borderline low-medium impacts to be reduced to low impacts provided that mitigation / control measures to reduce the impact to a low degree are specified and implemented.

Results for the EAP provided Impact Assessment indicates that the construction and operational activities associated with the proposed Tournée 2 Solar PV Park pose a medium impact significance prior to the implementation of mitigation measures and a very low impact significance post the implementation of mitigation measures. The activities associated with the decommissioning phase pose a very low impact significance pre and post implementation of mitigation measures.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed Tournée 2 Solar PV Park activities are likely to be reduced during the construction and operational phases assuming that a high level of mitigation takes place. It is, therefore, the opinion of the freshwater ecologist that the proposed Tournée 2 Solar PV Park and assoicated infrastructure be considered favourably provided that all mitigation measures as set-out in this report are implemented and the development can be considered for authorisation by means of registration of a General Authorisation in terms of GN509 of 2016.

MANAGEMENT SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem assessment as part of the Environmental Authorisation (EA) and Water Use Application (WUA) processes for the proposed Tournée 2 Solar photovoltaic (PV) Park and associated infrastructure, near the Thuthukani Settlement, 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 will have a generating capacity of no more than 150 Megawatts (MW) and battery energy storage systems (BESS) of 600 megawatt-hours (MWh).

A scoping phase freshwater assessment was compiled in March 2023 based on a preliminary high level baseline assessment of the freshwater ecology of the proposed Tournée 2 Solar PV Park, which identified potential impacts on the freshwater environment of the area and development constraints and opportunities based on the spatial distribution of freshwater ecosystems in relation to the proposed Tournée 2 Solar PV Park. This Environmental Impact Report phase assessment aims to define the freshwater ecology associated with the proposed Tournée 2 Solar PV Park and associated investigation area (defined as a 500 m radius around the various components that form part of the proposed Tournée 2 Solar PV Park, in line with GN 509 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) as amended, in terms of freshwater characteristics, including mapping of the freshwater ecosystems, defining areas of increased Ecological Importance and Sensitivity (EIS) and defining the Present Ecological State (PES) of the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park. The report also aims to define the socio-cultural and ecological service provision of the freshwater ecosystems and additionally outlines the Recommended Ecological Category (REC), Recommended Management Objective (RMO) and Best Attainable State (BAS) for the freshwater ecosystems. The assessment took the following approach:

- A desktop study was conducted, in which possible freshwater ecosystems were identified for on-site investigation, and relevant national and provincial databases were consulted; and
- The field assessment took place on the 7th to 8th of February 2023 during which a Channelled Valley Bottom wetland (CVB) and a depression wetland was identified to be associated with the proposed Tournée 2 Solar PV Park and associated investigation area.

The results of the field assessment are presented in Section 4 of this report, and are summarised in the table below:

Table A: Summary of results of the field assessment as discussed in Section 4.

Freshwater ecosystems	PES	Ecoservices importance	EIS	REC / RMO / BAS
Eastern/Southern CVB wetland	D (Largely Modified)	Moderate – Very Low	Moderate	D/Maintain/D

Following the freshwater ecosystem assessment, the DWS Risk Assessment Matrix (2016) was applied to determine the significance of impacts arising from the proposed Tournée 2 Solar PV Park on the receiving freshwater environment. The activities associated with the construction, operation and decommissioning of the proposed Tournée 2 Solar PV Park and associated infrastructure pose a “Low” risk significance to the freshwater ecosystems, provided that all mitigation measures as detailed are implemented. Certain of the mitigation measures (as highlighted in red text in Table 8) are critical to ensuring that a medium impact is able to be reduced to a low impact – the DWS risk matrix allows borderline low-medium impacts to be reduced to low impacts provided that mitigation / control measures to reduce the impact to a low degree are specified and implemented.

The outcome of the DWS Risk Assessment is summarised in the table below.

Table B: Summary of DWS Risk Assessment applied to the proposed Tournée 2 Solar PV Park.

	Phase	Activity	Aspect	Manual Adjustment	Risk Rating	Reversibility
1	Construction phase	Site clearing and set-up of contractor camps prior to commencement of construction activities outside the delineated extent of the CVB wetland and associated NEMA 32m ZoR.	•Removal and clearing of all terrestrial vegetation leading to exposure and associated disturbances to soil; •Exposure of soil and increased likelihood of dust generation; •Increased likelihood of sedimentation and erosion of the freshwater ecosystems •Creation of access roads to facilitate contractor laydown areas and subsequent construction activities; and •Laydown of construction offices and ablution facilities.	M	L	Fully Reversible
2		Construction of infrastructure (including O&M buildings, substation and paved areas) and installation of the bi-facial Solar panels and associated support structures.	•Excavation of soil to facilitate foundations for mounting of the solar panels; •Mixing and casting of concrete for foundations; •Installation of solar panels including mounting of rods into foundations; and •Vehicles, construction machinery and personnel movement to facilitate mounting of Solar panels.	NA	L	Partially Reversible
3	Operation phase	Operation and maintenance of the proposed Tournée 2 Solar PV Park.	•Potential indiscriminate movement of maintenance vehicles along or through the CVB wetland.	NA	L	Fully Reversible
4		Discharge of water from the access roads and bare soils into the surrounding landscape.	•Increased impermeable surface areas adjacent to the CVB wetland, resulting in increased volume of stormwater entering the systems.	NA	L	
6	Decommissioning phase	Closure of the proposed Tournée 2 Solar PV Park. and rehabilitation of the footprint area.	•Potential risk associated with the removal of solar PV infrastructure; and •Subsequent negative impacts due to bare areas or exposed soils after the life cycle of the facility is complete.	NA	L	

Results for the EAP provided Impact Assessment indicates that the construction and operational activities associated with the proposed Tournée 2 Solar PV Park pose a medium impact significance prior to the implementation of mitigation measures and a very low impact significance post the implementation of mitigation measures. The activities associated with the decommissioning phase pose a very low impact significance pre and post implementation of mitigation measures.

Consideration was also given to the International Finance Corporation (IFC) Performance Standards (PS), with emphasis on PS 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources). The freshwater ecosystems fall within the ***natural habitat*** category of the IFC as the freshwater ecosystems are "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 proponent will not significantly convert or degrade the natural freshwater habitats as the CVB wetland and the associated NEMA 32m Zone of Regulation (ZoR) have been avoided, in line with the mitigation hierarchy, and effective mitigation measures to prevent direct and indirect impacts have been set (Section 7 and Appendix H) to ensure ***no net loss of aquatic biodiversity***.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the proposed Tournée 2 Solar PV Park activities are likely to be reduced during the construction and operational phases assuming that a high level of mitigation takes place. It is, therefore, the opinion of the freshwater ecologist that the proposed Tournée 2 Solar PV Park and associated infrastructure be considered favourably provided that all mitigation measures as set-out in this report are implemented and the development can be considered for authorisation by means of registration of a General Authorisation in terms of GN509 of 2016.

DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on aquatic biodiversity in terms of Government Notice 320 as promulgated in Government Gazette 43110 of 20 March 2020 in line with the Department of Environmental Affairs screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

No.	Requirements	Section in report
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Appendix J
2.2	Description of the preferred development site, including the following aspects-	Section 1
2.2.1	a. Aquatic ecosystem type b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns	Section 4.3
2.2.2	Threat status, according to the national web based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Section 3.1
2.2.3	National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub- catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Section 3.1 and 3.2
2.2.4	A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including: a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Section 4.3
2.3	Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification	Section 6 and 7; Appendix I
2.4	Assessment of impacts - a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Section 7
2.4.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Section 4.3 and Section 7
2.4.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	Section 4.3
2.4.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); b. Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; c. The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). d. Assessment of the risks associated with water use/s and related activities.	Section 4.3
2.4.4	How will the development impact on the functionality of the aquatic feature including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of system); b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river);	Section 4.3

	c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland); d. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); and e. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal).	
2.4.5	How will the development impact on the functionality of the aquatic feature including: a. water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river) b. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland). c. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); d. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); e. The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soil, etc.) associated with or within the aquatic ecosystem.	Section 4.3
2.4.6	How will the development impact on key ecosystem regulating and supporting services especially Flood attenuation; Streamflow regulation; Sediment trapping; Phosphate assimilation; Nitrate assimilation; Toxicant assimilation; Erosion control; and Carbon storage.	Section 4.3
2.4.7	How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Section 4.3
2.4.9	A motivation must be provided if there were development footprints identified as per paragraph 2.3 above that were identified as having a “low” biodiversity sensitivity and were not considered appropriate.	Section 8
3.	The report must contain as a minimum the following information:	
3.1	Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae;	Appendix A and J
3.2	A signed statement of independence by the specialist;	Appendix A
3.3	The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1 and 4.3
3.4	The methodology used to undertake the impact assessment and site inspection, including equipment and modelling used, where relevant;	Appendix C and D
3.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.3
3.6	Areas not suitable for development, to be avoided during construction and operation (where relevant);	Section 6 and 7
3.7	Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts;	Section 7
3.8	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted protocol;	Section 6
3.9	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Section 7
3.10	A motivation where the development footprint identified as per 2.3 were not considered stating reasons why these were not being considered; and	Section 8
3.11	A reasoned opinion, based on the finding of the specialist assessment, regarding the acceptability or not, of the development and if the development should receive approval, and any conditions to which the statement is subjected.	Section 8

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GLOSSARY OF TERMS

Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
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 flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
Fluvial:	Resulting from water movement.
Gleying:	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydromorphic soil:	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soil).
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Hydrophyte:	Any plant that grows in water or on a substratum that is at least periodically deficient of oxygen as a result of soil saturation or flooding; plants typically found in wet habitats.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soil with variegated colour patterns are described as being mottled, with the "background colour" referred to as the matrix and the spots or blotches of colour referred to as mottles.
Obligate species:	Species almost always found in wetlands (>99% of occurrences).
Perched water table:	The upper limit of a zone of saturation that is perched on an unsaturated zone by an impermeable layer, hence separating it from the main body of groundwater
Perennial:	Flows all year round.
RAMSAR:	The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.
RDL (Red Data listed) species:	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status according to the International Union for Conservation of Nature (IUCN) Classification.
Seasonal zone of wetness:	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50 cm of the surface
Temporary zone of wetness:	the outer zone of a wetland characterised by saturation within 50 cm of the surface for less than three months of the year
Watercourse:	In terms of the definition contained within the National Water Act, a watercourse means: • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; • and a reference to a watercourse includes, where relevant, its bed and banks
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soil, which may in turn have an influence on the ecological characteristics and functioning of wetlands.

ACRONYMS

AC	Alternating Current
BAS	Best Attainable State
BESS	Battery Energy Storage System
BGIS	Biodiversity Geographic Information Systems
CVB	Channelled Valley Bottom
DC	Direct Current
DWA	Department of Water Affairs
DFFE	Department of Environment Forestry and Fisheries
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EI	Ecological Importance
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EPL	Ecosystem Protection Level
ES	Ecological Sensitivity
ESA	Ecological Support Area
ETS	Ecosystem Threat Status
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	hectares
HGM	Hydrogeomorphic
IFC	International Finance Corporations
IPP	Independent Power Producer
km	kilometres
kV	Kilovolt
m	Metres
mm	Millimetre
m.a.m.s.l	Metres above mean sea level
MAP	Mean Annual Precipitation
MW	Megawatt
MWh	Megawatt-hours
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
OHPL	Overhead Powerline
O & M	Operation and Maintenance
PES	Present Ecological State
PS	Performance Standard
PV	Photovoltaic
REC	Recommended Ecological Category
REDZ	Renewable Energy Development Zone
RMO	Resource Management Objective
RQIS	Research Quality Information Services
SACNASP	South African Council for Natural Scientific Professions
SAS	Scientific Aquatic Services
SEF	Solar Energy Facility
SQR	Sub quaternary catchment reach
subWMA	Sub-Water Management Area
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WUA	Water Use Authorisation
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 Megawatt (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 and 2 below.

In order to identify all freshwater ecosystems that may potentially be impacted by the development of the proposed Tournée 2 Solar PV Park, a 500 m “zone of investigation” was implemented around the proposed Tournée 2 Solar PV Park development site and associated infrastructure, in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA), in order to assess possible sensitivities of the receiving freshwater 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’.

A scoping phase freshwater assessment was undertaken for the proposed Tournée 2 Solar PV Park in March 2023. That report provided a description of the ecology of the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park and investigation area, including mapping of the natural freshwater ecosystems, a brief description of their characteristics, verification of freshwater sensitivity in the context of the aquatic biodiversity sensitivity that has been assigned through the DFFE Web-based Screening Tool, and a high-level investigation of potential impacts on freshwater ecosystems that would potentially result from the development of the proposed Tournée 2 Solar PV Park. This subsequent Environmental Impact Report -phase freshwater assessment aims to define the freshwater ecology of the area in terms of characteristics, assessing key ecological drivers, and to define the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS), as well

as the socio-cultural and ecological service provision of the freshwater ecosystems utilising current industry “best practice” assessment methods. Additionally, this report aims to define the Recommended Management Objectives (RMO) and Recommended Ecological Category (REC) for the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park. Lastly the potential impact of the proposed development on the freshwater ecosystems has been assessed through the application of the DWS Risk Assessment and the impact assessment methodology provided by the EAP. Suitable mitigation measures have been specified.

This report, after consideration of the above, must guide the Environmental Assessment Practitioner (EAP) and proponent on the proposed Tournée 2 Solar PV Park activities from a freshwater management perspective and indicate any development constraints that should be considered in line with the principles of sustainable development and Integrated Environmental Management.

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 back-to-back substation. The Battery Energy Storage System's main components include the batteries installed in rows of containers, the power conversion system (inverters) and transformers.

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.

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

Farm Potions Combined Extent	573,78 hectares (ha)
Buildable Area (subject to finalisation)	~297 ha
Contracted Capacity of PVSEF	Up to 150 MW/600MWh. Area required – 40 000 m^2
Associated Infrastructure	Internal Roads up to 4 Metres (m) wide and up to 20 km long. Access Roads up to 8 m wide.
	Back to back substation (including facility substation, and Eskom collector/switching station) will consist of a high voltage substation yard to allow for multiple (up to) 132 kV feeder bays and transformers, control buildings, telecommunications infrastructure, access roads, etc. - 30,000 m^2
	Independent Power Producer (IPP) site substation and battery energy storage system (BESS):

	Total footprint will be up to 7 ha in extent (4 ha for the BESS and 3 ha for the IPP portion of the substation).
	An up to 132kV Overhead Powerline ("OHPL"). The final interconnection solution will be dependent on the requirements of Eskom, which are still to be defined. Cables - Communication, AC and DC cables installed underground and overhead. AC cabling up to 33 kV between project components
	Paved areas (m²) - 2 500.
	Operation & Maintenance (O&M) building (m²) - 1 500.
	Construction phase: Construction camp area (m²) –5,000 (100 m x 50 m) Laydown area (m²) - 20,000 (100m x 200 m) Temporary concrete batching plant - Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo - 30,000 m² Septic tanks, and portable toilets.
	PV Modules (~297 ha).
Technical Specifications	Tier 1 bi-facial installed on single axis tracker mounting structures. Lithium Ion Batteries are proposed for the BESS Height: up to 6 m above ground level. Includes inverters and transformers.
	Fencing around development area.

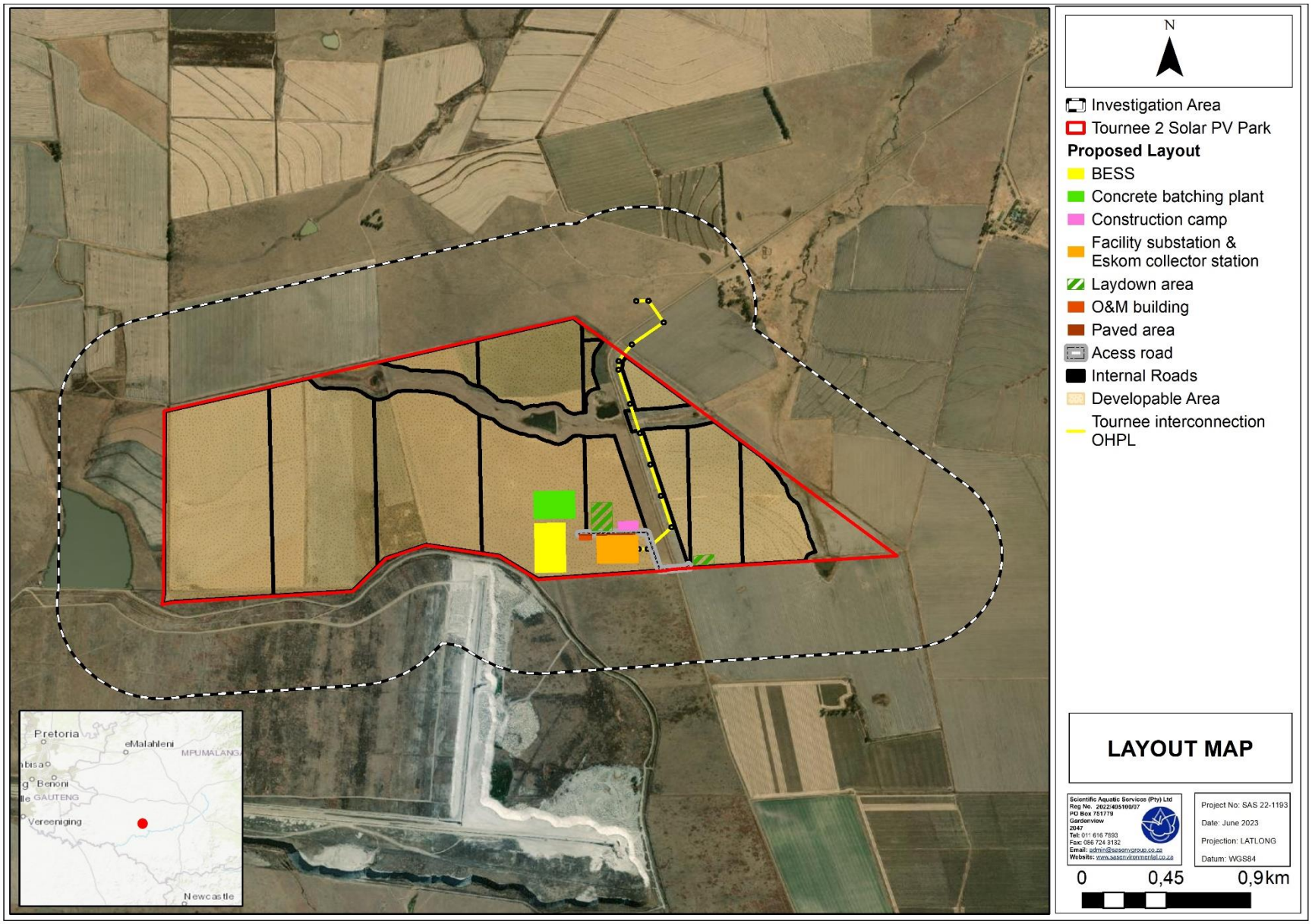


Figure 1: A digital satellite image depicting the location of the proposed Tournée 2 Solar PV Park and associated investigation area in relation to the surrounding area.

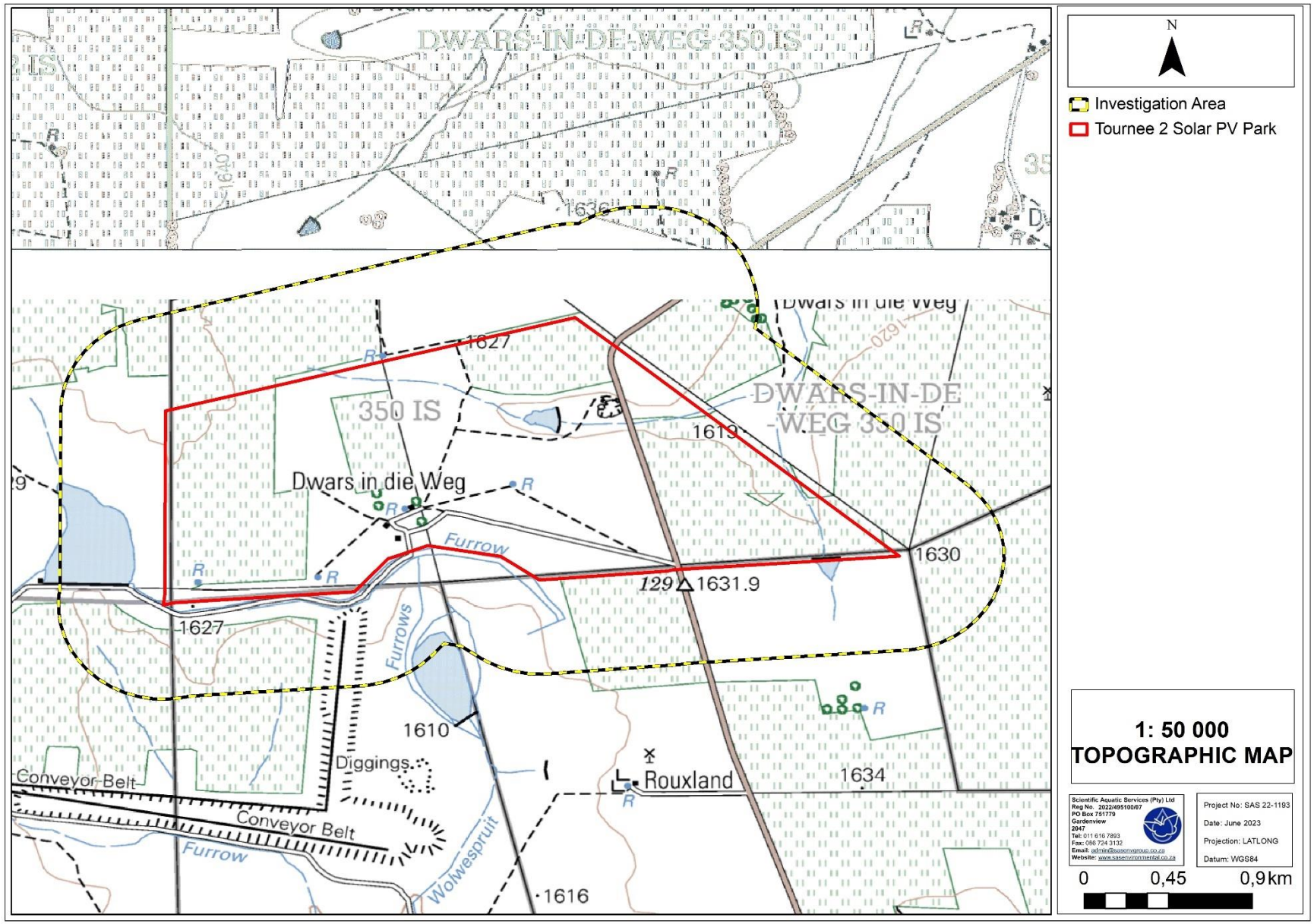


Figure 2: The proposed Tournée 2 Solar PV Park and investigation areas depicted on a 1:50 000 topographic map in relation to the surrounding area.

1.3 *Scope of Work*

Specific outcomes in terms of this report are outlined below:

- A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; the Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], (2014) database, National Biodiversity Assessment (NBA) (2018), and the Mpumalanga Biodiversity Sector Plan (2019), were undertaken to aid in defining the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the freshwater ecosystems;
- All freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park and associated investigation area were delineated using desktop methods in accordance with GN 509 of 2016 as it relates to activities as stipulated in the National Water Act, 1998 as amended (Act No. 36 of 1998) and verified according to the "Department of Water Affairs and Forestry (DWAF)[1] (2008)[2]: A practical field procedure for identification of wetlands and riparian areas". Aspects such as soil morphological characteristics and wetness along with vegetation types were used to verify the freshwater ecosystems;
- The freshwater ecosystem classification assessment was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013);
- The Present Ecological State (PES) of the freshwater ecosystems were assessed according to the resource directed measures guideline as advocated by Macfarlane *et al.* (2008);
- The Ecological Importance and Sensitivity (EIS) of the freshwater ecosystems were determined according to the method described by Rountree and Kotze*,* (2013);
- The ecosystem services provided by the relevant freshwater ecosystems according to the method of Kotze *et al. (*2020) (Version 2) were determined in which services to the ecology and to the people are assessed;
- The freshwater ecosystem boundaries, and legislated zones of regulation were depicted for the freshwater ecosystems, where applicable;
- Allocation of a suitable Recommended Management Objective (RMO), Recommended Ecological Category (REC) and Best Attainable State (BAS) of the freshwater

[1] The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA) and subsequently as the Department of Water and Sanitation (DWS). For the purposes of referencing in this report, the name under which the Department was known during the time of publication of reference material, will be used.
[2] Even though an updated manual is available since 2008 (Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas), this is still considered a draft document currently under review.

ecosystems were assigned based on the results obtained from the PES and EIS assessments;

- The EAP-supplied impact assessment method and the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2016) were applied to identify potential impacts that may affect the freshwater ecosystems as a result of the proposed development, and to aim to quantify the significance thereof; and
- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact of the proposed development on the receiving environment.

1.4 *Assumptions and Limitations*

The following assumptions and limitations are applicable to this report:

- The freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park, were ground-truthed, however freshwater ecosystems within 500 m of the proposed Tournée 2 Solar PV Park (within the investigation area) were delineated in fulfilment of GN509 of the NWA using various desktop methods including use of topographic maps, historical and current digital satellite imagery and aerial photographs. Delineations developed using desk based methods were ground-truthed where feasible. The delineations of freshwater ecosystems outside the proposed Tournée 2 Solar PV Park must not be utilised for any purpose, other than planning within the proposed Tournée 2 Solar PV Park the data in this study pertains to. Any areas that may have additionally been mapped will require field-based delineation and ground-truthing as directed by applicable legislation and best practice methods;
- Various areas within the proposed Tournée 2 Solar PV Park and investigation area displayed transformed topography, soil profiles and runoff patterns within the landscape. As such, these disturbances have likely resulted in alterations to the hydroperiod of the identified freshwater ecosystems;
- The proposed Tournée 2 Solar PV Park is located within the Ea17 land type, which is characterised by the predominance of vertic soils. Due to their chemical properties, vertic soils do not display typical signs of redoximorphism in the form of iron and manganese mottling, and thus delineation of wetland habitats needs to be based on assessment of topographical and vegetative indicators as the primary indicators;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the proposed

Tournée 2 Solar PV Park at the scale required to inform the EA process. However, this information is considered useful as background information to the study;

- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with surveying equipment;
- Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; and
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. It is, however, expected that the freshwater ecosystems that may be affected by the proposed activities have been accurately assessed and considered, based on the site observations undertaken in terms of freshwater ecosystem ecology.

2 ASSESSMENT APPROACH

2.1 *Freshwater Ecosystem definition*

The National Water Act, 1998 (Act No. 36 of 1998) as amended 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 National Water Act, 1998 (Act No. 36 of 1998) as amended, 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 / feature" is used and carries the same meaning as "watercourse" as defined by the NWA.

The Act further provides definitions of wetland 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.”

2.2 *Freshwater Ecosystem Field verification*

Where limitations to on-site delineations were experienced, use was made of historical and current digital satellite imagery, topographic maps and available provincial and national databases to aid in the delineation of the freshwater ecosystems following the site assessment. The following were taken into consideration when utilising the above desktop methods:

- 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 site assessment was undertaken in February 2023 (mid-summer, wet season), to delineate the freshwater ecosystems and undertake a detailed freshwater ecosystem assessment. The delineation of the freshwater ecosystems took place as far as possible, according to the method presented in the “Updated manual for the identification and delineation of wetland and riparian resources” (DWAF, 2008). The foundation of the method

is based on the fact that freshwater ecosystems have several distinguishing factors including the following:

- Landscape position;
- The presence of water at or near the ground surface;
- Distinctive hydromorphic soil; and
- Vegetation adapted to saturated soil.

In addition to the delineation process, a detailed assessment of the delineated freshwater ecosystems was undertaken. Factors affecting the integrity of the freshwater ecosystems were taken into consideration and aided in the determination of the functioning and the ecological and socio-cultural services provided by the freshwater ecosystems. A detailed explanation of the methods of assessment undertaken is provided in **Appendix C** of this report.

3 RESULTS OF THE DESKTOP ANALYSIS

3.1 *Analyses of Relevant Databases*

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 2). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for integration of results by the reader to take place. Where required, further discussion and interpretation is provided.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the study areas actual site characteristics at the scale required to inform the EA/ WUA processes. Nevertheless, this information is considered useful as background information to the study, is important in legislative contextualisation of risk and impact, and was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process. The information contained in the dashboard report below is intended to provide background to the landscape of the proposed Tournée 2 Solar PV Park. Actual site conditions at the time of the assessment may differ to the background information provided by various datasets. Please refer to Section 4 for details pertaining to the site investigation.

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

Aquatic ecoregion and sub-regions in which the proposed Tournée 2 Solar PV Park is located.	
Ecoregion	Highveld
Catchment	Vaal
Quaternary Catchment (Figure 3)	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

Details of the proposed Tournée 2 Solar PV Park in terms of the Land Types Database.

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.

National Web Based Environmental Screening Tool (Accessed 2023) (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

Details of proposed Tournée 2 Solar PV Park in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database.

FEPA CODE	The Tournée 2 Solar PV Park and associated investigation area falls 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 4 and 5)	According to the NFEPA (2011) database, six (6) seep wetlands, a depression wetland, and two (2)wetland flats are indicated within the proposed Tournée 2 Solar PV Park and associated 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 4 and 5)	According to the NFEPA (2011) database, no rivers are indicated to be within the proposed Tournée 2 Solar PV Park. An unnamed tributary of the Vaal River is indicated within the investigation area. The tributary is indicated to be 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 wetland 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) (Figures 6 and 7).

According to the NBA database (2018), two (2) seep wetlands, one (1) Channelled Valley Bottom (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 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. Lastly, the depression wetland is indicated to be in a natural to near natural (WETCON A/B) ecological condition. The artificial wetlands database indicates the presence of six (6) dams within the proposed Tournée 2 Solar PV Park and associated investigation area, three (3) of which occur within the CVB and seep wetlands. No rivers are indicated within the proposed Tournée 2 Solar PV Park, however, an Unnamed Tributary of the Vaal River is indicated to be within the 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 8 and 9).

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).

hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas.

The Screening Tool indicates that the proposed Tournée 2 Solar PV Park has a **very high aquatic sensitivity** due to the proximity to wetlands. These wetland features corresponds with the features identified by the NBA (2018), MPHW (2014), and NFEPA (2011) databases.

Renewable Energy Development Zones and Corridors.

The proposed Tournée 2 Solar PV Park is not located within any Renewable Energy Development Zone (REDZ).

Strategic Transmission Corridors.

The proposed Tournée 2 Solar PV Park is not located within any Strategic Transmission Corridors.

The five strategic transmission corridors were assessed as part of the 2016 Electricity Grid Infrastructure (EGI) Strategic Environmental Assessment (SEA). These corridors were Gazetted for implementation on 16 February 2018 in government Gazette 41445, GN 113. The gazette documented notice given by the minister of environmental affairs of alternative procedures to be followed when applying for environmental authorisation for large scale electricity transmission and distribution development activities, identified in terms of section 24(2)(a) of the NEMA in the identified strategic transmission corridors (i.e., Areas declared as geographical areas of strategic importance).

Mpumalanga Biodiversity Sector Plan (MBSP, 2019) Freshwater Database (Figure 10).	
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 Ecological Support Areas (ESA). 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.
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 (CBA).
Other Natural Areas (ONA)	The majority of the proposed Tournée 2 Solar PV Park is indicated as Other Natural Areas (ONA). 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.
Modified or Heavily Modified areas	The remaining portions of the proposed Tournée 2 Solar PV Park and associated investigation area 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; MBSP = Mpumalanga Biodiversity Sector Plan; MHW = Mpumalanga Highveld Wetlands; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; ONA = Other Natural Area; PES = Present Ecological State; REDZ = Renewable Energy Development Zone; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area.

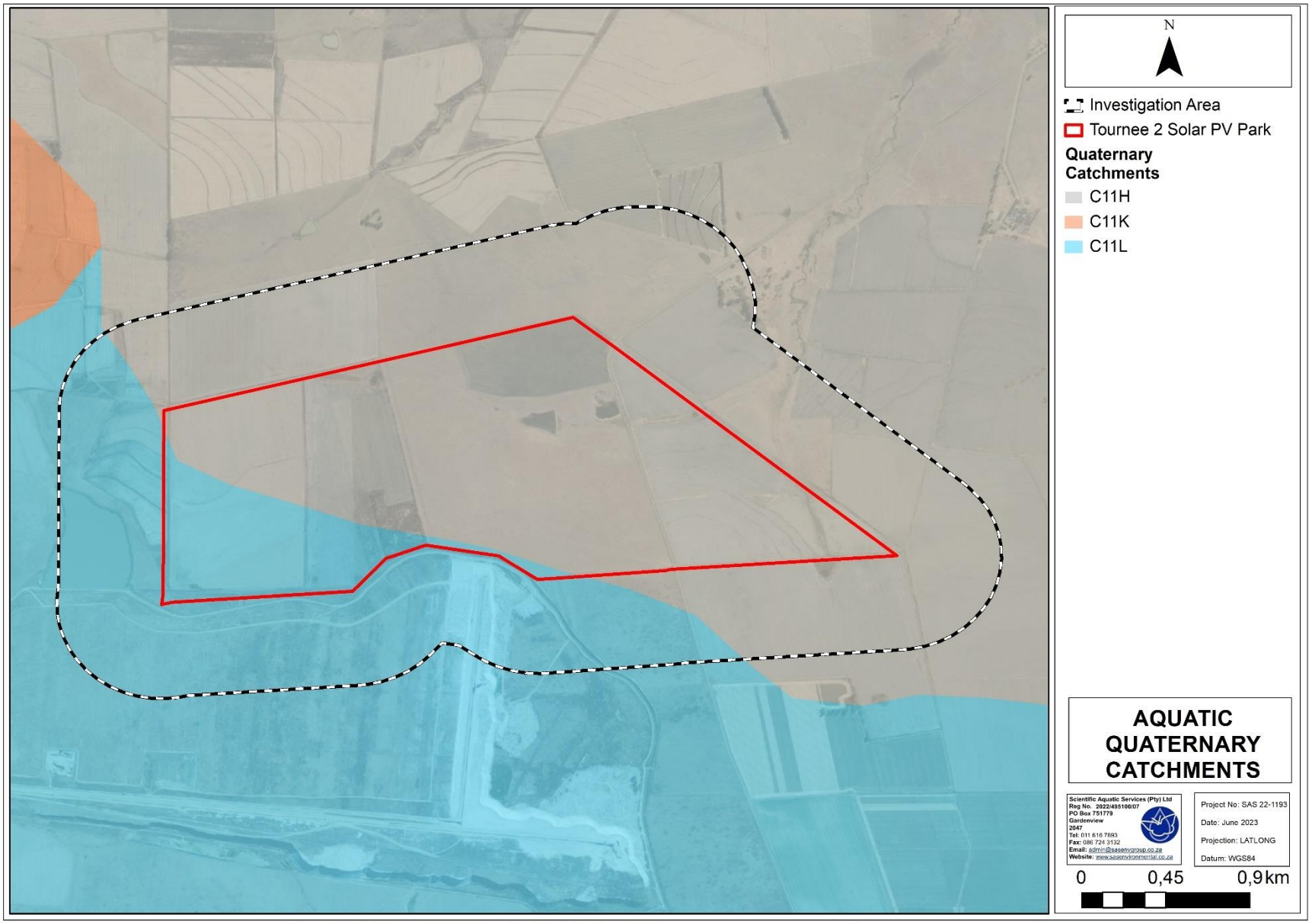


Figure 3: Quaternary Catchments associated with the proposed Tournée 2 Solar PV Park and investigation area according to the NFEPA database (2011).

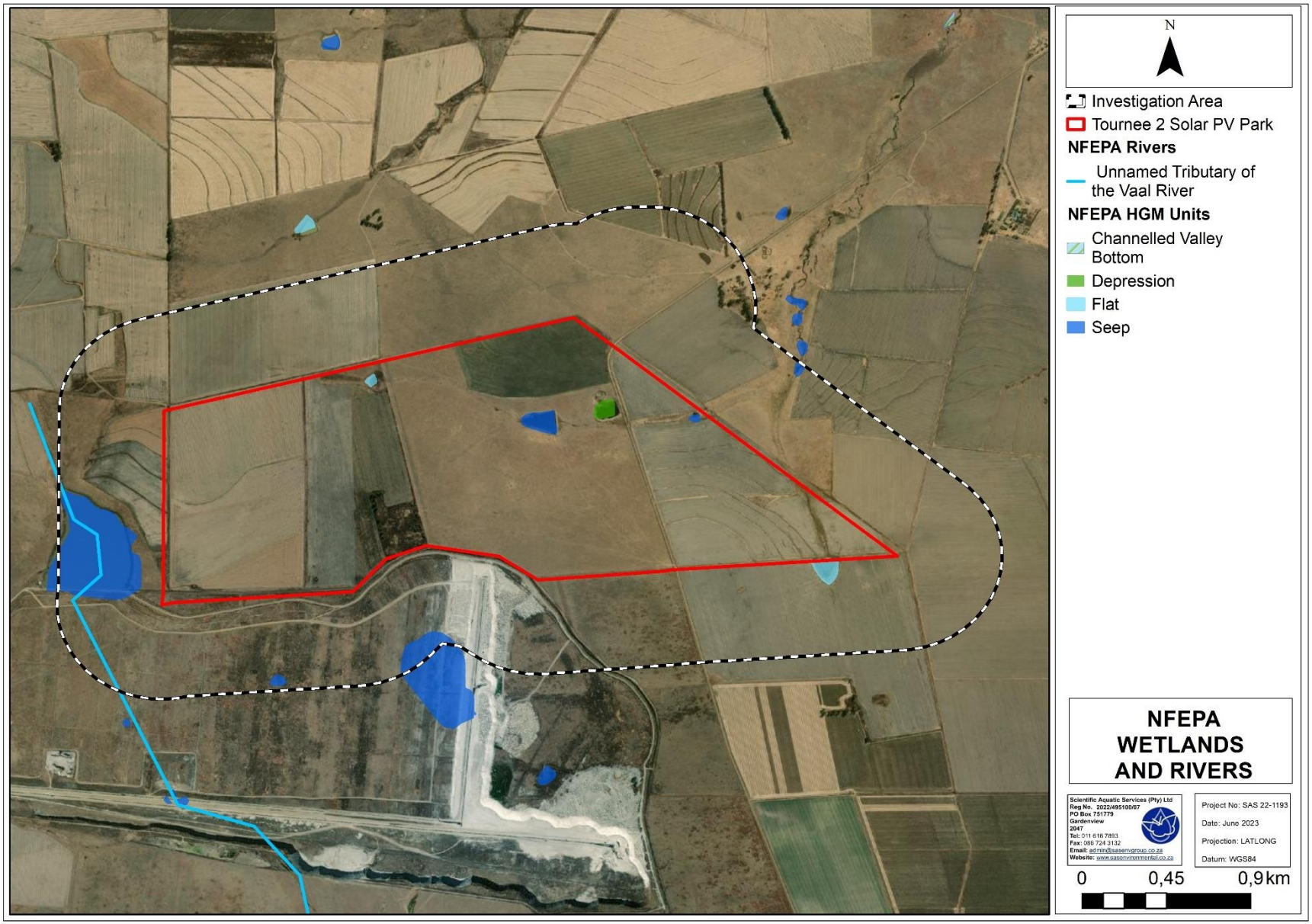


Figure 4: Wetlands and Rivers associated with the proposed Tournée 2 Solar PV Park and investigation area according to the NFEPA database (2011).

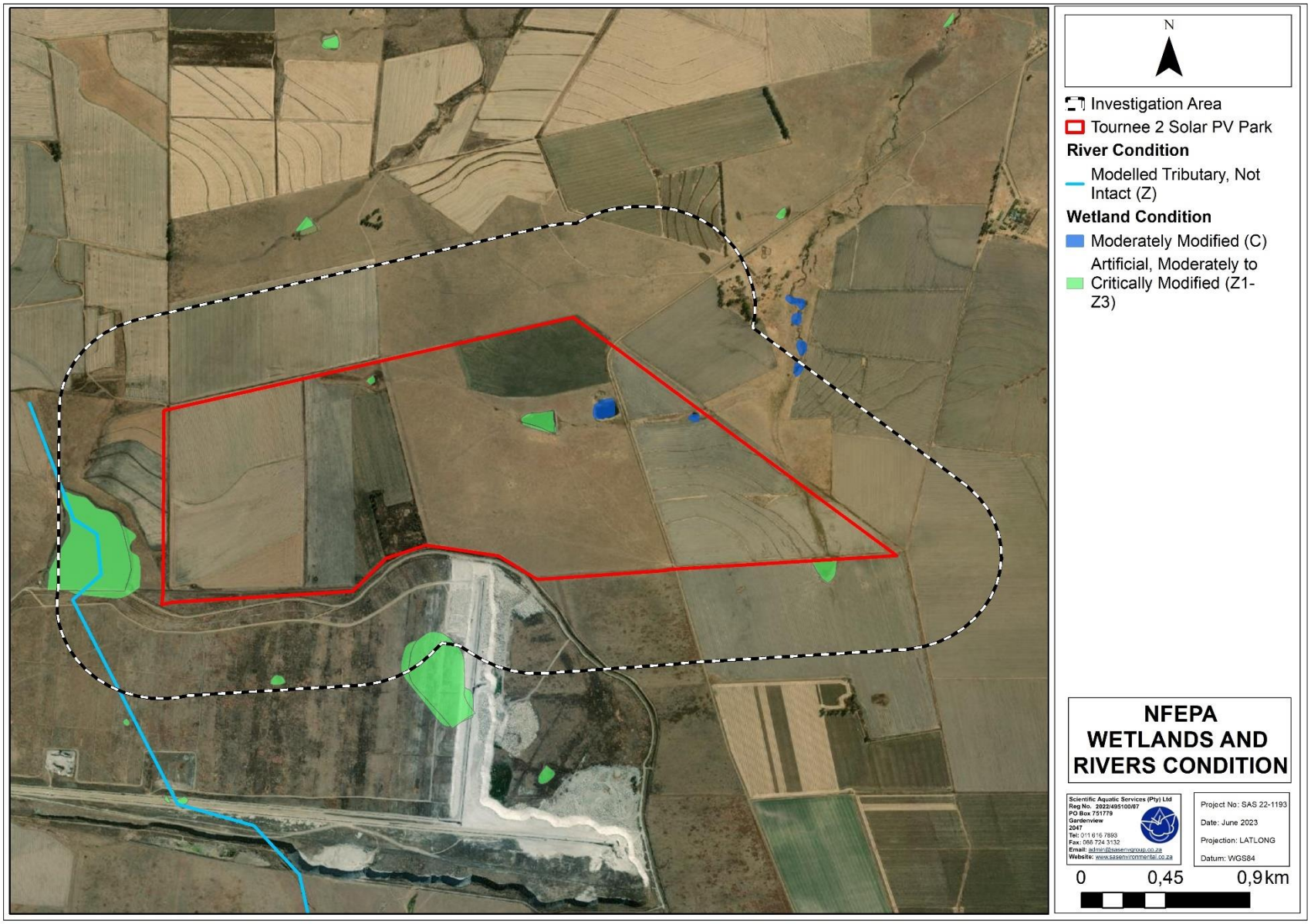


Figure 5: Ecological condition of the wetlands and rivers associated with the proposed Tournée 2 Solar PV Park and investigation area according to the NFEPA database (2011).

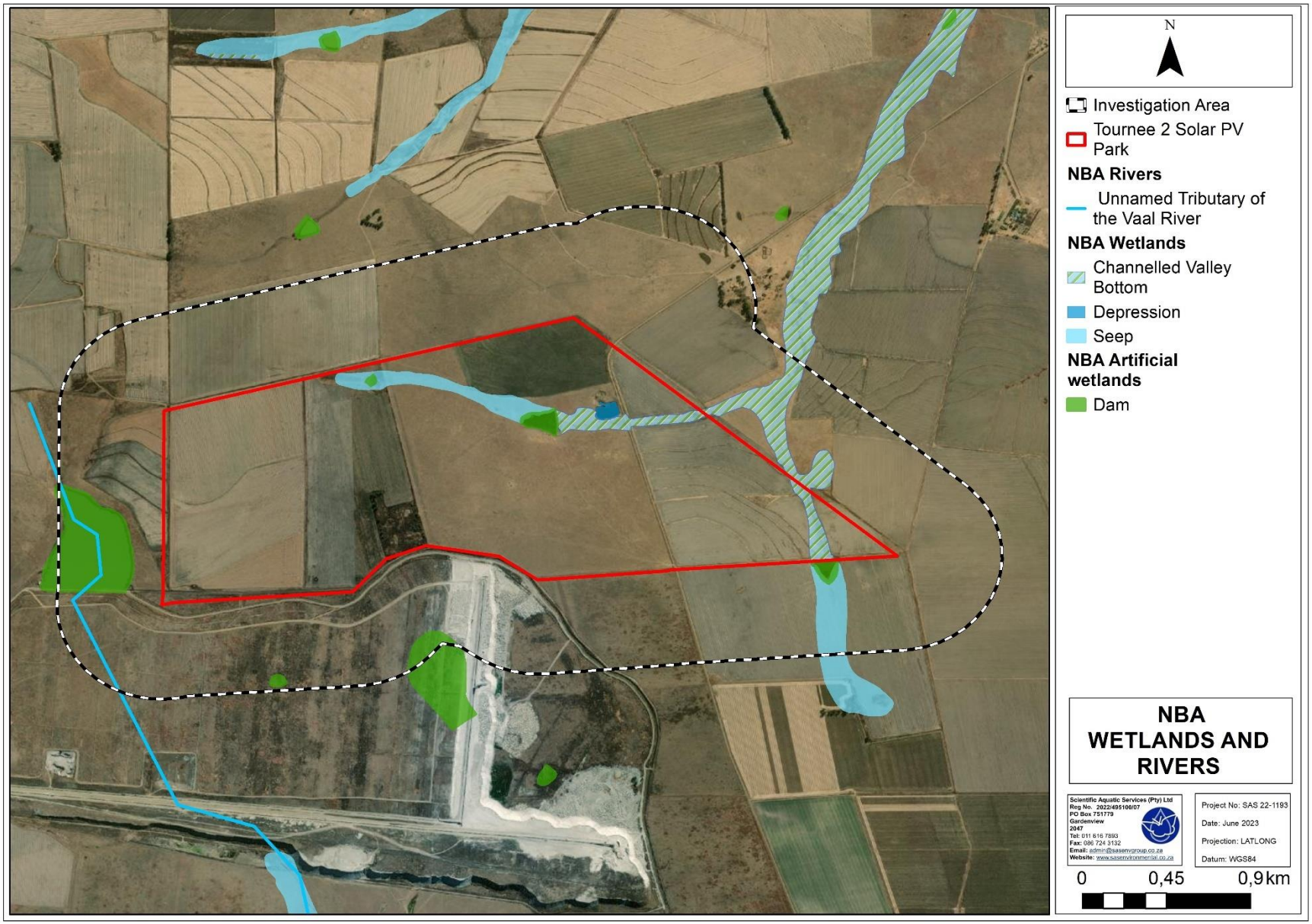


Figure 6: Wetlands and Rivers associated with the proposed Tournée 2 Solar PV Park and investigation area according to the National Biodiversity Assessment database (2018).

Figure 7: Ecological condition of the wetlands and rivers associated with the proposed Tournée 2 Solar PV Park and investigation area according to the National Biodiversity Assessment database (2018).

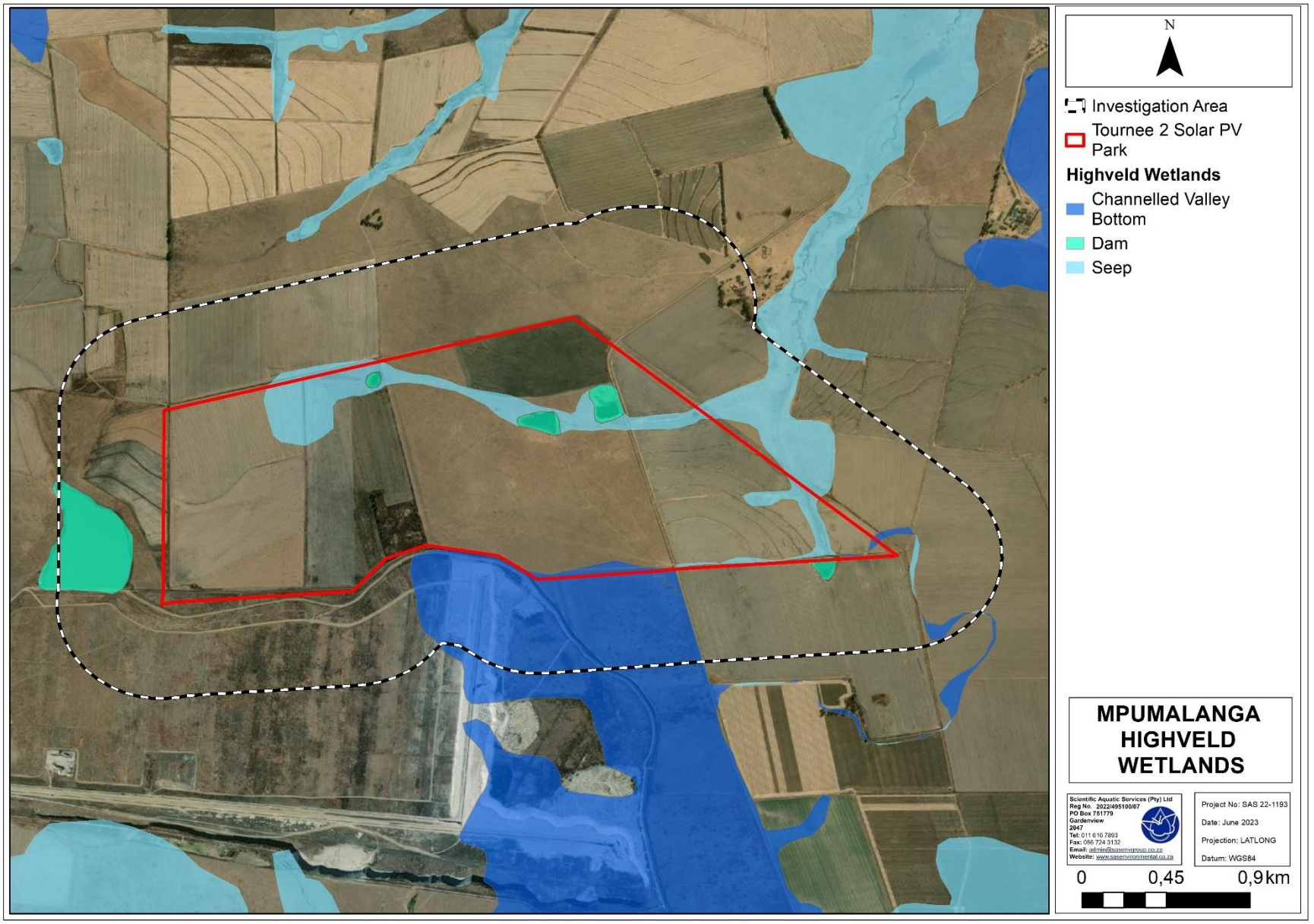


Figure 8: Wetlands associated with the proposed Tournée 2 Solar PV Park and investigation area according to the Mpumalanga Highveld Wetlands Database (2014).

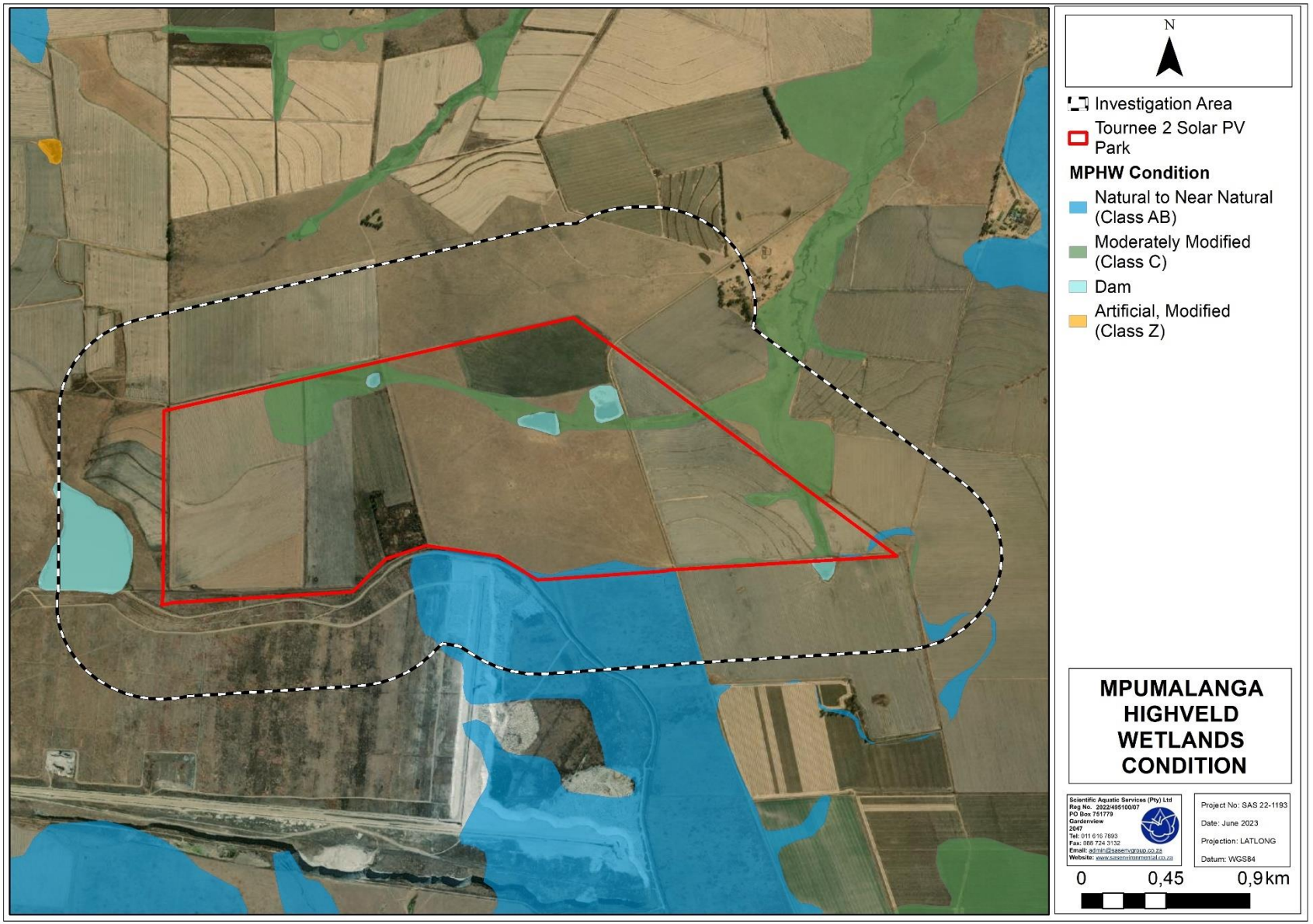


Figure 9: Ecological condition of the wetlands associated with the proposed Tournée 2 Solar PV Park and investigation area according to the Mpumalanga Highveld Wetlands Database (2014).

Figure 10: Ecologically Important Areas associated with the proposed Tournée 2 Solar PV Park and investigation area according to the Mpumalanga Biodiversity Spatial Plan (2019).

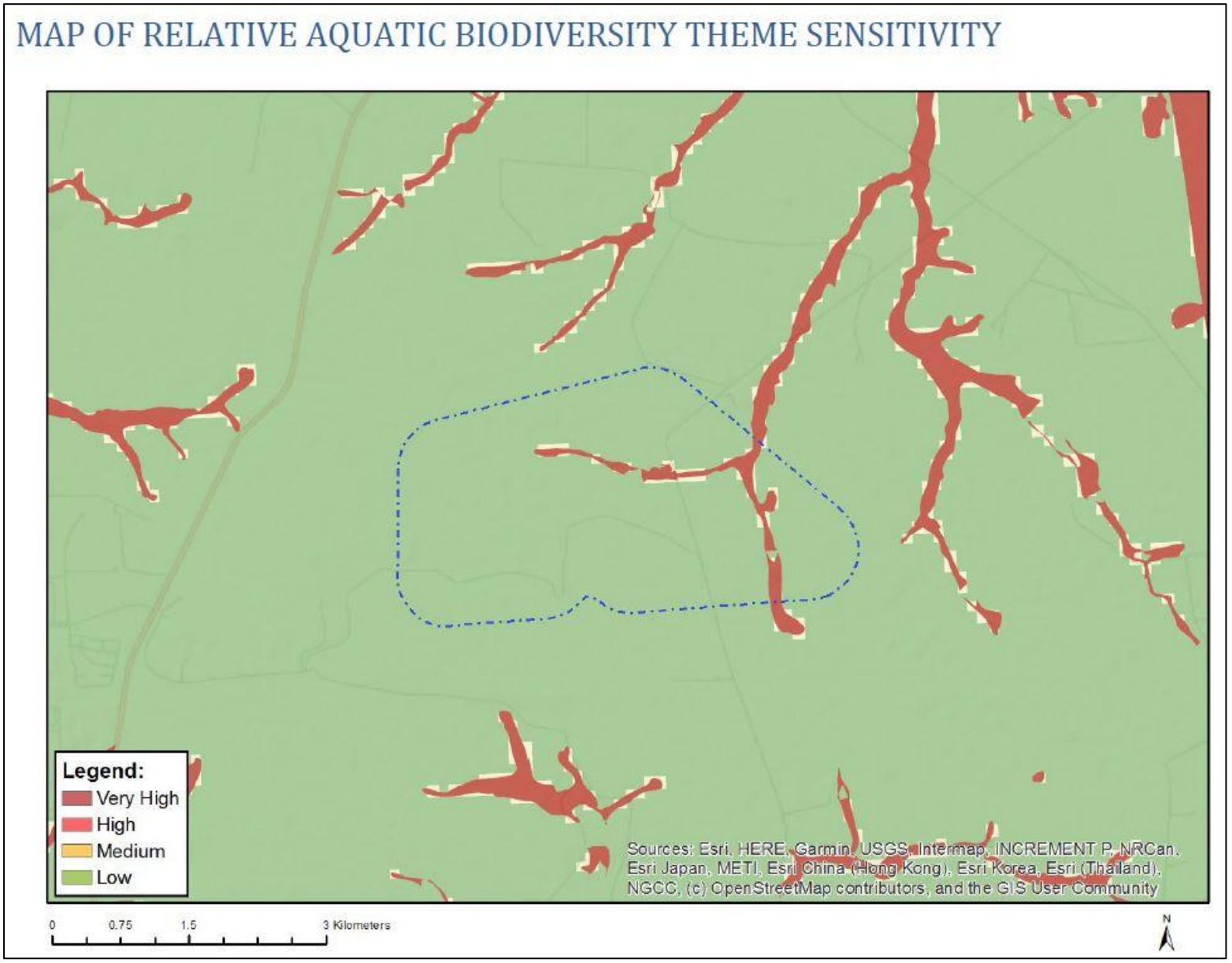


Figure 11: Aquatic Biodiversity Theme Sensitivity associated with the proposed Tournée 2 Solar PV Park according to the National Web-based Screening Tool (Accessed 2023).

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 12 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.

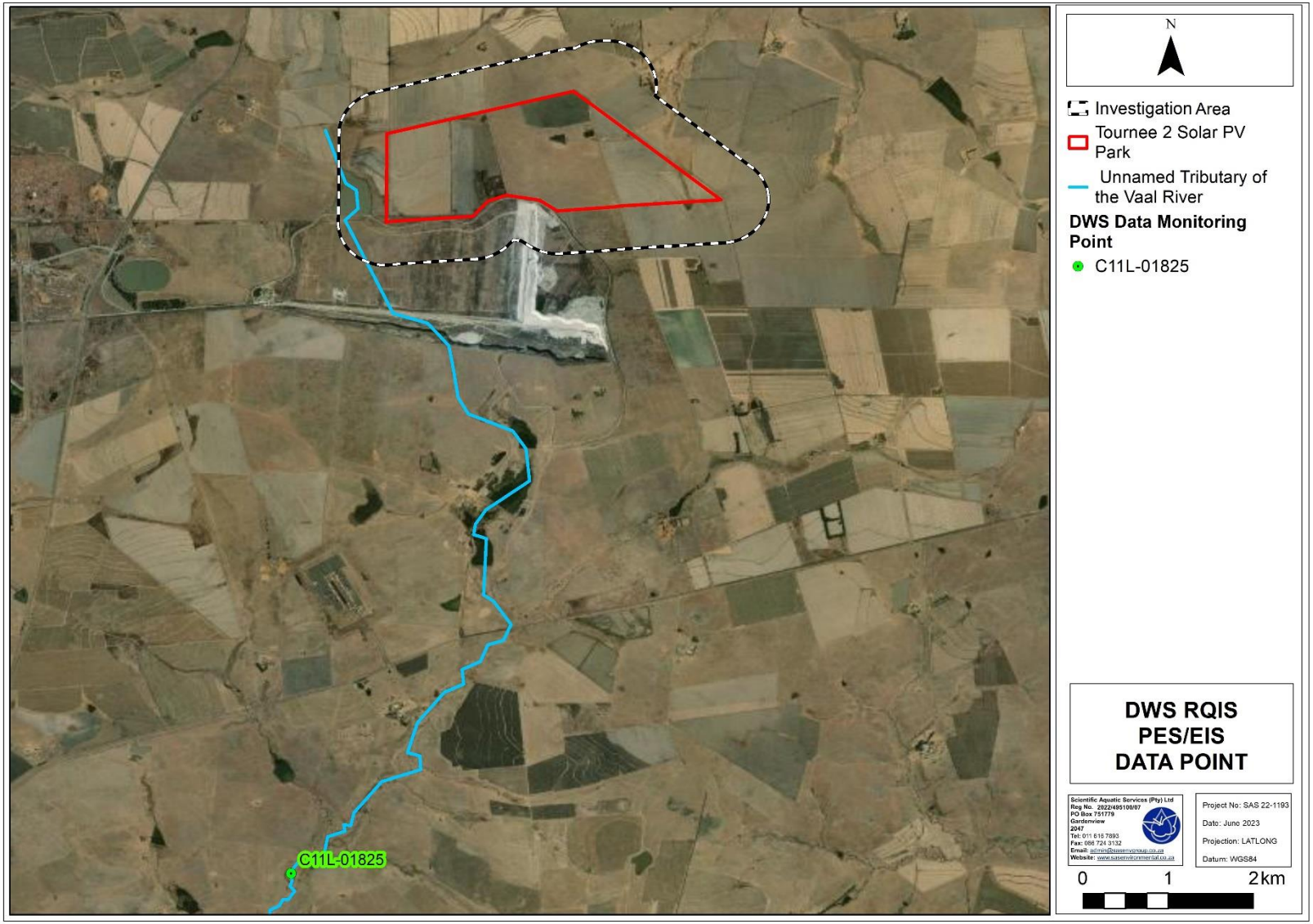


Figure 12: Relevant sub-quaternary catchment reach (SQR) associated with the proposed Tournée 2 Solar PV Park and investigation area according to the DWS database (2014).

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 RESULTS: FRESHWATER ECOSYSTEM ASSESSMENT

4.1 *Freshwater Ecosystem Characterisation*

The site assessment confirmed the presence of a Channelled Valley Bottom (CVB) wetland and depression wetland associated with the proposed Tournée 2 Solar PV Park and associated investigation area.

The identified CVB wetland within the proposed Tournée 2 Solar PV Park and investigation areas was classified according to the Classification System (Ollis *et al.*, 2013) as an Inland System. The wetland falls within the Highveld Aquatic Ecoregion and within the Mesic Highveld Grassland Group 3 wetland vegetation (wetveg) group considered Least Threatened according to Mbona *et al.* (2014). At Levels 3 (Landscape Unit) and 4 (HGM Type) of the Classification System, the system was classified as per the summary in Table 5, below.

Table 5: Characterisation at Levels 3 and 4 of the Classification System (Ollis *et al*., 2013) of the freshwater ecosystem associated with the study and investigation areas.

Freshwater ecosystems	Level 3: Landscape unit	Level 4: HGM Type
CVB wetland located within the eastern/southern portions of the proposed Tournée 2 Solar PV Park and investigation areas.	**Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land.	**CVB wetland:** a valley-bottom wetland with a river channel running through it.
Depression wetland located in the northern portion of the investigation area.		**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.

The delineated freshwater ecosystems in relation to the proposed Tournée 2 Solar PV Park and investigation areas are conceptually depicted in Figure 13 below.

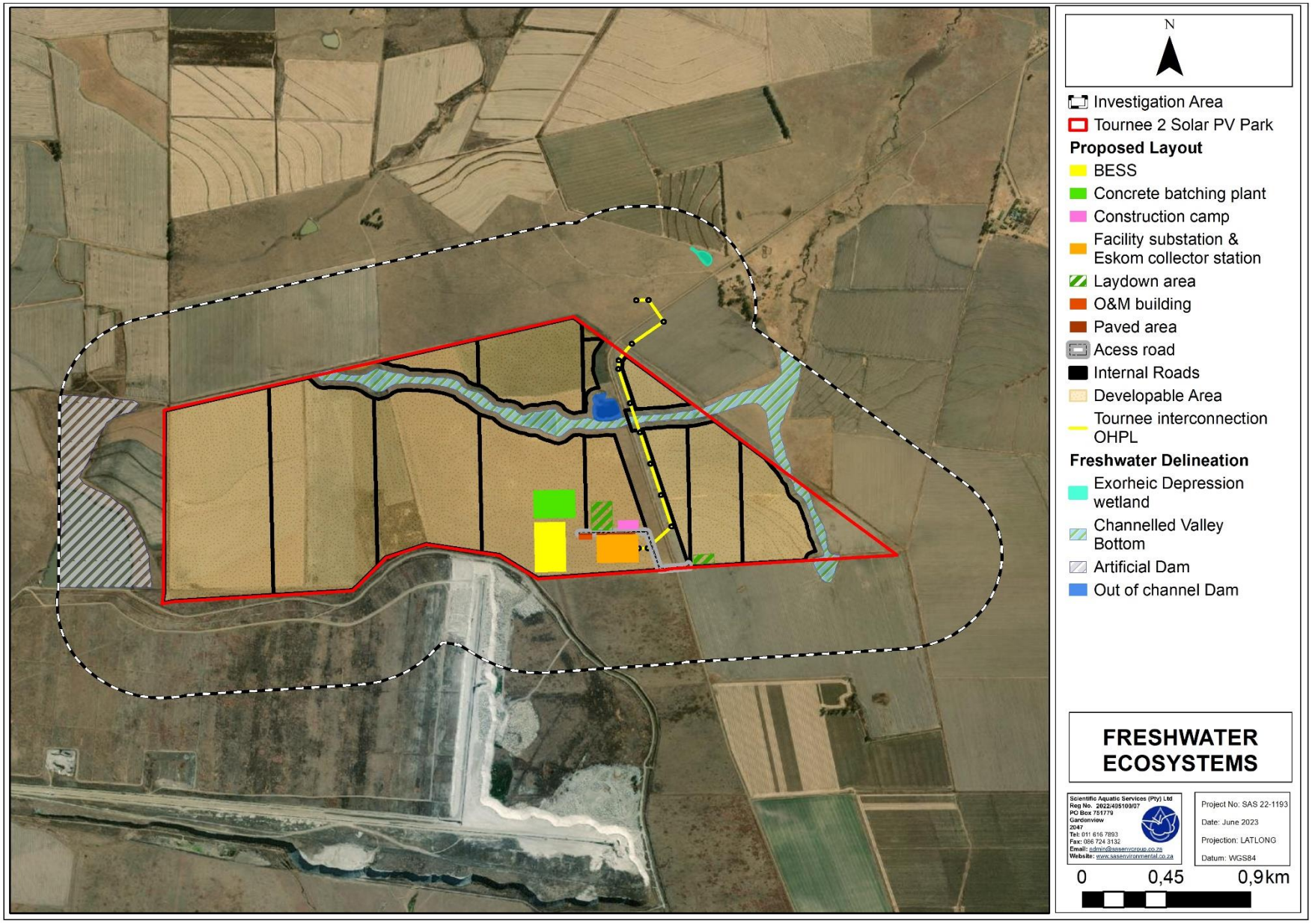


Figure 13: Location of the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park and investigation area.

4.2 *Freshwater Ecosystem Delineation*

As noted in Section 1.2, the freshwater ecosystem assessment was limited to the proposed Tournée 2 Solar PV Park and associated investigation area as provided by the proponent. It was noted during the site assessment that historical and ongoing agricultural activities have occurred within the proposed Tournée 2 Solar PV Park footprint, investigation area and immediate surrounds. The delineations as presented in this report, are nevertheless deemed the best estimate of the freshwater ecosystem boundaries based on site conditions present at the time of the assessment and are considered adequate to allow for informed decision-making.

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 (Figure 14 below). 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.

Figure 14: Photographic representation of the soils within the EA landtype displaying strongly structured, high clay content, dark brown soils.

During the site assessment, the following indicators were used to delineate the boundaries of the freshwater ecosystems:

- Vegetation was utilised as the primary indicator to identify and define freshwater ecosystems, where feasible. The distinction between obligate, facultative, and terrestrial vegetation was relatively discernible. Vegetation species composition and structure was utilised to determine wetland boundaries;
- Terrain setting indicators were used as a secondary, confirmatory indicator. Terrain was utilised to provide an indication of low-lying areas where water is likely to collect and/or move through the landscape. In EA landtypes channelled valley bottom wetlands are often narrow features and confined to the area between two macro channel banks; and
- The presence of moisture and evidence of water movement in the landscape was utilised as a further confirmatory indicator, although this was utilised with caution due to the presence of artificial wet responses in many parts of the study area that have been generated by stormwater and other discharges.

4.3 *Site Verification Results*

Following the site assessment, the assessments outlined in Section 1.2 were applied. For the purposes of presenting a concise discussion, the assessment results of the CVB wetlands are discussed collectively as the results were largely similar. However, the calculations for the wetlands were done per HGM unit. As the depression wetland is only associated with the investigation area and is of low risk to be impacted by the proposed Tournée 2 Solar PV Park, further assessment of the depression wetland was not included in this report. The results of the assessments are discussed in the dashboard style reports which follow and the details thereof are presented in **Appendix E.**

Table 6: Summary of the assessment of the CVB wetland associated with the proposed Tournée 2 Solar PV Park and investigation areas.

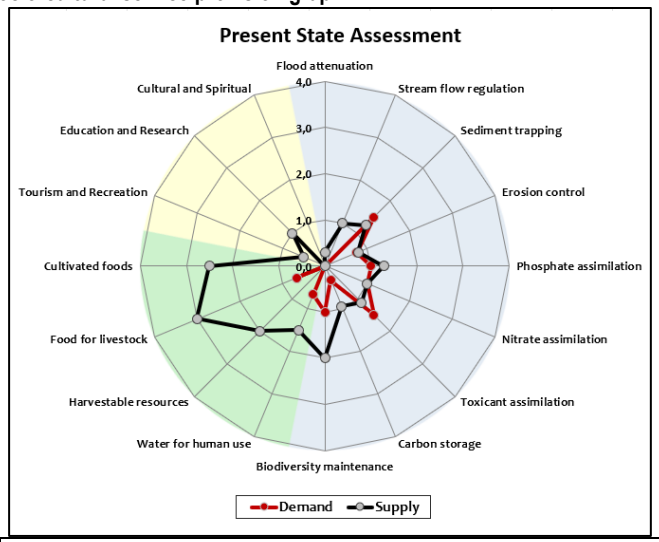
<table>
<tr><td colspan="4">Ecological & socio-cultural service provision graph
 
</td><td colspan="2"> 
Figure 15: Photographic representation of the eastern (left)/ southern (right) CVB wetlands.</td></tr>
<tr><td>Ecoservice provision</td><td colspan="2">Ecoservices category: Moderate -Very Low
The CVB wetland has a moderate to very low ecoservice provision, with the primary ecoservice provisioning attributed to provisioning services such as food for livestock and cultivated foods. The low importance of biodiversity maintenance is attributed to the fact that the wetland is likely to provide a suitable habitat for faunal and floral species (albeit less sensitive) in an area dominated by agricultural activities. The ecological support the wetland provides are also deemed important according to the MBSP (2019) database (Section 3.1).</td><td>PES Discussion</td><td>Present Ecological Condition (PES)
Eastern/Southern CVB: Largely modified (PES D) (5.6)
The CVB wetland was assessed to be in a largely modified ecological condition. The primary impacts to the hydrology and geomorphology of the wetland includes infringement of and catchment wide agricultural activities, farm dams and informal road crossings. These activities have resulted in increased runoff due to hardened surfaces and alterations to the natural flow path and flood peaks of the wetland. The vegetation community of the wetland has also been altered and is dominated by graminoids, sedges and a few herbaceous species. Agricultural activities and related disturbances have resulted in the encroachment of Alien and Invasive Plants (AIP) and problem weeds within the wetland.</td></tr>
<tr><td>EIS discussion</td><td colspan="2">EIS Category: Moderate (1.80)
The CVB wetland was assessed to be of moderate Ecological Importance and Sensitivity (EIS) on a landscape scale. The moderate EIS is largely attributed to the fact that the CVB wetland has been identified by the NBA database (2019) and classified as ESAs (MBSP, 2019) (Section 3.1). However, the NBA database indicates that the wetland is in a moderately modified to critically modified ecological condition. As such, although the inherent rating for the wetland is moderate, the effective EIS is likely to be lower.</td><td>REC, RMO & BAS Category</td><td>Recommended Ecological Category (REC): Category D
Best Attainable State (BAS): Category D
Recommended Management Objective (RMO): D (Maintain)
Based on the PES and EIS of the CVB wetland, the RMO is to maintain the ecostatus of the wetland system at a BAS and REC of D (Largely modified). As a result, should any future activities be planned within the delineated boundary of the wetland system and its catchment, the wetland and its catchments must be managed to mitigate impacts (in-line with the mitigation hierarchy) to ensure that at a minimum the RMO is achieved.</td></tr>
<tr><td colspan="4">Freshwater Ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The hydraulic regime and geomorphological processes of the CVB wetland has been altered from the natural condition. Anthropogenic activities such as agricultural activities, road crossings, farm dams and associated hardened surfaces have altered the natural flow path, flood peaks and sediment balance of the wetland (Please refer to Figure 16 below for photographic representations of the numerous impacts within the wetlands). The road crossings in the CVB wetland has also influenced the hydraulic connectivity of the wetland and thus negatively affects the hydraulic regime of the wetland.</td></tr>
</table>

Figure 16: Photographic representation of the impacts identified within the eastern/southern CVB wetland. (A) an informal road bisects the CVB wetland. (B) Agricultural activities such as cultivation and associated clearing of areas within the delineated extent of the wetland. (C) AIP encroachment as a result of disturbance. (D) Agricultural dam which has been built within the active channel of the wetland.

Water quality sampling was undertaken within the CVB wetlands with measurements including pH, temperature and Electrical Conductivity (EC). The pH was measured as 6,47 which is within the ideal range of the RWQO (2011) according to DWA (2011). Temperature was 19,1°C which complied with the TWQR and was considered largely natural for the season (summer) and time of day (early morning) at which sampling was undertaken. The EC of 43 mS/m is within the acceptable to tolerable range limit according to the DWA (2011).

Although the CVB wetland is in a largely modified ecological condition, the wetland still provides a habitat for biota with the dominant vegetation cover comprised of graminoid, sedge and herbaceous species such as *Cyperus congestus, C. esculentus, C. rotundus, Kyllinga erecta* var. *erecta, Pannicum dilatatum* and *Typha capensis*. Numerous Alien and Invasive Species (AIPs) and problem weeds were also noted within the wetland which included, but are not limited to, *Conyza bonariensis* (hairy fleabane), *Tagetes minuta* (southern corn marigold), *Bidens pilosa* (black jack), *Oenothera rosea* (evening primrose), *Verbena bonariensis* (purple top vervain) and a few *Salix babylonica* (weeping willow) individuals. Overall, the CVB wetland is considered likely to provide roosting, breeding and feeding habitat for avifauna, small mammals, amphibians, reptiles and invertebrate, albeit less sensitive species (Please refer to the biodiversity report for more detail (STS, 2023)).

Extent of modification anticipated.	**Low** The proposed Tournée 2 Solar PV Park and associated infrastructure has been acceptably designed to optimally avoid the CVB wetland and the associated NEMA 32m ZoR, which is deemed the minimum mitigation measure to minimise potential impacts on the wetland. As such, a low degree of modification is anticipated from the construction and operation of the proposed Tournée 2 Solar PV Park as no development is proposed within the delineated extent of the CVB wetland or within the associated NEMA 32m Zone of Regulation of the wetland.
Risk Assessment Outcome & Business Case:	
Low	The activities associated with the construction, operation and decommissioning of the proposed Tournée 2 Solar PV Park and associated infrastructure pose a "Low" risk significance to the CVB wetland, provided that all mitigation measures as detailed in this report are implemented. Certain mitigation measures (as highlighted in red text in Table 7 below) are critical to ensure that a medium impact is able to be reduced to a low impact. Key mitigation measures include: ➢ Vegetation clearing must be restricted to the approved development footprint area, done in a phased manner as the development of the proposed Tournée 2 Solar PV Park progresses and, as much indigenous vegetation as possible is to be retained; and ➢ Drifts fences/silt curtains (as part of construction-phase stormwater control system) must be placed along the NEMA 32m ZoR to mitigate against potential sediment deposition and erosion control.

5 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 proponent 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 following Equator Principles as well as Performance Standards were considered, where applicable: 1,3,4,6 and 8. 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 PS 1) – Assessment and Management of Environmental and Social Risks and Impacts; and
- Performance Standard 6 (IFC PS 6) – Biodiversity Conservation and Sustainable Management of Living Natural Resources.

IFC PS 1 is applicable to all projects which pose potential risk and may have an impact on the receiving environment. IFC PS 1 (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 PS 1 (2012), that are applicable to the freshwater assessment, are summarised as follows:

- The identification and quantification of environmental risks and impacts associated with the proposed Tournée PV 2 Solar 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 PV 2 Solar 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 PS 6 recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The objectives of IFC PS 6 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 PS6 states that the proponent (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 PS6 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 PV 2 Solar Park development has avoided development within the freshwater ecosystems identified within the development footprint and their associated NEMA 32m Zone of Regulation (ZoR) thereby ensuring a no net loss of freshwater biodiversity and has avoided potential impacts in line with the mitigation hierarchy.

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

The freshwater ecosystems fall within the ***natural habitat*** category as the freshwater ecosystems are “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 proponent will not significantly convert or degrade the natural habitats as the freshwater ecosystems have been avoided, as per the mitigation hierarchy, and effective mitigation measures to prevent direct and indirect impacts have been set (Section 7 and **Appendix H**) to ensure ***no net loss of aquatic biodiversity***.

6 LEGISLATIVE REQUIREMENTS AND APPLICATION OF BUFFER ZONES

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[3];
- 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); and
- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998).

Certain articles of legislation related to the above Acts and legislation impose potential zones of regulation on freshwater ecosystems in both a national and provincial context. The Zones of Regulation (ZoR) are not necessarily development exclusion zones, rather areas in which EIA and Water Use Authorisation legislative tools have been introduced for the protection and sustainable use of freshwater resources by requiring that certain types of activities within a freshwater ecosystem, or within a certain distance of a freshwater ecosystem require authorisation. The definition and motivation for a regulated zone of activity for the protection of freshwater ecosystems can be summarised as follows:

Table 7: Articles of Legislation and the relevant zones of regulation applicable to each article.

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	**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):

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

Regulatory authorisation required	Zone of applicability
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).***	*The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* **a. Mpumalanga** ***i Outside urban areas:*** *(hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland;* **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: **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 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 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**

Regulatory authorisation required	Zone of applicability
	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). • 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.

Activity 10 of Listing Notice 3 related to the storage of dangerous goods, has been included to highlight that should the proponent wish to store dangerous goods (e.g. fuel) on the development site, a 100m ZoR related to NEMA would apply to the development.

The following relevant Zones of Regulation (ZoR) are thus applicable (Figure 17 below):

- NEMA 32m ZoR as it relates to the National Water Act, 1998 (Act No. 107 of 1998) as amended; and
- GN 509 500m ZoR as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended.

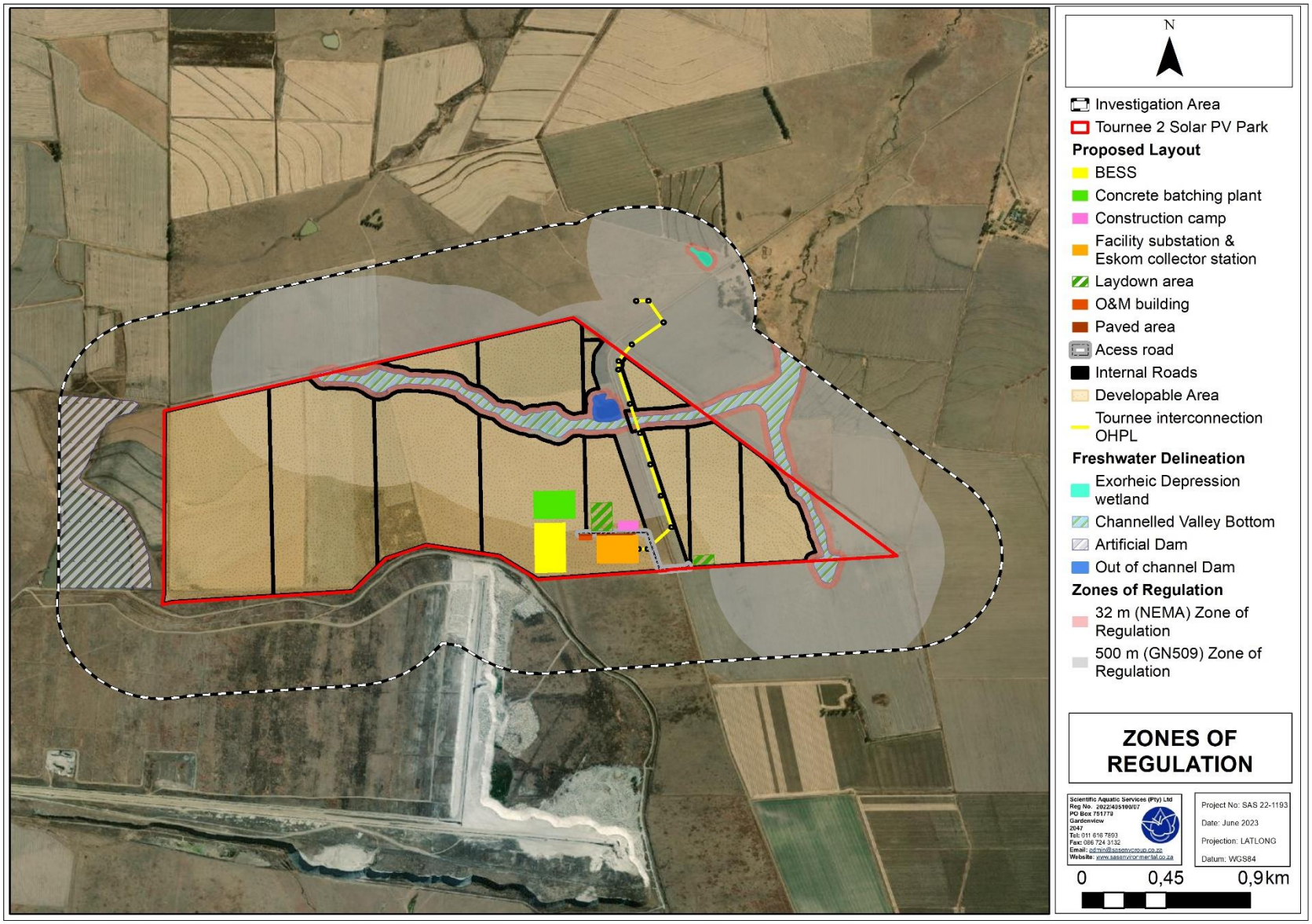


Figure 17: Conceptual representation of the zones of regulation in terms of NEMA and GN 509 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended associated with the proposed Tournée 2 Solar PV Park and investigation area.

7 RISK AND IMPACT ASSESSMENTS

This section presents the significance of potential impacts on the freshwater ecology of the hillslope seep wetland associated with the proposed Tournée 2 Solar PV Park and investigation areas. In addition, it indicates the required mitigatory measures needed to minimise the perceived impacts of the proposed activities and presents an assessment of the significance of the impacts taking into consideration the available mitigatory measures and assuming that they are fully implemented. The impact significances were determined using the method provided by the DWS Risk Assessment Matrix (2016).

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

- The DWS Risk Assessment Matrix (2016) was applied assuming that a high level of mitigation will be implemented, thus the results, provided in this report presents the perceived impact significance ***post-mitigation***;
- In applying the risk assessment, it was assumed that the mitigation hierarchy as advocated by the DEA *et al* (2013) (Please refer to Figure D1, Appendix D) would be followed, i.e. the impacts would first be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required;
- Should the proposed Tournée 2 Solar PV Park's layout change from the layout provided and assessed in this report, or should details pertaining to the construction and use of materials become available, the Risk Assessment Matrix will need to be revised and potentially amended based on the new design layout and specifics;
- It was assumed that the entire proposed Tournée 2 Solar PV Park area would be cleared of vegetation prior to construction activities;
- It was also assumed that all fuel and dangerous goods will be stored further than 100m from the identified freshwater ecosystems (as per LN 3 Activity 10 of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended in 2017));
- The majority of the proposed solar facility and associated infrastructure are located within the GN509 500 m ZoR in terms of the National Water Act, 1998 (Act No. 36 of 1998) as amended, of the freshwater ecosystems. As such, all legal issues pertaining to aspects and activities relating to the freshwater ecosystems were scored as "5";
- While the operation of the proposed development will be a permanent activity, the construction thereof is envisioned to take no more than a few months to a year. However, the frequency of the construction impacts may be daily during this time; and

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

7.1 *Risk Assessment Discussion*

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

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

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

In accordance with GN 509 of 2016, activities that score within the low-medium sensitivity rating range (56-81) can be manually adjusted to allow for a low risk, with relevant reasoning and implementation of specific mitigation measures (which will be indicated in red text).

A summary of the DWS Risk Assessment Matrix applied to the proposed Tournée 2 PV Park activities, is provided in the table below, whilst a comprehensive outcome of the risk assessment is presented in **Appendix G**.

Table 8: Summary of the results of the DWS risk assessment matrix applied to the freshwater ecosystems associated with the proposed Tournée 2 Solar PV Park.

Number	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Manual Adjustment		Control Measures (Additional mitigation measures are indicated in red text)	Reversibility
1	Construction phase	Vegetation clearing and earthworks outside the delineated extent of the CVB wetland and associated NEMA 32m ZoR.	•Removal of vegetation leading to exposure and associated disturbances to soil; •Exposure of soil and increased likelihood of dust generation; •Creation of access roads to facilitate contractor laydown areas and subsequent construction activities; and •Laydown of construction offices and ablution facilities.	•Compaction of soil due to the movement of heavy machinery; •Reduced vegetation cover; •Alteration of runoff patterns; •Smothering of vegetation as a result of increased sediment leading to altered habitat; •Disturbance of soil leading to increased AIP proliferation; and •Potential soil and stormwater contamination from oils as well as hydrocarbons from construction machinery.	2	5	12	60	M	60-5= 55	L	**•The proposed Tournée 2 Solar PV Park and associated infrastructure has been acceptably designed to optimally avoid the CVB wetlands and the associated NEMA 32m ZoR, which is deemed the minimum mitigation measure to minimise potential impacts on the freshwater ecosystems. This will optimally ensure increased protection from the risk of the potential increase in sedimentation and erosion from the removal and clearing of natural terrestrial vegetation in close proximity (less than 40m) to the CVB wetland. This is deemed particularly pertinent since bi-facial solar panel technology is being proposed, which requires that the area where the solar panels are placed be kept clear of vegetation during the operational phase;** •The entire construction area (development site) must be fenced prior to the commencement of construction and vegetation clearing to ensure that no vehicle or other construction personnel access occurs off the site and within the 32m ZoR of the or into the freshwater ecosystems themselves; •Vegetation clearing must be restricted to the approved development footprint, done in a phased manner as the development of the proposed Tournée 2 Solar PV Park progresses and, as much indigenous vegetation as possible is to be retained; • Drifts fences/silt curtains (as part of construction-phase stormwater control system) must be placed along the NEMA 32m ZoR to mitigate against potential sediment deposition and erosion control; •Dust suppression techniques must be implemented to prevent smothering of freshwater vegetation; •Protect exposed soil/ soil stockpiles by means of a geotextile fabric such as hessian sheeting; •Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the delineated CVB wetland and the associated NEMA 32m ZoR; •The CVB wetland and associated NEMA 32m ZoR must be clearly demarcated by an Environmental Control Officer (ECO) and marked as a no-go area; and •Construction footprint areas to remain within the authorised footprint and vegetation clearing to be limited to the development footprint area.	Partially Reversable

Number	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Manual Adjustment	Control Measures (Additional mitigation measures are indicated in red text)	Reversibility
2	Construction phase	Construction of infrastructure (including O&M buildings, substation and paved areas) and installation of the bi-facial Solar panels and associated support structures.	•Excavation of soil to facilitate foundations for mounting of the Solar panels; •Mixing and casting of concrete for foundations; •Installation of solar panels including mounting of rods into foundations; and •Vehicles, construction machinery and personnel movement to facilitate construction activities.	•Excavations and hardened surfaces, resulting in impacts on hydrology and sediment balance; •Removal of vegetation in close proximity to the CVB wetland, but outside the NEMA 32m ZoR; •Altered runoff patterns as a result of excavation and hardened surfaces, potentially leading to increased erosion and sedimentation thereof; •Disturbances of soil, leading to increased AIP proliferation and potentially altered freshwater habitat; and •Potential for deteriorated water quality, including increased likelihood of dust generation and turbidity.	1	4	13	52	L	NA	<u>The following measures are recommended to mitigate against indirect impacts:</u> •During excavation activities, it must be ensured that stockpiles are not higher than 2 m in height and all exposed soil must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the receiving freshwater environment. Furthermore, measures must be undertaken to limit the time in which soil is exposed; •Dust suppression measures must be implemented (such as spray watering on gravel access roads) throughout the proposed development activities to prevent excessive dust and suppress the potential for runoff of sediment which may smother vegetation; •Construction vehicles not in use and fuel storage facilities must be underlain by batter boards to prevent spills from contaminating groundwater. However, as per the hydropedological assessment (ZRC, 2023), the soils associated with the area are characterised as shallow responsive soils with little to no infiltration of water into the soil. As such, it is unlikely that pollutants would reach the groundwater and eventually the CVB wetland. Conversely the highly limited degree of infiltration poses a much greater risk of pollution to surface water in the event of a spill, hence measures to prevent spills and transport of pollution need to be undertaken. <u>With regards to concrete mixing on site:</u> Concrete and cement-related mortars can be toxic to aquatic life and other biota. Proper handling and disposal is considered imperative to minimize or eliminate discharge into the drainage lines. High alkalinity associated with cement can dramatically affect and contaminate both soil and ground water. <u>The following recommendations must be adhered to:</u> •Fresh concrete and cement mortar must be mixed within the approved development footprint and may not be undertaken on bare soil; •Mixing of concrete is to be strictly undertaken within a lined, bound or bunded portable mixer. Consideration must be given to the use of ready mix concrete; •A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; •A washout area should be designated within the approved development footprint and wash water should be treated on-site or discharged to a suitable sanitation system;	Fully reversible

Number	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Manual Adjustment	Control Measures (Additional mitigation measures are indicated in red text)	Reversibility
											•Any cement bags must be disposed of in the demarcated hazardous waste receptacles; •Concrete spillage outside of the areas of application must be promptly removed and taken to a suitably licensed waste disposal site. •Excavation of pits for the foundation of Solar panels and support structures may result in loose sediments within the landscape, specifically if works are taken during a period of rainfall (if applicable). As such, sediment traps must also be installed downstream/downgradient of the construction area. Sediment traps can be created by pegging an appropriate geotextile across the entire width of the work area at the specified support structure, held down by cobbles/boulders or by geotextile wrapped hay bales spanning the width of the work area and staked into position; •During excavation of the foundations to facilitate support structures, soil must be stockpiled upgradient of the excavated pits. Mixture of the lower and upper layers of the excavated soil must be kept to a minimum. This soil must be used to close off the pits, immediately after installation of the support structures; •The transformers associated with the proposed facility substation must be bunded and the area fenced off to reduce the impacts on the downgradient freshwater ecosystems, should a spill occur; and •Most Lithium ion batteries are factory sealed and no additional hazardous or toxic chemicals are required. However, potential containment loss of hazardous substances could lead to soil and water pollution. As such, the correct installation, handling and use of the batteries as per the regulated guidelines must be implemented (as per the SANS 56005:2022 Ed 1 as issued in Schedule B1 of GN 1427 of 18 November 2022, as issued in terms of section 24(1)(a) of the Standards Act (act 8 of 2008)). Should a leak occur, the ECO must be informed and the correct procedure (as per the EMPr) be followed.	
3	**Operational phase**	Operation and maintenance of the proposed Tournée 2 Solar PV Park.	•Potential indiscriminate movement of maintenance vehicles along or through the CVB wetland.	•Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; and •Potential spillage and ingress of hydrocarbons from maintenance vehicles.	**1**	**3**	**9**	**27**	**L**	**NA**	•Maintenance vehicles must make use of dedicated access roads and no indiscriminate off-road driving or movement unless authorised for maintenance activities may be permitted; •Regular inspection of the batteries and transformers (associated with the substation) should be undertaken for leaks. If leaks are encountered, the relevant competent person should be informed and immediately rectified; •During periodic maintenance activities of the surface infrastructure, monitoring for erosion should be undertaken with specific mention of investigating the support structures and areas accessed to facilitate maintenance activities;	**Fully Reversible**

Number	Phases	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Manual Adjustment	Control Measures (Additional mitigation measures are indicated in red text)	Reversibility
											•Should erosion be noted at the base of the support structures the areas must be rehabilitated by infilling and resurfacing of disturbed areas and revegetating these areas with suitable indigenous vegetation; and •Monitoring for the establishment of AIPs within the development footprint and along access roads must be undertaken. Should AIPs be identified, they must be removed and disposed of as per an approved AIP control plan and the area must be revegetated with suitable indigenous vegetation.	
4		Discharge of water from the access roads into the surrounding landscape.	•Increased impermeable surface areas in the catchments of the freshwater ecosystems, resulting in increased volume of stormwater entering the systems.	•Altered runoff patterns and increased water inputs to the CVB wetland, resulting in altered flow regime, erosion and incision; and •Altered flow regime may lead to possible impacts on vegetation (increased growth of wetland vegetation).	1	3	9	27	L	NA	•The design criteria of the stormwater management structures are important to mitigate the operational impacts of the release of stormwater into the surrounding landscape and potentially the freshwater ecosystems. As such, a formal Stormwater Management Plan (SWMP) must be designed by a suitably qualified engineer/hydrologist which must consider the increased runoff potential and increased sedimentation potential of the areas permanently kept clear of vegetation (i.e. array footprint area); and •Regular inspection of the stormwater outlet structures should be undertaken (specifically after large storm events) in order to monitor the occurrence of erosion. If erosion has occurred, it should immediately be rehabilitated through stabilisation of embankments and revegetation; and •Only indigenous vegetation species may be used as part of the rehabilitation process and invasive plant species should be eradicated.	Fully Reversible
5	Decommission phase	Closure of the proposed Tournée 2 Solar PV Park and rehabilitation of the footprint area.	•Potential risk associated with the removal of solar PV infrastructure and associated infrastructure (substation, BESS, O&M buildings); and •Subsequent negative impacts due to bare areas or exposed soils after the life cycle of the facility is complete.	•Potential disturbance to soil, established vegetation, and habitats; •Potential spillage and ingress of hydrocarbons from transport vehicles; •Potential increased sedimentation and compaction of soil due to vehicle movement; and •Alien proliferation on the abandoned facility due to reduced maintenance activities.	1	3	8	24	L	NA	•Material associated with the Lithium ion batteries and substation transformers must be disposed of at a registered hazardous landfill site; and •All rehabilitation activities, including vehicle movement and miscellaneous activities by personal, must not occur within the CVB wetland and associated NEMA 32m ZoR. All bare areas should be revegetated with suitable indigenous vegetation species.	Fully Reversible

The activities associated with the construction, operation and decommissioning of the proposed Tournée 2 Solar PV Park and associated infrastructure pose a “Low” risk significance to the freshwater ecosystems, provided that all mitigation measures as detailed are implemented. Certain of the mitigation measures (as highlighted in red text in Table 7 above) are critical to ensuring that a medium impact is able to be reduced to a low impact – the DWS risk matrix allows borderline low-medium impacts to be reduced to low impacts provided that mitigation / control measures to reduce the impact to a low degree are specified and implemented.

In addition, all mitigation measures as stipulated in the above table, must be implemented to prevent any edge effects and cumulative impacts from occurring on the identified freshwater ecosystems.

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

7.2 *Impact Assessment*

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

Tables 9 - 11 below provide the outcome of the impact assessment for the above-listed activities, based on the methods presented in **Appendix D.**

Table 9: Freshwater Impact Assessment of the Construction phase of the proposed Tournée 2 Solar PV Park.

IMPACT NATURE	Impact – freshwater ecosystem habitat		STATUS	NEGATIVE
Impact Description	Removal of vegetation and exposure and disturbance of soil.			
Impact Source(s)	•Compaction of soil due to the movement of heavy machinery; •Reduced vegetation cover; •Alteration of runoff patterns; •Smothering of vegetation as a result of increased sediment leading to altered habitat; •Disturbance of soil leading to increased AIP proliferation; and •Potential soil and stormwater contamination from oils as well as hydrocarbons from construction machinery.			
Receptor(s)	Freshwater Ecosystem Habitat			
Driver / activity	**Parameter**	**Pre - mitigation (Score)**	**Post - mitigation (Score)**	
Vegetation clearing and earthworks outside the delineated extent of the CVB wetland and associated NEMA 32m ZoR.	**Impact Magnitude (M)**	3	2	
	Impact Extent (E)	1	1	
	Impact Reversibility (R)	3	1	
	Impact Duration (D)	2	1	
	Probability of Occurrence (P)	4	2	
	Significance (S)	(-) 36	(-) 10	
	Environmental Significance Rating	**Moderate**	**Very Low**	
Construction of infrastructure (including O&M buildings, substation, BESS, paved areas) and installation of the bi-facial Solar panels and associated support structures.	**Impact Magnitude (M)**	3	2	
	Impact Extent (E)	1	1	
	Impact Reversibility (R)	3	1	
	Impact Duration (D)	2	1	
	Probability of Occurrence (P)	4	2	
	Significance (S)	(-) 36	(-) 10	
	Environmental Significance Rating	**Moderate**	**Very Low**	
CUMULATIVE IMPACTS	Freshwater ecosystems within the Mpumalanga region are under continued threat due a variety of factors primarily related to landuse which include cultivation, livestock grazing, mining activities and linear developments. These impacts have resulted in degradation of freshwater features due to physical transformation of freshwater ecosystems which alter the geomorphological process, hydraulic regime and vegetation community of these systems. The proposed Tournée 2 Solar PV Park will not impact any freshwater ecosystems in terms of the development of its solar arrays as no freshwater ecosystems are located in close proximity (within 32m of the CVB wetland) to the proposed solar array footprint. The only potential impact relates to the stormwater management of the proposed project. However, the correct design of the stormwater management systems and implementation of the recommended mitigation measures would however significantly reduce the potential for cumulative impacts to materialise.			
CONFIDENCE	Moderate			
MITIGATION MEASURES	Please refer to DWS Risk Assessment Matrix (Table 8 above).			

Table 10: Freshwater Impact Assessment of the Operational phase of the proposed Tournée 2 Solar PV Park.

IMPACT NATURE	Impact – freshwater ecosystem habitat	STATUS	NEGATIVE
Impact Description	Operation and maintenance of the proposed Tournée 2 Solar PV Park.		
Impact Source(s)	•Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; •Potential spillage and ingress of hydrocarbons from maintenance vehicle; •Altered runoff patterns and increased water inputs to the freshwater ecosystems, resulting in altered flow regime, erosion and incision; and •Altered flow regime may lead to possible impacts on vegetation (increased growth of wetland vegetation).		
Receptor(s)	Freshwater Ecosystem Habitat		
Driver / activity	**Parameter**	**Pre - mitigation (Score)**	**Post - mitigation (Score)**
Operation and maintenance of the proposed Tournee PV 2 Park..	**Impact Magnitude (M)**	1	1
	Impact Extent (E)	1	1
	Impact Reversibility (R)	1	1
	Impact Duration (D)	4	4
	Probability of Occurrence (P)	3	2
	Significance (S)	(-) 21	(-) 14
	Environmental Significance Rating	**Low**	**Very Low**
Discharge of water from the access roads into the surrounding landscape.	**Impact Magnitude (M)**	3	2
	Impact Extent (E)	1	1
	Impact Reversibility (R)	3	1
	Impact Duration (D)	4	4
	Probability of Occurrence (P)	3	1
	Significance (S)	(-) 33	(-) 8
	Environmental Significance Rating	**Moderate**	**Very Low**
CUMULATIVE IMPACTS	Freshwater ecosystems within the Mpumalanga region are under continued threat due a variety of factors primarily related to landuse which include cultivation, livestock grazing, mining activities and linear developments. These impacts have resulted in degradation of freshwater features due to physical transformation of freshwater ecosystems which alter the geomorphological process, hydraulic regime and vegetation community of these systems. The proposed Tournée 2 Solar PV Park will not impact any freshwater ecosystems in terms of the development of its solar arrays as no freshwater ecosystems are located in close proximity (within 32m of the CVB wetland) to the proposed solar array footprint. The only potential impact relates to the stormwater management of the proposed project. However, the correct design of the stormwater management systems and implementation of the recommended mitigation measures would however significantly reduce the potential for cumulative impacts to materialise.		
CONFIDENCE	Moderate		
MITIGATION MEASURES	Please refer to DWS Risk Assessment Matrix (Table 8 above).		

Table 11: Freshwater Impact Assessment of the Decommissioning phase of the proposed Tournée 2 Solar PV Park.

IMPACT NATURE	Impact – freshwater ecosystem habitat	STATUS	NEGATIVE
Impact Description	Closure of the proposed Tournée 2 Solar PV Park and rehabilitation of the footprint area.		
Impact Source(s)	•Potential disturbance to soil, established vegetation, and habitats; •Potential spillage and ingress of hydrocarbons from transport vehicles; •Potential increased sedimentation and compaction of soil due to vehicle movement; and alien proliferation on the abandoned facility due to reduced maintenance activities.		
Receptor(s)	Freshwater Ecosystem Habitat		
Driver / activity	**Parameter**	**Pre - mitigation (Score)**	**Post - mitigation (Score)**
Closure of the proposed Tournée 2 Solar PV Park and rehabilitation of the footprint area.	**Impact Magnitude (M)**	1	1
	Impact Extent (E)	1	1
	Impact Reversibility (R)	1	1
	Impact Duration (D)	2	1
	Probability of Occurrence (P)	2	2
	Significance (S)	(-) 10	(-) 8
	Environmental Significance Rating	**Very Low**	**Very Low**
CUMULATIVE IMPACTS	Freshwater ecosystems within the Mpumalanga region are under continued threat due a variety of factors primarily related to landuse which include cultivation, livestock grazing, mining activities and linear developments. These impacts have resulted in degradation of freshwater features due to physical transformation of freshwater ecosystems which alter the geomorphological process, hydraulic regime and vegetation community of these systems. The proposed Tournée 2 Solar PV Park will not impact any freshwater ecosystems in terms of the development of its solar arrays as no freshwater ecosystems are located in close proximity (within 32m of the CVB wetland) to the proposed solar array footprint. The only potential impact relates to the stormwater management of the proposed project. However, the correct design of the stormwater management systems and implementation of the recommended mitigation measures would however significantly reduce the potential for cumulative impacts to materialise.		
CONFIDENCE	Moderate		
MITIGATION MEASURES	Please refer to DWS Risk Assessment Matrix (Table 8 above).		

7.3 *Cumulative Impacts*

Cumulative impacts are all anthropogenic activities and their associated impacts on the past, present and foreseeable future, both spatially and temporally, considered together with the impacts identified in Section 7.1 and 7.2 above. Wetlands and riparian areas within the region are under continued threat due to the transformation of the surrounding landscape due to agriculture and urbanisation.

Anticipated impacts to the freshwater ecosystems include an increase in alien and invasive species entering the system due to regular disturbance of soils and removal of indigenous vegetation due to the increased activity in the area. This results in greater inputs of sediment, and nutrients from runoff. As well as potential conveyance of contaminated water or excess sediment loads from the construction footprint area. The impacts of the proposed Tournée 2 Solar PV Park on the reach of the identified freshwater ecosystems are unlikely to significantly add to the cumulative impacts on the systems, as the proposed activities are located outside the delineated boundaries of the CVB wetland and the associated NEMA 32m ZoR and provided that the recommended mitigation measures, as set out in this report, are implemented. With management and mitigation measures implemented during the construction and operation phases, the impacts can further be reduced, thus no significant contribution to the above mentioned cumulative impacts on the systems from this project are considered likely.

8 CONCLUSION

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem assessment as part of the Environmental Authorisation (EA) and Water Use Application (WUA) processes for the proposed Tournée 2 Solar photovoltaic (PV) Park and associated infrastructure, near the Thuthukani Settlement, Mpumalanga Province. The proposed Tournée 2 Solar PV Park forms part of the larger Tournée Solar PV Cluster which will include two (2) 150 Megawatts (MW) Solar Energy Facilities (SEFs). 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).

The site assessment confirmed the presence of a Channelled Valley Bottom (CVB) wetland in the eastern and southern portions of the proposed Tournée 2 Solar PV Park and a depression wetland in the northern portions of the investigation area. As the depression

wetland is exclusively associated with the investigation area, and unlikely to be directly impacted by the proposed Tournée 2 Solar PV Park, only the CVB wetland was assessed further. The CVB wetland was assessed to be in a largely modified ecological condition and of moderate ecological importance and sensitivity.

Following the freshwater ecosystem assessment, the DWS Risk Assessment Matrix (2016) was applied to determine the significance of impacts arising from the proposed Tournée 2 Solar PV Park on the receiving freshwater environment. The activities associated with the construction, operation and decommissioning of the proposed Tournée 2 Solar PV Park and associated infrastructure pose a “Low” risk significance to the CVB wetland, provided that all mitigation measures as detailed are implemented. Certain of the mitigation measures (as highlighted in red text in Table 8) are critical to ensuring that a medium impact is able to be reduced to a low impact – the DWS risk matrix allows borderline low-medium impacts to be reduced to low impacts provided that mitigation / control measures to reduce the impact to a low degree are specified and implemented.

Results for the EAP provided Impact Assessment indicates that the construction and operational activities associated with the proposed Tournée 2 Solar PV Park poses a medium impact significance prior to the implementation of mitigation measures and a very low impact significance post the implementation of mitigation measures. The activities associated with the decommissioning phase pose a very low impact significance pre and post implementation of mitigation measures.

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

Based on the findings of this study it is the opinion of the freshwater ecologist that the proposed Tournée 2 Solar PV Park, from a freshwater resource management perspective, be considered for development provided that all mitigation measures as defined in this report are implemented.

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APPENDIX A – Terms of Use and Indemnity

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 – Legislation

LEGISLATIVE CONSIDERATIONS

The Constitution of the Republic of South Africa, 1996	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered.
National Environmental Management: Biodiversity Act (2004) (Act 10 of 2004) (NEMBA)	**Ecosystems that are threatened or in need of protection** (1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection. *(b)* An MEC for environmental affairs in a province may, by notice in *the Gazette,* publish a provincial list of ecosystems in the province that are threatened and in need of protection. (2) The following categories of ecosystems may be listed in terms of subsection (1): *(a)* critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation; *(b)* endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems; (c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and *(d)* protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs *(a), (b)* or (c).
The National Water Act 1998 (Act No. 36 of 1998) (NWA) as amended	The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) & (i).
Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998) as amended	In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as: a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; b) In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or c) A 500 m radius from the delineated boundary (extent) of any wetland or pan. 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 – Method of Assessment

1. Desktop Study

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

1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

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

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

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

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

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

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

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

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

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

Level 1: Inland systems

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean[4] (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

[4] 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.

a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have 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. General Habitat Integrity

The general habitat integrity of each site was discussed based on the application of the Index of Habitat Integrity (Kleynhans *et al.* 2008). It is important to assess the habitat at each site in order to aid in the interpretation of the results of the community integrity assessments, by taking habitat conditions and impacts into consideration. This method describes the Present Ecological State (PES) of both the in-stream and riparian habitat at each site. The method classifies habitat integrity into one of six classes, ranging from unmodified/natural (Class A) to critically modified (Class F), as indicated in Table C5 below.

Table C5: Classification of Present State Classes in terms of Habitat Integrity [Kleynhans *et al.*2008]

Class	Description	Score (% of total)
A	Unmodified, natural.	90 - 100
B	Largely natural with few modifications. The flow regime has been only slightly modified and pollution is limited to sediment. A small change in natural habitats may have taken place. However, the ecosystem functions are essentially unchanged.	80 - 89
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	60 - 79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40 – 59
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	20 – 39
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	0 - 19

5. WET-Health

The Riparian Vegetation Response Assessment Index (VEGRAI)

VEGRAI is designed for qualitative assessment of the response of riparian vegetation to impacts in such a way that qualitative ratings translate into quantitative and defensible results (Kleynhans *et al.*, 2007a). Results are defensible because their generation can be traced through an outlined process (a suite of rules that convert assessor estimates into ratings and convert multiple ratings into an Ecological Category).

Riparian vegetation is described in the National Water Act (Act No. 36 of 1998) as amended as follows: 'riparian habitat' includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soil, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

Table C6: Descriptions of the A-F ecological categories.

Ecological category	Description	Score (% of total)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitat and biota may have taken place but the ecosystem functions are essentially unchanged.	80-89
C	Moderately modified. Loss and change of natural habitat have occurred, but the basic ecosystem functions are still predominately unchanged.	60-79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Critically modified. Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances, the basic ecosystem functions have been destroyed and the changes are irreversible	0-19

6. Watercourse 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".[5] 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-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 C7: 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.

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

Table C8: 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.

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

The purpose 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 C9: 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

8. 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 watercourse in order to ensure continued ecological functionality.

Table C10: 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 unacceptable (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 watercourse.

Table C11: Description of Recommended Ecological Category (REC) classes.

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

9. WET-Ecoservices

"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".[6] 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-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 C9: Integrating scores for supply and demand to obtain and overall importance score

Integrating scores for supply & demand to obtain an overall importance score						
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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

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

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 C10: 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.

APPENDIX D – Risk and Impact Assessment Methodology

DWS Risk Assessment Methodology

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

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

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[7]. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as freshwater features, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria (refer to the table below). The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity, impact, legal issues and the detection of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 20. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether mitigation is necessary[8].

[7] The definition has been aligned with that used in the ISO 14001 Standard.
[8] Some risks/impacts that have low significance will however still require mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table D8: Rating Classes

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

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

Table D9: Calculations

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

The following points were considered when undertaking the assessment:

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

Control Measure Development

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

- Mitigation and performance improvement measures and actions that address the risks and impacts[9] are identified and described in as much detail as possible. Mitigating measures are investigated according to the impact minimisation hierarchy as follows:
  - Avoidance or prevention of impact;
  - Minimisation of impact;
  - Rehabilitation; and
  - Offsetting.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation; and

[9] Mitigation measures should address both positive and negative impacts.

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

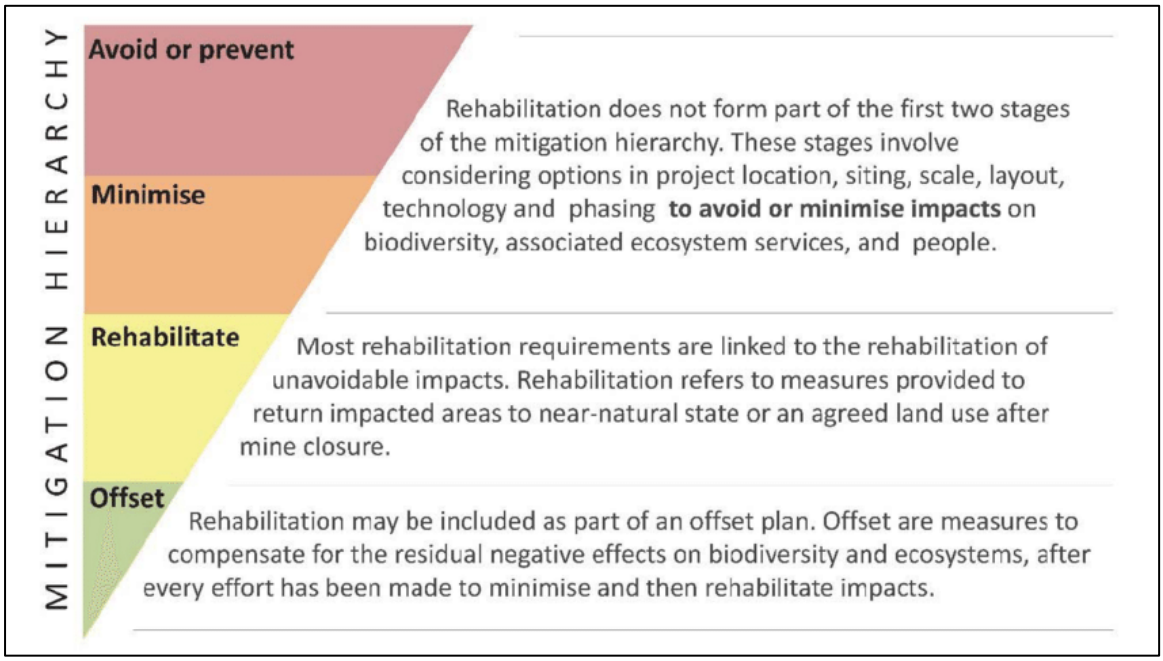

Figure D1: Impact Minimisation hierarchy as advocated by the DEA *et al.,* (2013)

Recommendations

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

Table D10: Reversibility of impacts on the watercourses

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

IMPACT ASSESSMENT METHODOLOGY

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 (**Table 0-3**), where the latter is based on general consideration to the intensity, extent, and duration.
The scales and descriptors used for scoring probability and consequence are detailed in

Table and **Table 0-2** respectively.

Table 0-1: Probability Scores and Descriptors

Score	Descriptor
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 0-2: 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 0-3: Significance Screening Tool

	Consequence Scale				
PROBABILITY		1	2	3	4
SCALE	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 (**Table**) has been applied according to the nature and significance of the identified impacts.

Table 0-4: 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

Assessment of Impact 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[10], indirect[11], secondary[12] as well as cumulative[13] 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[14] presented in **Table**.

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

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

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

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

[14] 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 0-5: 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:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
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 above.**

APPENDIX E – Results of Field Investigation

PRESENT ECOLOGICAL STATE (PES) AND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) RESULTS

Table E1: Presentation of the results of the WET-Health PES assessment applied to the CVB wetland associated with the proposed Tournée 2 Solar PV Park and investigation area.

Freshwater Ecosystems	Hydrology		Geomorphology		Vegetation		Overall score
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
Eastern/Southern CVB wetland	7.0 (E)	0	3.1 (C)	0	6.0 (E)	0	5.6 (D)

Table E2: Presentation of the results of the EIS assessment applied to the CVB wetland associated with the proposed Tournée 2 Solar PV Park and investigation area.

Freshwater Ecosystems			Eastern/Southern CVB wetland
Ecological Importance and Sensitivity			Score (0-4)
Biodiversity support			A (average)
			1.00
Presence of Red Data species			0
Populations of unique species			0
Migration/breeding/feeding sites			3
Landscape scale			B (average)
			1.80
Protection status of the wetland			3
Protection status of the vegetation type			0
Regional context of the ecological integrity			2
Size and rarity of the wetland type/s present			2
Diversity of habitat types			2
Sensitivity of the wetland			C (average)
			1.67
Sensitivity to changes in floods			2
Sensitivity to changes in low flows/dry season			2
Sensitivity to changes in water quality			1
ECOLOGICAL IMPORTANCE & SENSITIVITY			B (1.80)
Hydro-Functional Importance			Score (0-4)
Regulating & supporting benefits	Flood attenuation		2
	Streamflow regulation		3
	Water Quality Enhancement	*Sediment trapping*	3
		Phosphate assimilation	2
		Nitrate assimilation	2
		Toxicant assimilation	2
		Erosion control	3
	Carbon storage		3
HYDRO-FUNCTIONAL IMPORTANCE			3
Direct Human Benefits			Score (0-4)
Subsistence benefits	*Water for human use*		2
	Harvestable resources		4
	Cultivated foods		3
Cultural benefits	*Cultural heritage*		3
	Tourism and recreation		4
	Education and research		4

Freshwater Ecosystems	Eastern/Southern CVB wetland
DIRECT HUMAN BENEFITS	**0.83**

Table E3: Presentation of the results of the Ecoservices assessment applied to the CVB wetland associated with the southern and eastern portions of the proposed Tournée 2 Solar PV Park and investigation area.

CONDENSED SUMMARY SHEET

		Present State			
	ECOSYSTEM SERVICE	Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0,3	0,0	0,0	Very Low
	Stream flow regulation	1,0	0,0	0,0	Very Low
	Sediment trapping	1,3	1,5	0,5	Very Low
	Erosion control	0,8	0,8	0,0	Very Low
	Phosphate assimilation	1,3	1,0	0,3	Very Low
	Nitrate assimilation	1,0	1,0	0,0	Very Low
	Toxicant assimilation	1,1	1,5	0,4	Very Low
	Carbon storage	0,9	0,3	0,0	Very Low
	Biodiversity maintenance	2,0	1,0	1,0	Low
PROVISIONING SERVICES	Water for human use	1,5	0,7	0,3	Very Low
	Harvestable resources	2,0	0,0	0,5	Very Low
	Food for livestock	3,0	0,7	1,8	Moderate
	Cultivated foods	2,5	0,0	1,0	Low
CULTURAL SERVICES	Tourism and Recreation	0,5	0,0	0,0	Very Low
	Education and Research	1,0	0,0	0,0	Very Low
	Cultural and Spiritual	0,0	0,0	0,0	Very Low

APPENDIX F- IFC Performance Standards

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

1 Assessment and Management of Environmental and Social Risk and Impacts;
2 Labor 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 environmental assessment had to consider, were 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;
- PS 3: must be considered where relevant in terms of water consumption, pollution prevention, wastes, hazardous material management and pesticide use and management;
- PS 4: must be considered, if applicable, in terms of ecosystem services; and
- PS 6: must be included in terms of protection and conservation of biodiversity and habitat (modified, natural and critical).
- PS 8: 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 PS 1 are to identify and evaluate environmental and social risks and 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 PV 2 Solar Park and associated investigation area by implementing the DWS (2016) approved Risk Assessment Matrix (Section 7).

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 is 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 PV 2 Solar Park and associated investigation area by implementing the DWS (2016) approved Risk Assessment Matrix (Section 7). The risk assessment was applied assuming that the mitigation hierarchy as advocated by the DEA *et al.* (2013) would be followed, i.e. the impacts would be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required.

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 PV 2 Solar Park, were calculated (Section 4.3 and **Appendix E**) to be very low in terms of cultural and provisioning services. Regulating and supporting services, especially biodiversity maintenance were determined to be moderate to low/marginal as freshwater ecosystems can often act as an important migratory site for avifauna, amphibians, reptiles and invertebrates.

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 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. The assessment of the freshwater ecosystems related to the proposed Tournée PV 2 Solar Park included ecoservice provision, ecosystem importance and sensitivity (EIS) as well as the Present Ecological State (PES) of the systems (Section 4.3). The possible risks associated with the construction and operation of the proposed Tournée PV 2 Solar Park

on the associated freshwater ecosystems, were identified and described, along with mitigation measures in order to best protect, conserve and maintain the benefits from the systems.

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 PV 2 Solar 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 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) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat 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 proponent will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those 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 is 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 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 practice between projects and improve transparency in decision making

GN28. Both natural and modified habitats may contain high biodiversity values, thereby qualifying as critical habitat. 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 on 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 habitat 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 – Risk and Impact Assessment Outcome

Table G1: Presentation of the results of the DWS Risk Assessment.

Number	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Manual Adjustment	
1	Construction phase	Site clearing and set-up of contractor camps prior to commencement of construction activities outside the delineated extent of the CVB wetland and associated NEMA 32m ZoR.	•Removal of vegetation leading to exposure and associated disturbances to soil; •Exposure of soil and increased likelihood of dust generation; •Creation of access roads to facilitate contractor laydown areas and subsequent construction activities; and •Laydown of construction offices and ablution facilities.	•Compaction of soil due to the movement of heavy machinery; •Reduced vegetation cover; •Alteration of runoff patterns; •Smothering of vegetation as a result of increased sediment leading to altered habitat; •Disturbance of soil leading to increased AIP proliferation; and •Potential soil and stormwater contamination from oils as well as hydrocarbons from construction machinery.	2	2	2	2	2	1	2	5	5	1	5	1	12	60	M	60-5= 55	L

Number	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Manual Adjustment
2	Construction phase	Installation of the bi-facial Solar panels and associated support structures.	•Excavation of soil to facilitate foundations for mounting of the Solar panels; •Mixing and casting of concrete for foundations; •Installation of solar panels including mounting of rods into foundations; and •Vehicles, construction machinery and personnel movement to facilitate mounting of Solar panels.	•Excavations and hardened surfaces, resulting in impacts on hydrology and sediment balance; •Removal of vegetation in close proximity to the CVB wetland, but outside the NEMA 32m ZoR; •Altered runoff patterns as a result of excavation and hardened surfaces, potentially leading to increased erosion and sedimentation thereof; •Disturbances of soil, leading to increased AIP proliferation and potentially altered freshwater habitat; and •Potential for deteriorated water quality, including increased likelihood of dust generation and turbidity.	1	1	1	1	1	1	2	4	5	1	5	2	13	52	L	NA

Number	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Manual Adjustment
3	Operational phase	Operation and maintenance of the proposed Tournée 2 Solar PV Park.	•Potential indiscriminate movement of maintenance vehicles along or through the freshwater ecosystems.	•Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; and •Potential spillage and ingress of hydrocarbons from maintenance vehicles.	1	1	1	1	1	1	1	3	1	1	5	2	9	27	L	NA
4		Discharge of water from the access roads into the surrounding landscape.	•Increased impermeable surface areas adjacent to the CVB wetland, resulting in increased volume of stormwater entering the system.	•Altered runoff patterns and increased water inputs to the freshwater ecosystems, resulting in altered flow regime, erosion and incision; and •Altered flow regime may lead to possible impacts on vegetation (increased growth of wetland vegetation).	1	1	1	1	1	1	1	3	1	1	5	2	9	27	L	NA

Number	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Manual Adjustment
5	**Decommissioning phase**	Closure of the Tournée 2 Solar PV Park and rehabilitation of the footprint area.	•Potential risk associated with the removal of solar PV infrastructure; and •Subsequent negative impacts due to bare areas or exposed soils after the life cycle of the facility is complete.	•Potential disturbance to soil, established vegetation, and habitats; •Potential spillage and ingress of hydrocarbons from transport vehicles; •Potential increased sedimentation and compaction of soil; and •Alien proliferation.	1	1	1	1	**1**	1	1	**3**	1	1	5	1	**8**	**24**	**L**	**NA**

Table G2: Presentation of the results of the EAP provided Impact Assessment.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Construction phase																			
Impact 1:	Vegetation clearing and earthworks outside the delineated extent of the CVB wetland and associated NEMA 32m ZoR.	Compaction of soil due to the movement of heavy machinery; •Reduced vegetation cover; •Alteration of runoff patterns; •Smothering of vegetation as a result of increased sediment leading to altered habitat; •Disturbance of soil leading to increased AIP proliferation; and •Potential soil and stormwater contamination from oils as well as hydrocarbons from construction machinery.	Construction	Negative	Moderate	3	1	3	2	4	**36**	**N3**	2	1	1	1	2	**10**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
Impact 2:	Construction of infrastructure (including O&M buildings, substation, BESS, paved areas) and installation of the bi-facial Solar panels and associated support structures.	Excavations and hardened surfaces, resulting in impacts on hydrology and sediment balance; •Removal of vegetation in close proximity to the CVB wetland, but outside the NEMA 32m ZoR; •Altered runoff patterns as a result of excavation and hardened surfaces, potentially leading to increased erosion and sedimentation thereof; •Disturbances of soil, leading to increased AIP proliferation and potentially altered freshwater habitat; and •Potential for deteriorated water quality, including increased likelihood of dust generation and turbidity.	Construction	Negative	Moderate	3	1	3	2	4	**36**	**N3**	2	1	1	1	2	**10**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Operational phase																			
Impact 1:	Operation and maintenance of the proposed Tournée 2 Solar PV Park.	Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; and •Potential spillage and ingress of hydrocarbons from maintenance vehicles.	Operational	Negative	Moderate	1	1	1	4	3	**21**	**N2**	1	1	1	4	2	**14**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
Impact 2:	Discharge of water from the access roads into the surrounding landscape.	•Altered runoff patterns and increased water inputs to the CVB wetland, resulting in altered flow regime, erosion and incision; and •Altered flow regime may lead to possible impacts on vegetation (increased growth of wetland vegetation).	Operational	Negative	Moderate	3	1	3	4	3	**33**	**N3**	2	1	1	4	1	**8**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
Decommissioning phase																			
Impact 1:	Closure of the proposed Tournée 2 Solar PV Park and rehabilitation of the footprint area.	Potential disturbance to soil, established vegetation, and habitats; •Potential spillage and ingress of hydrocarbons from transport vehicles; •Potential increased sedimentation and compaction of soil due to vehicle movement; and •Alien proliferation on the abandoned facility due to reduced maintenance activities.	Decommissioning	Negative	Easy	1	1	1	2	2	**10**	**N1**	1	1	1	1	2	**8**	**N1**
					Significance	**N1 - Very Low**							**N1 - Very Low**						

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

Rehabilitation

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

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Applying science to the real world

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APPENDIX I – Site Sensitivity Verification

FRESHWATER ECOSYSTEM SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED TOURNéE 2 SOLAR PV PARK, NEAR THUTHUKANI, MPUMALNGA 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 development 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 approximately 32 km north-east of Standerton and is situated adjacent to the Eskom Tutuka Power Station ash fallout facility. 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 will have a generating capacity of no more than 150 Megawatts (MW) and battery energy storage systems (BESS) of 600 megawatt-hours (MWh).

The proposed Tournée 2 Solar PV Park is located on 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 within the Lekwa Local Municipality, under jurisdiction of the Gert Sibande District Municipality (Figure I1).

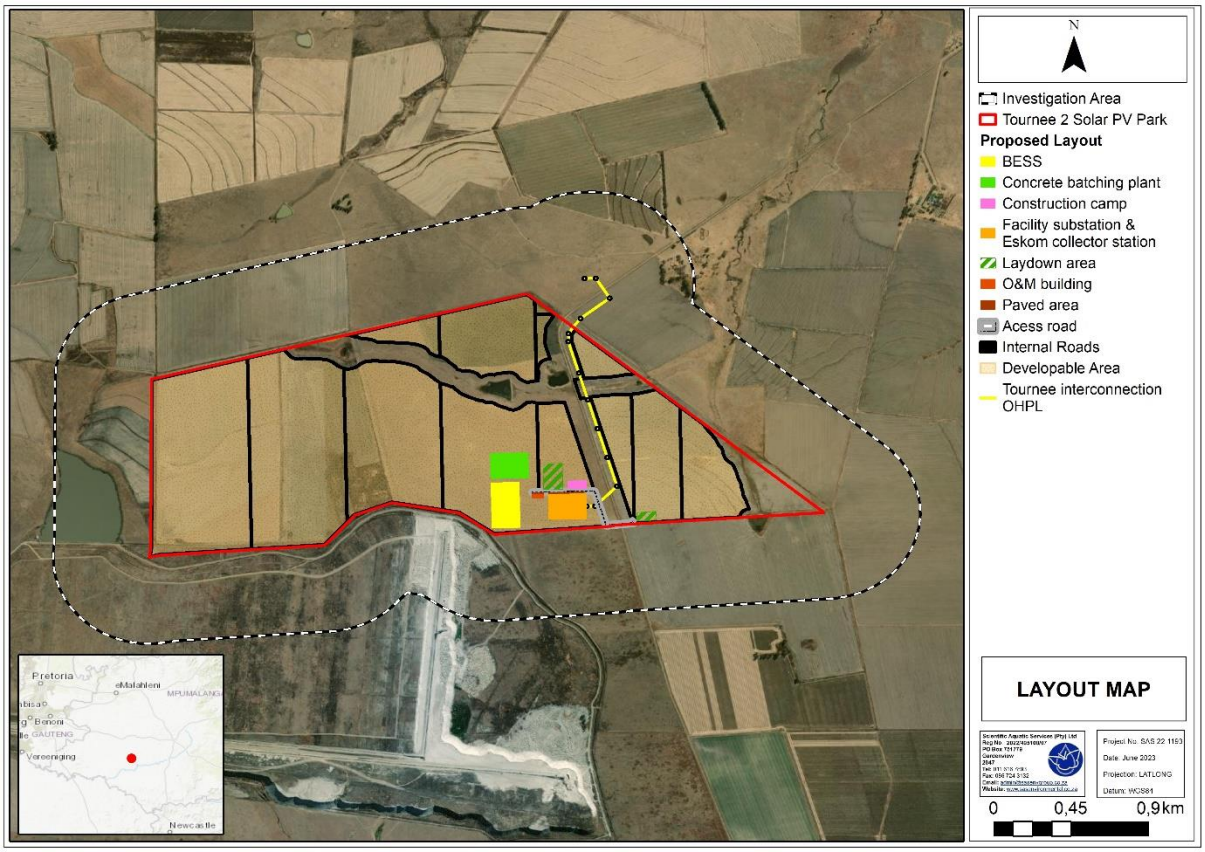

Figure I1: Digital satellite image depicting the location of the proposed Tournée 2 Solar PV Park and associated investigation area in relation to the surrounding area.

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 I1: Aquatic Biodiversity Theme Sensitivity analysis for the proposed project.

Environmental Theme	Applicable Protocol	Response
Aquatic Biodiversity Sensitivity Rating: The study and investigation area shows a **very high aquatic biodiversity sensitivity due to the presence of wetlands** within the study and investigation area. The majority of the study and investigation areas have a **low aquatic biodiversity sensitivity.** **Actual Sensitivity: The Channelled Valley Bottom wetland identified during the site assessment was determined to be of moderate sensitivity and Importance.**	3(b) Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity (GG 43110 of 10/03/2020).	A Freshwater Ecosystem Assessment was conducted by Scientific Aquatic Services (SAS, 2023). During the assessment and associated field verification it was determined that the majority of the development site (study area) is of low sensitivity whilst the identified freshwater ecosystems is of high aquatic biodiversity sensitivity. A detailed study was required to support both the authorisation process required in terms of NEMA as well as the NWA. The study and associated comprehensive report from a site visit in February 2023 provide a detailed description of the freshwater ecosystem associated with the proposed project and considered the potential impacts applicable to the freshwater ecosystem and provided suitable mitigation measures to best minimise the potential impact on the freshwater ecosystems.

APPENDIX J – Specialist information

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

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

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

Company of Specialist:	Scientific Aquatic Services		
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. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

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

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.

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

I, Stephen van Staden, declare that -

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

Signature of the Specialist.

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF 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, Western Cape, Gauteng, Mpumalanga, Limpopo Provinces.

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
- Maintenance and Management Plans
- Plant Species and Landscape Plans

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 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