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Attention: Mr. Reuben Heydenrych

TECHNICAL MEMORANDUM: APPLICATION OF DEPARTMENT OF WATER AND SANITATION (DWS) RISK ASSESSMENT MATRIX TO THE ACTIVITIES ASSOCIATED WITH THE PROPOSED ADDITIONAL EXTENSION FOOTPRINT OF THE MOGALAKWENA PHOTOVOLTAIC (PV) SOLAR PLANT NEAR MOKOPANE, LIMPOPO PROVINCE.

1. SCOPE OF MEMORANDUM

The purpose of this document is to provide a summary of the results obtained from the application of the Department of Water and Sanitation's (DWS) Risk Assessment Matrix compiled in support of the Water Use Application (WUA) for the proposed additional extension of the Mogalakwena Photovoltaic (PV) solar plant near Mokopane in the Limpopo Province.

2. BACKGROUND

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem assessment as part of the Water Use Authorisation (WUA) processes for the additional extension footprint of the Mogalakwena PV solar infrastructure associated with the Mogalakwena Mine near Mokopane in the Limpopo province (Appendix A – Figure A1 and A2).

A freshwater ecological assessment was conducted by Scientific Aquatic Services (SAS 2021 and SAS 2022) in June 2021 and a subsequent follow up assessment conducted in May 2022 as part of the Environmental Impact Assessment (EIA) process.

3. LEGISLATIVE FRAMEWORK

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

A watercourse means:

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes where relevant, its bed and banks.

Wetland 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.”

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

For the purposes of this investigation, the definition of a freshwater ecosystem is considered synonymous with the definition of a watercourse as per the National Water Act, 1998 (Act No. 36 of 1998) (as amended) – NWA - and the terms may be used interchangeably in this document. The relevant articles of¹ legislation considered as part of this opinion are presented in Appendix B.

4. FRESHWATER ECOLOGICAL ASSESSMENT (SAS 2021 and SAS 2022)

During the field assessment, no freshwater ecosystems were identified within the project boundary, however various freshwater ecosystems were identified within the investigation area and these were identified as follows (Figure A3):

- The Groot-Sandsloot River located along the southern edge of the investigation area;
- A single seep wetland located east of the N11 highway within investigation area; and
- Various ephemeral² drainage lines (EDLs) associated with the Groot-Sandsloot River located within the investigation area.

¹ Seep wetland are wetlands located on gently to steeply sloping land and dominated by colluvial (i.e gravity-driven), unidirectional movement of water and material down-slope.

² Ephemeral systems flow for less time than they are dry. Flow or flood for short periods of most years in a five-year period, in response to unpredictable high rainfall events. Such systems support a series of pools in parts of the channel. Flow is absent between 26%-75% of the year.

The results of the ecological assessment are summarised in the table below:

Table 1: Summary of results of the field assessment (SAS 2021).

Freshwater Ecosystem	Present Ecological State (PES) / Ecstatus	Ecoservices	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category / Recommended Management Objective / Best Attainable State
Groot-Sandsloot River	Category C (Moderately Modified)	Intermediate	Moderate	REC Category: C/D BAS Category: C RMO: Maintain
Ephemeral Drainage Lines	Category C (Moderately Modified)	Intermediate	Moderate	REC Category: C BAS Category: C RMO: Maintain
Seep Wetland	Category C (Moderately Modified)	Intermediate	Moderate	REC Category: C BAS Category: C RMO: Maintain

5. DESCRIPTION OF FRESHWATER HABITATS AS PER THE INTERNATIONAL FINANCE CORPORATION (IFC) PERFORMANCE STANDARD 6

The impacts to the freshwater systems assessed during the baseline study were noted and taken into consideration when categorising the habitats according to the definitions contained in the IFC Principle 6: Overview of Performance Standards on Environmental and Social Sustainability document. According to this standard, the following definitions of habitats are applicable:

➤ **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 composition³. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed⁴ coastal zones, and reclaimed wetlands.

➤ **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.

➤ **Critical Habitat**

Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered⁵ species; (ii) habitat of significant importance to endemic

³ This excludes habitat that has been converted in anticipation of the project.

⁴ Reclamation as used in this context is the process of creating new land from sea or other aquatic areas for productive use.

⁵ As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

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.

Taking the above definitions into consideration, the various freshwater systems identified on site were categorised as follows:

Table 2: International Finance Corporation (IFC) Habitat Categories.

Freshwater system	Applicable IFC Habitat Category
Riverine systems (Groot-Sandsloot River and Ephemeral Drainage Lines)	Modified The hydraulic regime of the Groot-Sandsloot River has been altered by an impoundment upstream of the project boundary and infrastructure within the active channel, specifically the N11 road crossing. Additional impacts on the system include transformation of some portions of the riparian and non-marginal vegetation zone by encroachment of <i>Dichrostachys cinerea</i> . Thus, the degree and extent of modification is deemed sufficient to categorise these systems as 'modified' (in terms of the IFC definition).
Seep wetland systems	Modified The seep wetland was observed to be surrounded by mostly woody vegetation (especially <i>Dichrostachys cinerea</i>). The presence of the woody vegetation has likely impacted on the water inputs into the seep wetland. The primary modifiers noted were impacts to the vegetation, primarily as a result of grazing and trampling by domestic livestock. The resulting reduction in natural vegetation cover has led to encroachment by floral species associated with disturbance, however this is not considered to be severe. Thus, the degree and extent of modification is deemed sufficient to categorise these systems as 'modified' (in terms of the IFC definition).

6. RISK ASSESSMENT

This section presents the significance of potential impacts on the freshwater ecosystems associated with the expansion of the Mogalakwena Solar PV. When evaluating the perceived impacts of the activities associated with the expansion of the Mogalakwena Solar PV, the risk significance was ascertained based on the assumption that the recommended mitigation measures will be implemented, to reduce the risk significance. Thus, the risk assessment provided in this report presents the perceived impact significance post-mitigation.

At the time of the assessment (June 2022) and compilation of this report, no construction method statement or proposed construction works besides the footprint of the study area was provided. As a result, the risk assessment was based purely on the proposed development footprint, taking into account basic good practice principles for construction and assumptions based on the site conditions. In addition, the risk assessment does not consider any linear infrastructure (i.e access roads) which may be required for access of construction vehicles into the study area.

6.1 Consideration of impact and application of mitigation measures

The DWS approved Risk Assessment Matrix as promulgated in Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA was applied to ascertain the significance of perceived impacts on the key drivers and receptors (hydrology, water quality, geomorphology, habitat and biota) of the assessed freshwater ecosystems.

The points below summarise the considerations undertaken as part of the risk assessment:

- 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 then DEA *et al* (2013) would be followed, i.e., the impacts would first be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required.
- Should details pertaining to the construction method statement of the proposed infrastructure become available the Risk Assessment Matrix will need to be revised accordingly and potentially amended based on the design layout and specifics;
- The proposed grid corridor is located within the applicable 500 m Zone of Regulation (ZoR) in terms of the NWA of the delineated depression wetlands. As such all legal issues pertaining to aspects and activities relating to the wetland were scored as “5”;
- While the operation of the Mogalakwena Solar PV will be a permanent activity, the construction thereof is envisioned to take no more than a few months to a year, at most. 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 study.

6.2 Impact Discussion and Essential Mitigation Measures

There are four key ecological impacts the assessed freshwater ecosystems that are anticipated:

- Loss of freshwater 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, these impacts can be adequately minimised or avoided provided the mitigation measures provided in this report are implemented and adhered to. A summary of the risk assessment is provided in the below table, followed by a discussion of the outcome thereof. Site-specific mitigation measures have also been provided below to minimise any potential impact on the freshwater ecosystems.

Table 3: Summary of the risk assessment conducted for the Mogalakwena Solar PV expansion.

No.	Phases	Activity	Aspect	Impact	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	PES AND EIS OF	Reversibility of
1	Construction phase	Site clearing and set-up of contractor camps prior to commencement of construction activities.	- Removal of vegetation leading to exposure and associated disturbances to soil; - Exposure of soil and increased likelihood of dust generation freshwater habitat; - Movement of construction vehicles.	- Compaction of soil due to the movement of heavy machinery within the footprint areas; - Reduced vegetation cover within footprint areas; - Alteration of runoff patterns within the footprint areas due to increased disturbances - Smothering of the vegetation as a result of increased sediment leading to freshwater altered habitat; - Disturbance of soil leading to increased Alien Invasive Plant (AIP) proliferation; - Potential decrease in ecoservices; - Potential soil and stormwater contamination from oils as well as hydrocarbons into the freshwater ecosystems; and - Anthropogenic and noise-pollution to surrounding biota.	14	53	L	80	- Imperative that all construction works in or near the wetland be undertaken during the dry, winter months; - The assessed freshwater ecosystems and the associated 32 NEMA Zone of Regulation (ZoR) should be properly demarcated' by an Environment Control Officer (ECO) and marked as a 'no-go' area where no construction activities are planned; - It should be feasible to utilise existing roads to gain access to the construction area and existing roads must be used for this purpose. This will limit edge effects, erosion and sedimentation of the identified wetlands during the construction phase; - Contractor laydown areas, vehicle re-fuelling areas and material storage facilities must remain outside of the identified wetlands associated 32m ZoR; - All footprint areas must remain as small as possible and vegetation clearing must be limited to what is absolutely essential to ensure as much indigenous vegetation is retained; - Stockpiles must be placed outside demarcated freshwater features and associated NEMA ZOR; - Control of alien vegetation, specifically weeds which may find a niche to encroach disturbed areas; and - All waste must be removed from the site and disposed of at a registered waste disposal facility.	PES: Moderately to Largely Modified (C/D) and EIS : Moderate	Fully reversible

2		Installation of the surface infrastructure such as solar panels, collector cables, substation, battery storage of Mogalakwena Solar PV.	- Excavation of soil to facilitate foundations for mounting of the solar panels; - Installation of solar panels including mounting of rods into foundations and associated electrical cables; and - Vehicles, construction machinery and personnel to facilitate mounting of Solar panels and associated buildings	- Infringement into freshwater ecosystems, resulting in impacts on hydrology and sediment balance; - Removal of hydrophytic vegetation within freshwater ecosystems; - Disturbances to soil within the freshwater ecosystems, leading to altered freshwater ecosystem habitat; - Altered runoff patterns as a result of excavation and concrete within the wetland, leading to increased erosion; - Disturbance within the wetland leading to increased AIP proliferation and freshwater ecosystem habitat; - Potential for deteriorated water quality, including increased likelihood of dust generation and associated turbidity; - Physical obstruction of habitat to biota from the surface infrastructure component of the proposed development.	13	47	L	80	- 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 freshwater habitat. 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 to prevent excessive dust and suppress the potential for runoff of sediment which may smother hydrophytic vegetation of the freshwater habitat; <u>With regards to concrete mixing on site, the following recommendations must be adhered to:</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 wetlands. High alkalinity associated with cement can dramatically affect and contaminate both soil and ground water; - Fresh concrete and cement mortar must not be mixed near the proximity of the wetlands and associated buffer zones, as applicable; - Mixing of cement must only be undertaken within the construction camp and must not be mixed on bare soil; Mixing of concrete must also be strictly undertaken within a lined, bound or banded portable mixer. Consideration must be taken to use ready mix concrete; - A batter board or other suitable platform/mixing tray must be provided onto which any mixed concrete can be deposited whilst it awaits placing; - A washout area must be designated outside of the confines of the freshwater habitat and associated 32m NEMA ZOR and wash water must be treated on-site or discharged to a suitable sanitation system; and - Any cement bags must be disposed of in demarcated hazardous waste receptacles placed on the construction site; Concrete spillage outside of the areas of application must be promptly removed and taken to a suitably licensed waste disposal site.	Depression Wetland: PES: B / EIS: Moderate; Vaal River: PES: D / EIS: High	Fully reversible
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No.	Phases	Activity	Aspect	Impact	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	PES AND EIS OF	Reversibility of
3		Construction associated with stormwater infrastructure (stormwater channels and outlets) for management of flows in the landscape.	- Excavation activities within the footprint of the stormwater infrastructure; - Construction of stormwater outlets; - Miscellaneous activities by construction personnel.	- Disturbance of vegetation and associated disturbance to soil; - Potential for alteration to flow regime owing to anthropogenic disturbance and subsequent improved flow (after outlets have been installed); - Potential for construction-related waste (such as rubble and litter) within the freshwater habitat.	14	53	L	80	- It must be ensured that no channels and no outlets associated with the stormwater plan are located within the delineated boundary of the freshwater ecosystems. Authorisation must be obtained from the relevant authorities for stormwater infrastructure proposed within the 32 m boundary of the freshwater systems; - At the proposed discharge points, it must be ensured that energy dissipating structures and structures encouraging diffused flows are included to reduce the overall risk of erosion, especially given the nature of the soils in the Mogalakwena area; - In the design of the stormwater management plan, it must be ensured that no concrete is used, and the channels must be natural and well vegetated. As much indigenous vegetation is used as part of the stormwater management plan to mitigate for any potential changes in runoff volume within the proposed development footprint; - The duration of impacts within the freshwater systems should be minimised as far as possible by ensuring that the duration of time in which interruption/disturbance and sedimentation will take place, is minimised; - Any excavated materials (if applicable) should not be contaminated, and it should be ensured that the minimum surface area is taken up, and the stockpiles may not exceed 2m in height. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum, so as for later usage as backfill material or as part of rehabilitation activities; and - Stabilisation of channel banks and side slopes are required, by employing techniques such as temporary stabilisation of slopes using geotextiles.	Depression Wetland: PES: B / EIS: Moderate. Vaal River: PES: D / EIS: High	Fully reversible

No.	Phases	Activity	Aspect	Impact	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	PES AND EIS OF	Reversibility of
4	Operation Phase	Operation and maintenance of the Mogalakwena Solar PV expansion.	- Potential indiscriminate movement of maintenance vehicles along freshwater ecosystems situated in close proximity to the solar panels; and - Potential maintenance activities such as cutting of grass and cleaning of surface area underneath the solar panels.	- Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; - Potential spillage and ingress of hydrocarbons from maintenance vehicles; and - Increased sedimentation, runoff and turbidity as a result of reduced vegetation cover adjacent to freshwater ecosystems	12	36	L	80	- Maintenance vehicles must make use of dedicated access roads and no indiscriminate movement in the freshwater ecosystems and associated buffer zones, unless authorised for maintenance activities must be permitted; - During periodic maintenance activities of the surface infrastructure, monitoring for erosion must be undertaken with specific mention of investigating the support structures and areas accessed to facilitate maintenance activities; - Should erosion be noted at the base of the support structures that may potentially impact on a freshwater ecosystems, the areas must be rehabilitated by infilling and erosion gullies, resurfacing disturbed areas and revegetating these areas with suitable indigenous vegetation; and - Monitoring for the establishment for AIP's along freshwater habitat and associated buffer zones must be undertaken along disturbed areas and access roads used to facilitate maintenance activities. Should AIPs be identified, they must be removed and disposed of as per an AIP control plan and the area must be revegetated with suitable indigenous vegetation.	Depression Wetland: PES: B / EIS: Moderate; Vaal River: PES: D / EIS: High	Fully reversible

7. CONCLUSION REMARKS AND OPINION

According to the freshwater assessment (SAS 2021) no freshwater ecosystems were identified within the project boundary, however various freshwater ecosystems were identified within the investigation area, and these include the Groot Sandsloot River, a single seep wetland and various ephemeral drainage lines (EDLs). The investigation area was defined as the 500 m “zone of investigation” around the proposed Mogalakwena PV infrastructure, in accordance with Government Notice (GN) 509 of 2016 as it relates to the NWA, 1998 (Act No. 36 of 1998) (NWA).

Direct and indirect impacts identified on freshwater ecosystems within the investigation area include an increase in mining activity and expansion of communal areas (linked to increased livestock grazing) which have resulted in proliferation of alien and invasive species in the area due to regular disturbance of soil and removal of indigenous vegetation. Anticipated cumulative impacts associated with the project include changes in runoff which will result in changes in pattern of flows and timing of water in the landscape especially during rainfall events.

A stormwater management plan was designed to ensure that requirements from the relevant authorities are met, and these include specifically, designing a stormwater management plan to prevent off-site migration of contaminated stormwater/increased soil erosion, ensuring implementation of the appropriate design measures to allow surface and subsurface movement of water along drainage lines, to not impede natural surface and subsurface flows. Important mitigation measures which must be considered as part of the design of the stormwater management plan include the following:

- It must be ensured that no channels and no outlets associated with the stormwater plan are located within the delineated boundary of the freshwater ecosystems. Authorisation must be obtained from the relevant authorities for stormwater infrastructure proposed within the 32 m boundary of the freshwater systems;
- At the proposed discharge points, it must be ensured that energy dissipating structures and structures encouraging diffused flows are included to reduce the overall risk of erosion, especially given the nature of the soils in the Mogalakwena area;
- In the design of the stormwater management plan, it must be ensured that no concrete is used, and the channels must be natural and well vegetated. According to a study on the assessment of hydrologic impacts of solar panels, it was stated that addition of solar panels over a grassy field does not have much of an effect on the volume of runoff, the peak discharge, nor the time to peak while gravel and pavement increased runoff volume significantly (Cook and McCuen 2013). Given these findings it must be ensured that as much indigenous vegetation is used as part of the stormwater management plan to mitigate for any potential changes in runoff volume within the proposed development footprint; and
- In addition, consideration for additional stormwater outlets must be done, particularly where volume released from a single outlet has the potential to increase the risk of soil erosion to the freshwater ecosystems.

Provided that site-specific mitigation measures are implemented during all phases of the project, with specific mention of ensuring that the construction activities for the proposed solar PV avoid indirect impacts on the freshwater ecosystems, and that inspections of all stormwater infrastructure are done routinely as recommended in the hydrological report (SMEC 2022) during the operational phase of the solar PV, the risk significance can be considered a limited.

Given that the current layout which was optimised significantly to avoid traversing or encroaching into these freshwater ecosystems, the overall impact significance for the seep wetland, Groot-Sandsloot River and the EDLs was assessed to be between 'Minor – Negative' to 'Negligible – Negative' with recommended mitigations applied. It is the opinion of the specialist that the proposed Mogalakwena solar PV infrastructure poses a low-risk significance to the ecological integrity of the identified freshwater ecosystems, and with adherence to the suggested mitigation measures the project can be considered.

Sincerely,

Stephen van Staden

Pr. Sci. Nat.

APPENDIX A: DESKTOP DATA REVIEW AND BACKGROUND MAPS



Figure A1: A digital satellite image depicting the location of the study area and associated investigation area.

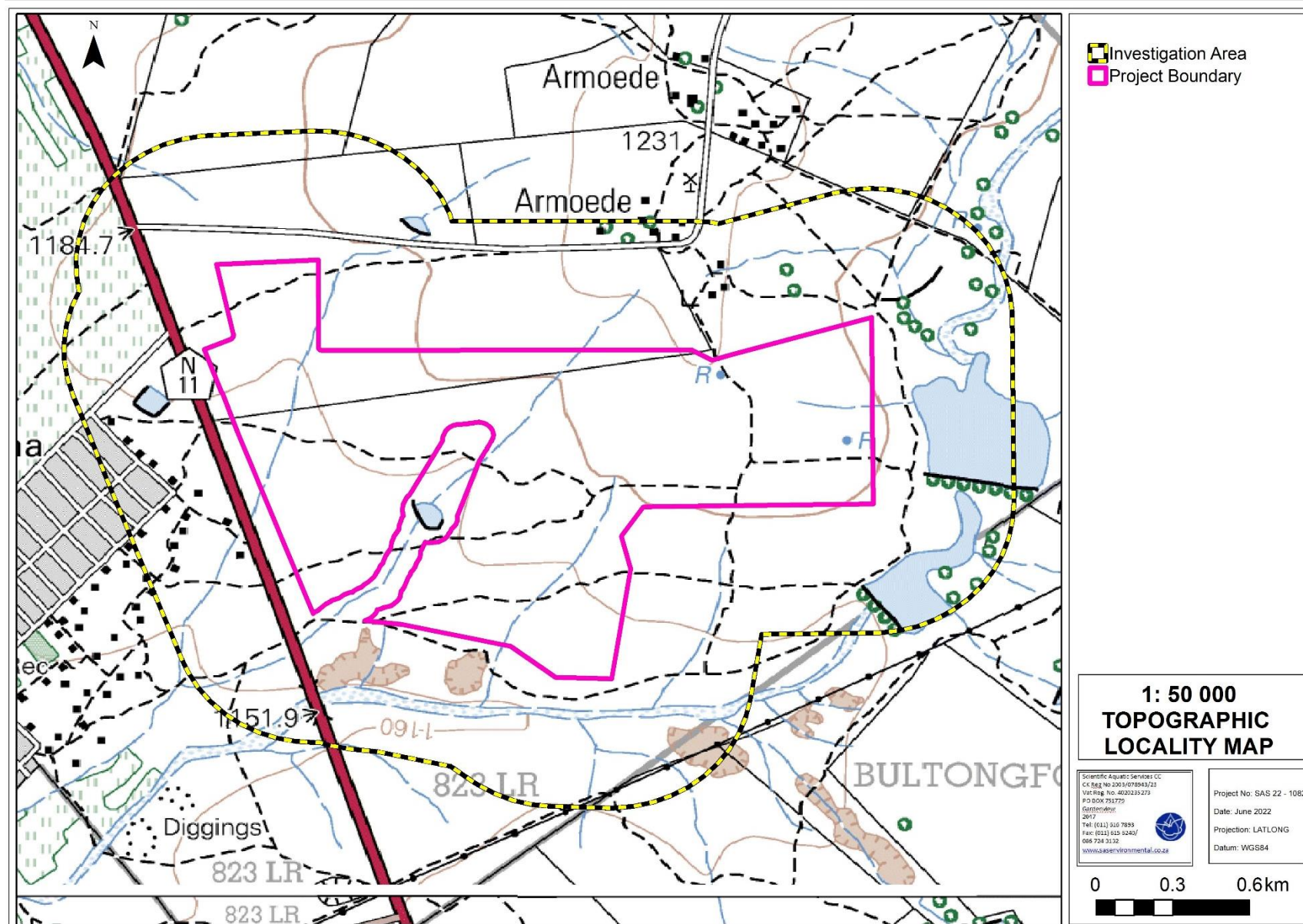


Figure A2: the study area and associated investigation area depicted on a 1:50 000 topographical map in relation to the surrounding area.



Figure A3: Freshwater ecosystems associated the study area and associated investigation.

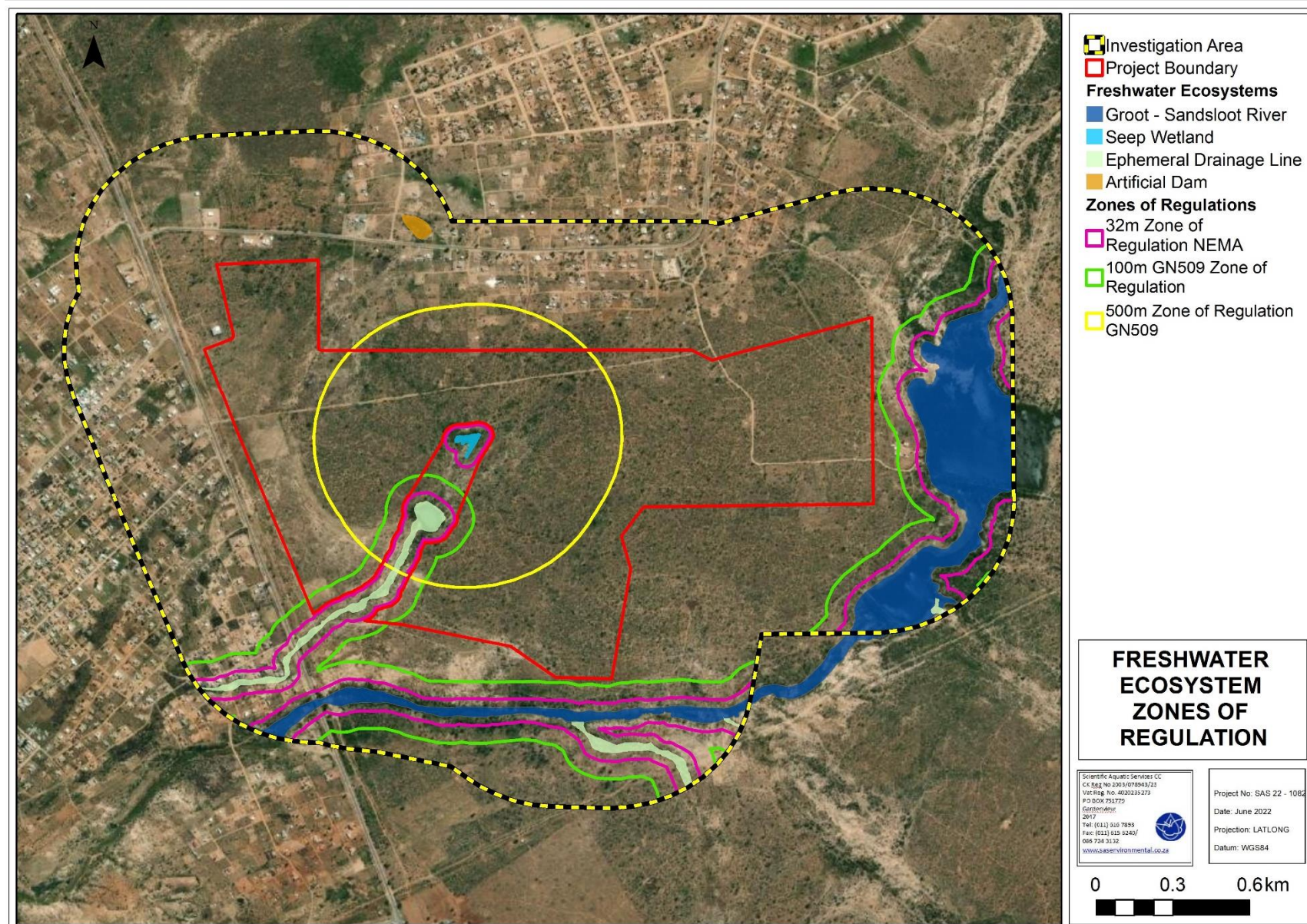


Figure A4: Freshwater ecosystems associated the study area and associated investigation.

Table A1: Summary of the risk assessment.

Risk Assessment Matrix in terms of GN509 of 2016					Reviewed by: Stephen van Staden (Pr. Sci. Nat)																
					SACNASP number: 400134/05																
																					
No.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Borderline LOW MODERATE Rating Classes
1	Construction Phase	Site clearing and set-up of contractor camps prior to commencement of construction activities.	- Removal of vegetation leading to exposure and associated disturbances to soil; - Exposure of soil and increased likelihood of dust generation freshwater habitat; - Movement of construction vehicles.	- Compaction of soil due to the movement of heavy machinery within the footprint areas; - Reduced vegetation cover within footprint areas; - Alteration of runoff patterns within the footprint areas due to increased disturbances - Smothering of the vegetation as a result of increased sediment leading to freshwater altered habitat; - Disturbance of soil leading to increased Alien Invasive Plant (AIP) proliferation; - Potential decrease in ecoservices; - Potential soil and stormwater contamination from oils as well as hydrocarbons into the freshwater ecosystems; and - Anthropogenic and noise-pollution to surrounding biota.	2	2	2	1	2	1	1	4	3	5	5	1	14	53	L	80	NA

2		Installation of the surface infrastructure such as solar panels, collector cables, substation, battery storage of Mogalakwena Solar PV.	- Excavation of soil to facilitate foundations for mounting of the solar panels; - Installation of solar panels including mounting of rods into foundations and associated electrical cables; and - Vehicles, construction machinery and personnel to facilitate mounting of Solar panels and associated buildings	- Infringement into freshwater ecosystems, resulting in impacts on hydrology and sediment balance; - Removal of hydrophytic vegetation within freshwater ecosystems; - Disturbances to soil within the freshwater ecosystems, leading to altered freshwater ecosystem habitat; - Altered runoff patterns as a result of excavation and concrete within the wetland, leading to increased erosion; - Disturbance within the wetland leading to increased AIP proliferation and freshwater ecosystem habitat; - Potential for deteriorated water quality, including increased likelihood of dust generation and associated turbidity; - Physical obstruction of habitat to biota from the surface infrastructure component of the proposed development.	1	2	3	1	2	1	1	4	2	5	5	1	13	47	L	80	NA
3		Construction associated with stormwater infrastructure (stormwater channels and outlets) for management of flows in the landscape.	- Excavation activities within the footprint of the stormwater infrastructure; - Construction of stormwater outlets; - Miscellaneous activities by construction personnel.	- Disturbance of vegetation and associated disturbance to soil; - Potential for alteration to flow regime owing to anthropogenic disturbance and subsequent improved flow (after outlets have been installed); - Potential for construction-related waste (such as rubble and litter) within the freshwater habitat.	2	2	2	1	2	1	1	4	3	5	5	1	14	53	L	80	NA

	Operational Phase	Operation and maintenance of the Mogalakwena Solar PV expansion.	- Potential indiscriminate movement of maintenance vehicles along freshwater ecosystems situated in close proximity to the solar panels; and - Potential maintenance activities such as cutting of grass and cleaning of surface area underneath the solar panels.	- Disturbance to soil, vegetation, biota and potentially water quality as a result of periodic maintenance activities; - Potential spillage and ingress of hydrocarbons from maintenance vehicles; and - Increased sedimentation, runoff and turbidity as a result of reduced vegetation cover adjacent to freshwater ecosystems	1	1	1	1	1	1	1	3	1	5	5	1	12	36	L	80	
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APPENDIX B – REFERENCED REPORTS

Scientific Aquatic Services. 2021. Freshwater Ecosystem and Aquatic Ecological Assessment As Part of the Environmental Authorisation Process For The Proposed Solar Photovoltaic (PV) Plant Associated With The Anglo-Mogalakwena Mine Near Mokopane, Limpopo Province. Report Reference: SAS 202186.

Scientific Aquatic Services. 2022. Freshwater Ecosystem and Aquatic Ecological Assessment Part of The Environmental Authorisation Process For The Additional Extension Footprint of The Mogalakwena PV Solar Plant Near Mokopane, Limpopo Province. Report Reference: SAS 22-1082.

SMEC South Africa. Design report: Mogalakwena PV Hydrological Study. Prepared for EDF Renewables. 06 May 2022.

APPENDIX C – 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) (as amended) (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) (as amended) (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 <i>the Gazette</i>, 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) (as amended) (NWA)	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)	In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21 (c) and 21 (i) of the NWA, 1998 is defined as: - The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; - In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or - A 500 m radius from the delineated boundary (extent) of any wetland or pan. This notice replaces GN1199 and may be exercised as follows: - 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; - 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 have a LOW risk class as determined through the Risk Matrix; and vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol. A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA. Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA.
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APPENDIX C – DECLARATION OF INDEPENDENCE

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

Stephen van Staden MSc (Environmental Management) (University of Johannesburg)
 Paul da Cruz BA (Hons) (Geography & Environmental Studies) (University of the Witwatersrand)
 Nqobile Lushozi MSc (Geoinformatics) (Stellenbosch University)

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

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

I, Stephen van Staden (reviewer), declare that -

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



Signature of the Specialist

I, Paul da Cruz (reviewer), declare that -

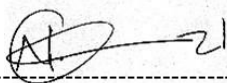
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity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



Signature of the Specialist

I, Nqobile Lushozi (author), declare that -

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



Signature of the Specialist



SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **STEPHEN VAN STADEN**

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydrogeology 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 Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

Freshwater Assessments

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

Aquatic Ecological Assessment and Water Quality Studies

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

Biodiversity Assessments

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

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

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



SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **PAUL DA CRUZ**

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

DEVELOPMENT SECTORS OF EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

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

Freshwater Assessments

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

Biodiversity Assessments

- Avifaunal Assessments
- Strategic Biodiversity Assessment

Visual Impact Assessment

- Visual Impact Assessments

GIS / Spatial Analysis

- GIS Spatial Analysis and Listing Notice 3 mapping



SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **NQOBILE LUSHOZI**

PERSONAL DETAILS

Position in Company	Freshwater Ecologist Wetland and Aquatic Ecology
Joined SAS Environmental Group of Companies	April 2019

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa
 Member of the South African Wetland Society (SAWS)
 Member of the South African Council for Natural Scientific Professions (SACNASP Reg No - 124679)

EDUCATION

Qualifications

MSc Geoinformatics (Cum laude) (Stellenbosch University)	2019
BSc (Hons) Environmental Sciences (University of KwaZulu-Natal)	2015
BSc Environmental Sciences (University of KwaZulu-Natal)	2014

Short courses

Tools for Wetland Assessment (Rhodes University)	2020
Grass Identification Course (Africa Land-Use Training)	2021

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

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
- Maintenance and Management Plans

Aquatic Ecological Assessment and Water Quality Studies

- Toxicological Analysis
- Surface and groundwater quality Monitoring
- Screening Test
- Mass and salt balance determination