SCIENTIFIC AQUATIC SERVICES

WETLAND REHABILITATION PLAN & MONITORING PROTOCOL FOR THE NEO1 20MW SOLAR POWER PLANT IN MAFETENG, LESOTHO.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY OF TERMS

Albic Horizon	Alternate name: E horizon. A bleached subsoil horizon with very weakly developed structure (being loose or friable in the moist state) that is usually paler in colour than the overlying topsoil horizon or the subsoil horizon that overlies it, due to the marked in situ net removal of colloidal matter.
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.
Bog mat	A ground protection solution used to create temporary access routes on construction sites located on or near fragile ground. They are typically made by lashing together timber planks, with certain types of wood being most suitable.
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.
Colluvial	Relating to gravitational forces that result in the transport and deposition of soil and / or rock fragments down hillslopes to the base of the slope.
Delineation	Refers to the technique of establishing the boundary of a resource such as a wetland or riparian area.
Gley Horizon	Alternate name: G Horizon. A subsoil horizon that is naturally saturated with water for long periods to form dominant grey, low chroma colours (often with blue or green tints) with or without mottling, with the accumulation of colloidal (clay) matter in the horizon
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Hydric / Hydromorphic Soils	Soils formed under conditions of saturation, flooding or ponding for sufficient periods of time for the development of anaerobic conditions and thus favouring the growth of hydrophytic vegetation.
Interflow	The lateral movement of water, usually derived from precipitation, that occurs in the upper part of the unsaturated zone between the ground surface and the water table. This water generally enters directly into a wetland or other aquatic ecosystem, without having occurred first as surface runoff, or it returns to the surface at some point down-slope from its point of infiltration.
Running Track	A temporary access constructed into a wetland that allows access for construction personnel and machinery while not damaging wetland soils, especially in saturated conditions.

LIST OF ACRONYMS

CR	Critically Endangered
EC	Ecological Category
ECO	Environmental Control Officer
EIS	Ecological Importance and Sensitivity
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan]
HGM	Hydrogeomorphic
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
LEA	Lesotho Environment Authority
LEC	Lesotho Electricity Corporation
LEWA	Lesotho Electricity and Water Authority
MAP	Mean Annual Precipitation
MEM	(Lesotho) Ministry of Energy and Meteorology
MW	Megawatt
NES	(Lesotho) National Environment Secretariat
OP	(World Bank) Operational Procedures
PES	Present Ecological State
REC	Recommended Ecological Category
PS	Performance Standard
PV	Photovoltaic
SAS	Scientific Aquatic Services
WRC	Water Research Commission
WRPM	Wetland Rehabilitation and Management Plan

1. INTRODUCTION

1.1 Background

Scientific Aquatic Services has been appointed by Red Rocket Energy to provide provision of professional assistance in the context of the International Finance Corporation (IFC) Performance Standard 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012)) (PS6) for the NEO1 Solar Power Plant in Mafeteng, Lesotho. Paul da Cruz of SAS previously undertook the wetland assessment report and rehabilitation and monitoring plan (WRMP) for the solar project. As Red Rocket has purchased the NEO1 solar project, the need for certain environmental documentation to be updated has arisen. SAS has thus been appointed to update the wetland rehabilitation and monitoring plan that was produced by Royal HaskoningDHV in 2020.

The primary rationale behind the compilation of a WRMP is to allow the implementation of mitigation and rehabilitation measures in the wetlands on the development site. The requirement to rehabilitate certain parts of the wetlands on the site arose during the compilation of the wetland assessment for the project, as it became evident that for technical reasons the majority of the site would need to be developed. In order to mitigate the impacts of the development of solar arrays and certain other infrastructure like access roads within the site wetlands, a series of rehabilitation actions were compiled. The site wetlands are highly degraded and transformed, primarily due to the historical agricultural (cultivation) landuses practices in the wetlands through which numerous bunds and drains were developed to alter the wetlands' natural hydrology, and due to which erosion, primarily in the form of headcuts and associated gullies have developed. The premise behind the development of the rehabilitation measures is to restore functional wetland habitat to large parts of the wetland on the development site to ensure that no nett loss of biodiversity occurs within the development context and to possibly ensure that a nett gain in biodiversity occurs.

This WRMP follows a system that seeks to achieve a required end state and describes how the pre-development impacts will be rehabilitated, also identifying the responsible parties and relevant timeframes (where applicable) which will be tasked with implementing measures to reverse or remediate the impacts. The key aims of the WRMP include:

- The identification of a series of wetland interventions aimed at the mitigation of impacts associated with the development of solar power infrastructure on the site as a means to ensuring no nett loss of biodiversity occurs as part of the development;

- The development of a set of mitigation and controls, as well as measures for the assessment of compliance thereof to be implemented in the rehabilitation of pre-development impacts in the wetland and in the construction of solar infrastructure in the site wetlands; and
- To define prudent monitoring to determine the success of the wetland rehabilitation efforts and to allow developing issues to be identified and to allow follow up / remediation efforts to be adequately and timeously implemented.

This WRMP advocates the use of several environmental management tools and mitigatory measures appropriate to the rehabilitation of pre-development impacts and potential impacts of in-wetland construction.

1.2 Context of IFC Performance Standard 6 in Wetland Rehabilitation Planning

The International Finance Corporation (IFC) Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources – Requirements Section states that:

As a matter of priority, the client should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimise impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project's lifecycle.

The need for the rehabilitation of pre-existing (pre-development) wetland impacts on the development site arose from the technical requirement that wetland habitat on the development site could not be avoided from inclusion of the development footprint, with the improvement of wetland functioning proposed to mitigate developmental impacts on wetlands.

In the context of the Protection of Biodiversity, as detailed in the IFC Performance Standard, the mitigation hierarchy that is applied in the assessment of impacts associated with a

particular development includes rehabilitation, which may be considered only after appropriate avoidance and minimisation measures have been considered and confirmed to be technically non-feasible. The wetland rehabilitation compliance measures detailed in Section 3 have been compiled in this context.

1.3 Assumptions and Limitations

- No detailed construction method statement for the construction of the solar power infrastructure in the wetlands on the development site has been compiled to date. This report may need to be revised to appropriately consider the method of construction and certain aspects of operation once this is made available.

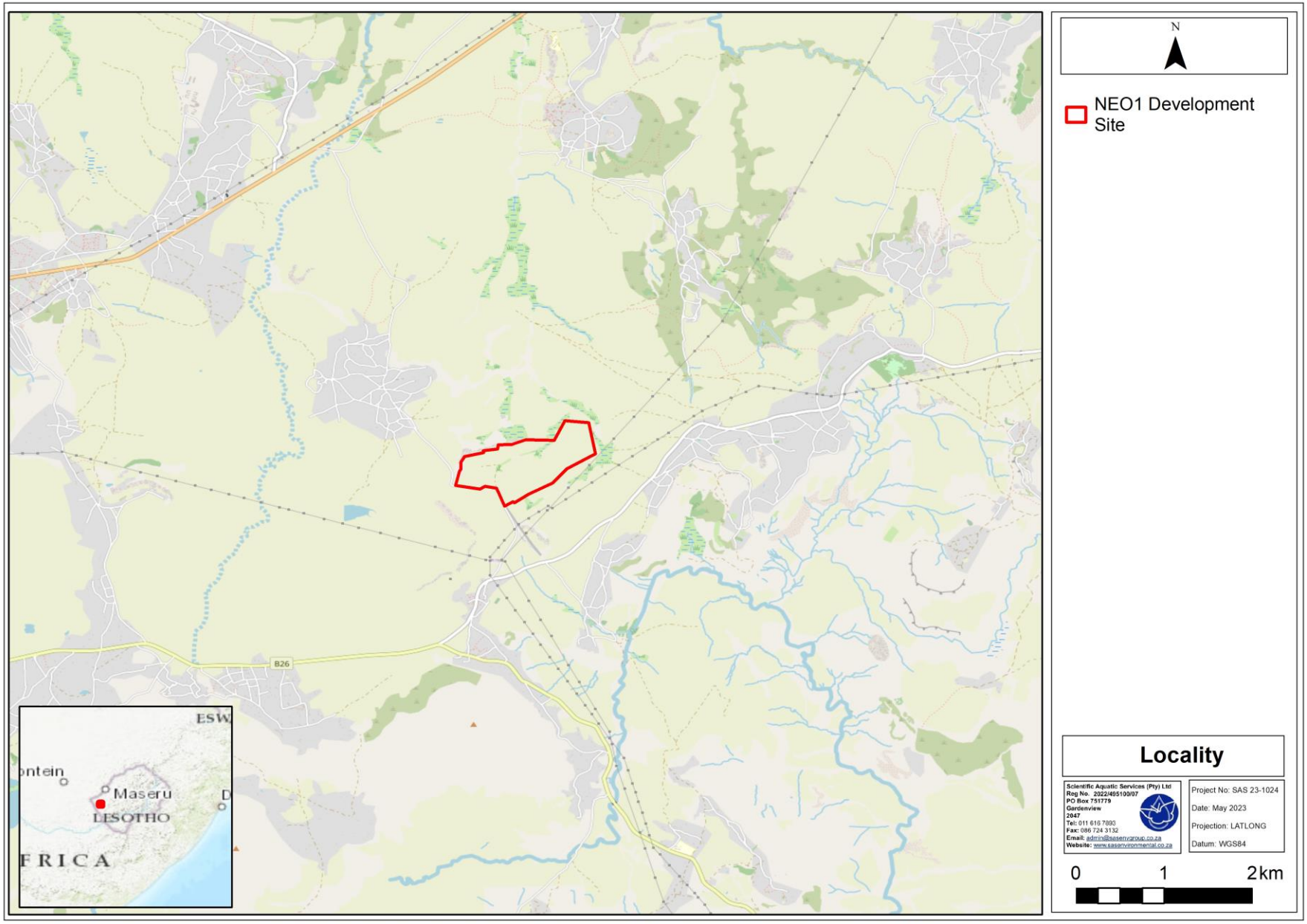


Figure 1: Location of the study site in relation to the surrounding environment.

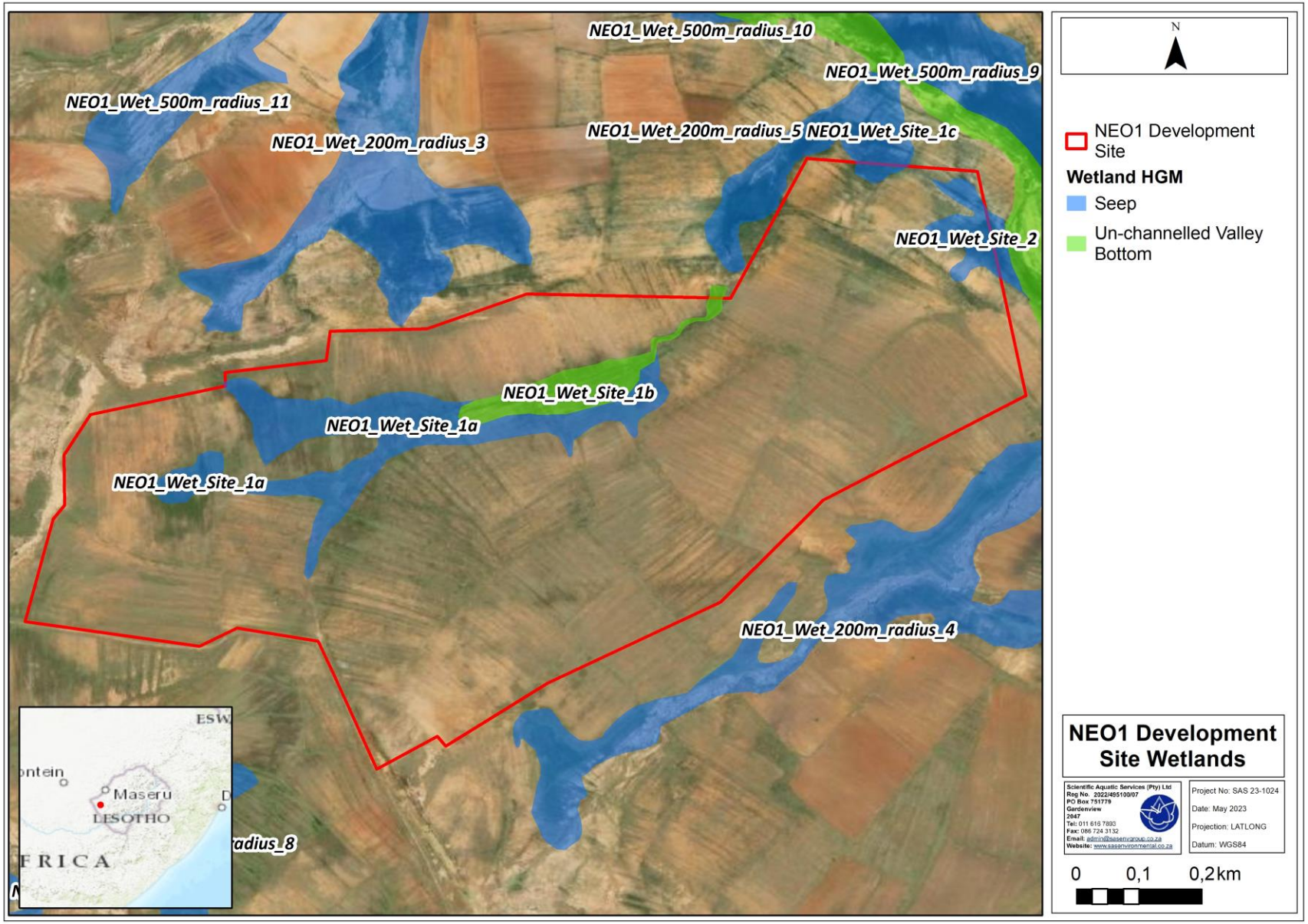


Figure 2 – Location of the wetlands on the NEO1 development site

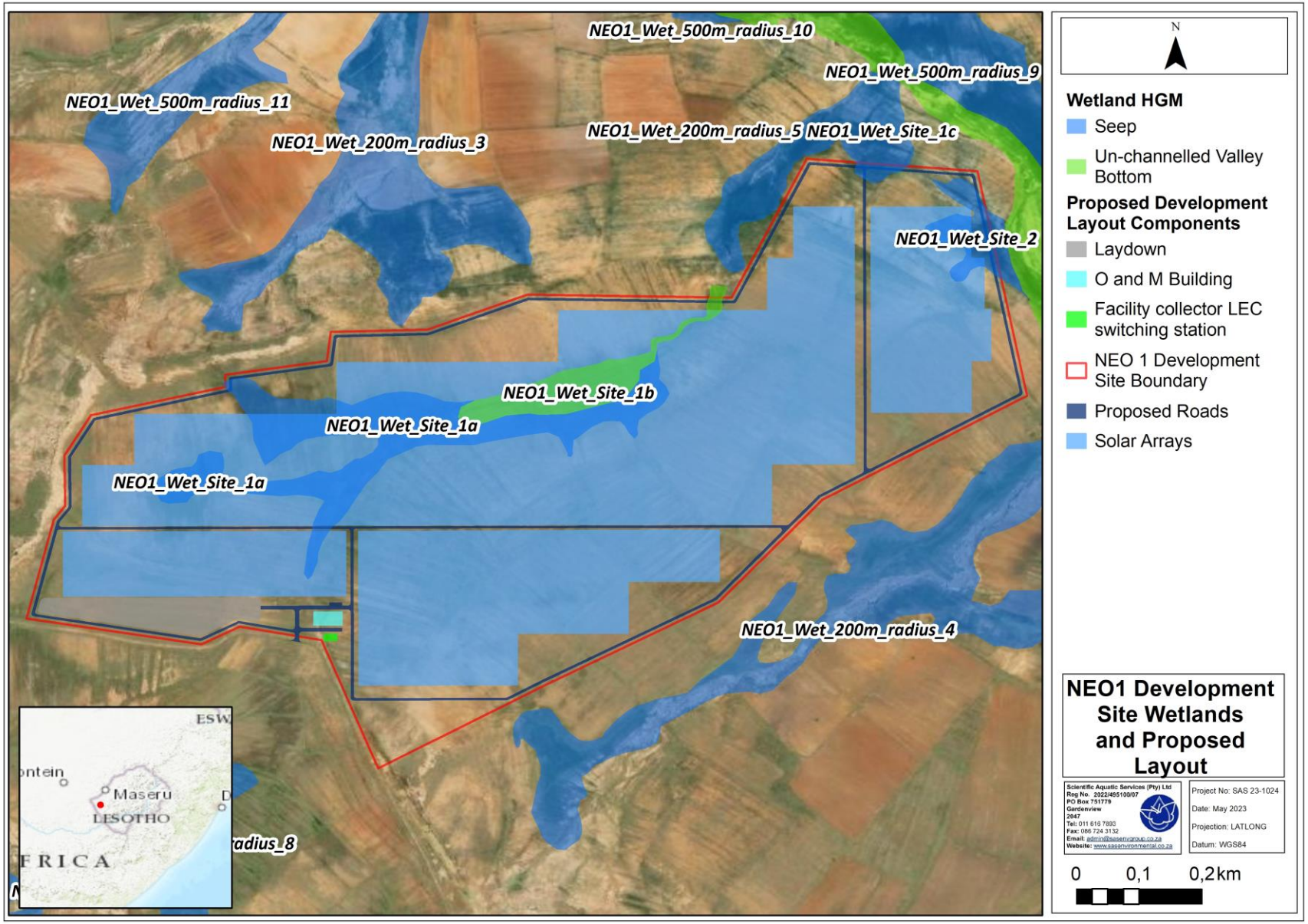


Figure 3 – The development layout in relation to the wetlands on the development site

2. FINDINGS OF WETLAND ASSESSMENT

The location and hydrogeomorphic (HGM) form of wetland units on the development site and within 500m of the development site are indicated in Figure 2. The location of wetlands in relation to the proposed plant layout is indicated in Figure 3.

The primary type of wetland on the site is the seep wetland. Seep wetlands are characterised by their location on sloping ground, with colluvial processes and groundwater inputs being the primary hydrological driver in this context. Seeps may or may not have channelled outflows, but irrespective are typically hydrologically connected to the wider drainage network in the form of interflow. Interflow is the most important component of the hydrology in the wetlands on the site, with much less limited surface flow. The largest seep wetland unit on the development site is Neo1_Wetl_Site_1a, with the wetland unit Neo1_Wetl_Site_2 being located partially in the north-eastern part of the development site. Other seep wetland units are located in immediate proximity to the northern site boundary (Neo1_Wetl_200m_radius_3 & Neo1_Wetl_200m_radius_1c), and to the south-east (Neo1_Wetl_200m_radius_4).

One wetland unit on the development site takes the form of un-channelled valley bottom wetland (Neo1_Wetl_Site_1b). A larger wetland unit (Neo1_Wetl_200m_radius_5) is located immediately to the east of the development site boundary and transitions from the seep wetlands (Neo1_Wetl_200m_radius_4 & Neo1_Wetl_500m_radius_9) that rise to the south and east of the development site.

A variety of soil forms have been identified on the site in association with the wetlands delineated. The most commonly occurring indicator of hydromorphism in parts of the site was the presence of a soft plinthic B horizon that is typically associated with wetland habitat, as it is formed by the presence of a seasonally occurring shallow water table that saturates the soils. Albic (E) horizons and gley (G) horizons were also present as indicators of hydromorphic soils, as associated with a number of wetland soil forms including the Avalon, Longlands, Katspruit, Kroonstad and Fernwood Soil Forms (Soil Classification Working Group, 2006).

These soil forms and soil wetness indicators are definitive indicators of wetland habitat occurrence on parts of the site. Based on the type of diagnostic horizons commonly encountered, twinned with the terrain setting on the site (mostly sloping ground), the occurrence of wetland habitat is due to the presence of shallow, mostly seasonally activated, rising and falling shallow groundwater that results in the development of hydromorphism in the

soils. In these seep wetlands interflow hydrologically links the wetland areas to the wider drainage network.

2.1 Results of Wetland Ecostatus Assessments

The Present Ecological Status (PES) categories / classes of the wetlands on the development site were using the WET-Health methodology (MacFarlane et al, 2009). Table 1 below indicates the PES scores for the wetland units assessed. Ecological Importance and Sensitivity (EIS) was calculated collectively for all wetland units on the site and within a 200m radius of the site. This approach was adopted due the relative uniformity of all wetland units on the site.

Table 1: PES Scores and Ecological Category for wetland units in the Study Area

WETLAND UNITS	EC CLASS HYDROLOGY	EC CLASS GEOMORPHIC.	EC CLASS VEGETATION	OVERALL EC CLASS
NEO1_Wet_Site_1a, 1b, 1c&2	B	A	D	**C**
NEO1_Wet_200m_radius_4&5	F	C	E	**E**
NEO1_Wet_200m_radius_3	C	C	D	**C**
All Wetland Units assessed	**D**	**C**	**E**	**D**

Table 2 below indicates the EIS scores for the wetlands on and in the immediate vicinity of the site. For the wetland units on the development site and in the 200m radius of the development site, the PES state of the wetlands must be maintained, as the Recommended Management Objective (RMO) is to maintain the PES of the wetlands on the site.

Table 2: EIS Scores and Category for the Site Wetlands

EIS SCORE – BIODIVERSITY & ECOLOGICAL	EIS SCORE – HYDROLOGICAL	EIS SCORE – HUMAN BENEFITS	OVERALL EIS SCORE[1]	EIS CATEGORY (EC)
2.3	0.8	0.3	2.3	**Moderate**

As a means to demonstrate the expected improvement in state and ecoservice provision associated with the wetlands on the NEO1 development site once the in-wetland rehabilitation measures have been implemented, the WET-EcoServices tool has been applied to the wetlands on the NEO1 development site. The tool is instructive in the context of the proposed

[1] The maximum score of the ecological, hydrological and human benefit sore is assigned as the overall the EIS score.

development as it enables a present state assessment, as well as a future state assessment to be undertaken. The future state assessment is reflective of the ecoservice provision of associated with the wetlands once rehabilitation measures have been implemented and with the development of solar panel arrays within the wetlands on the site. The results are presented in the present state and future state graphs below.

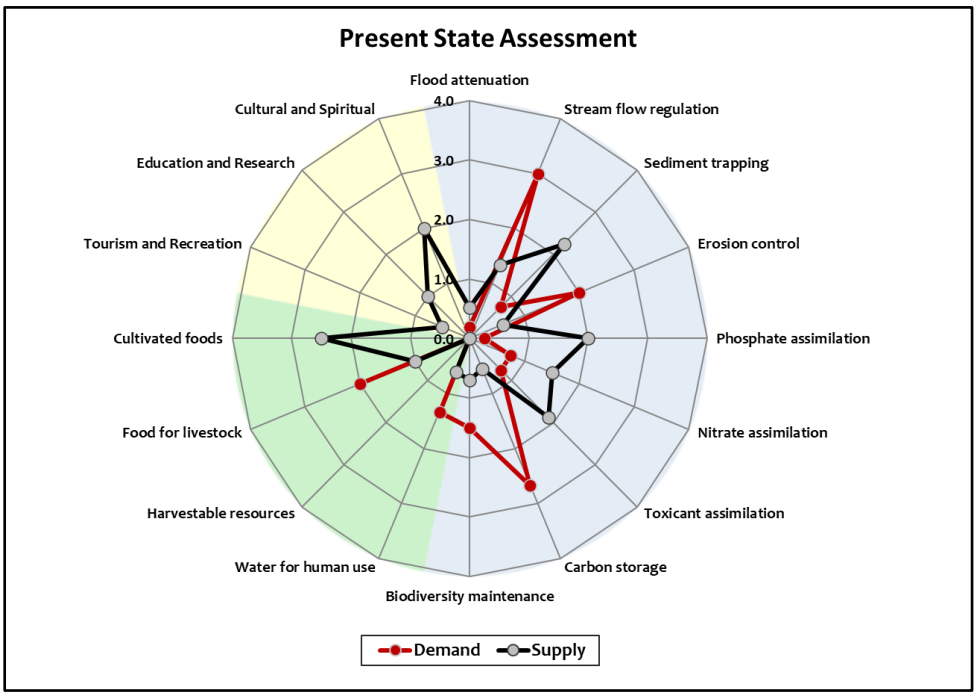


Figure 4 – Wet-Ecoservices Present State Assessment Graph for all wetlands on the Neo 1 development site

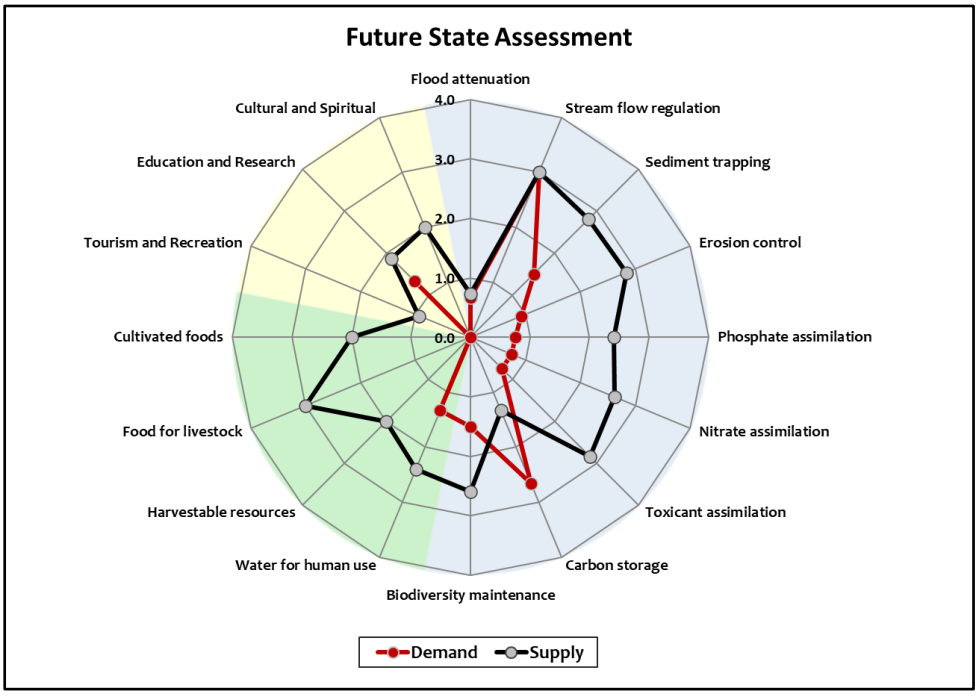


Figure 5 – Wet-Ecoservices Future State Assessment Graph for all wetlands on the Neo 1 development

3. WETLAND REHABILITATION AND CONSTRUCTION MANAGEMENT PLAN

3.1 Roles and Responsibilities

Table 3 provides a summary of the various parties that are involved with the implementation of this WRMP as well as their responsibilities.

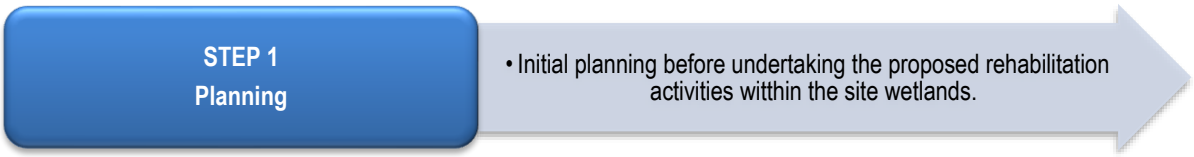
Table 3: Summary of various parties involved with the implementation of this WRMP.

Party	Responsibility
Proponent (Red Rocket)	• The Proponent will be responsible for the appointment of a suitably qualified independent Environmental Control Officer (ECO) who is directly responsible for independent monitoring of all site construction activities, including the WRMP, as well as the appointment of an independent wetland specialist (freshwater ecologist) to oversee the implementation of wetland rehabilitation measures on the development site; • The proponent must ensure compliance with the WRMP; • The Proponent will be responsible for ensuring all Contractors receive a copy of this document and understanding its contents; • The Proponent is responsible to ensure there is sufficient funding for the required rehabilitation and management actions, along with post-implementation monitoring as set out in this WRMP; and • The Proponent is responsible for securing all required legislative environmental approvals (if and where applicable) related to the rehabilitation works prior to the onset of the works.
Project Manager	• The Project Manager must ensure a clear communication line between all parties working on the project, to ensure all environmental concerns and measures as stipulated within this WRMP are implemented/adhered to; • The Project Manager should call a meeting with all responsible parties should there be conflict/ remediation requirements to ensure a suitable solution is found and implemented; • The Project Manager must ensure that there is sufficient funding and resources for an ECO to adequately perform their role; and • The lead project manager must ensure that the WRMP is implemented and that suitable penalties are in place for non-conformance to the WRMP by contractors (as indicated by the ECO).
Independent Wetland Specialist	• The independent wetland specialist is the person responsible for the monitoring of the implementation of the WRMP during the implementation of the activities and for reporting on the degree of compliance relating to all construction work related to wetlands, in association with the project's ECO. The independent wetland specialist must be appointed by the proponent prior to the start of construction activities and be responsible for ensuring that all rehabilitation activities are implemented. • The independent wetland specialist must approve all final construction method statements that related to in-wetland construction prior to their implementation; • Conduct a final environmental compliance assessment and a review of management and rehabilitation measures.
Contractor	• The Contractor/s in this case refers to any contractor/s on site, including the construction crews and relevant sub-contractors; • Such contractor/s will take full responsibility for each of his/her employees and any penalties imposed; • The Contractor may appoint an Environmental Officer (EO), whose responsibility is the day to day management and environmental control of the works; • The Contractor must immediately inform the Project Manager and ECO if any changes to the project are envisaged and if any aspects of this WRMP cannot be complied with; • It is the responsibility of the Contractor/s to ensure that the measures stipulated within this WRMP are adhered to; and

Party	Responsibility
	• Should the Contractor require clarity on any aspect of the WRMP the Contractor must contact the independent wetland specialist or ECO for advice.

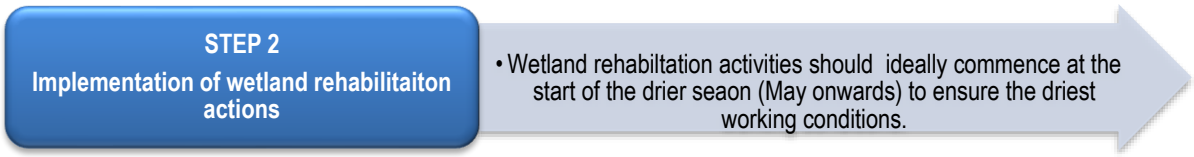
3.2 Site Specific Rehabilitation, Implementation and Management Plan

This Implementation plan is based on a three-step approach, which includes:



All plans and authorisations (if and where necessary) must be in place prior to commencement of the proposed rehabilitation activities. This includes but is not limited to:

a) Appointment of a Contractor, independent wetland specialist and ECO;
b) Planning for on-site requirements;
c) Inform the construction team of the contents and importance of the Rehabilitation and Management Plan;
d) Setting Timeframes and budgetary allowances.



The undertaking of all wetland rehabilitation actions. Wetland rehabilitation actions must be undertaken in conjunction with construction activities on the site.

Prudent monitoring of the rehabilitated areas of the site wetlands is of utmost importance. A list of monitoring and auditing requirements has been provided to maximise the success of the implementation of the control measures.

These steps have been expanded upon in greater detail in the sections that follow.

3.2.1 Step 1: Planning

Table 4: Planning activities that need to be completed prior to the start of wetland rehabilitation and in-wetland construction.

Step 1: Planning
1.1. Compilation and approval of the Construction Method Statement Prior to the onset of rehabilitation works the proponent and contractor must compile a construction method statement that details the procedures for wetland rehabilitation actions at each of the intervention points detailed in this WRMP as well as for in-wetland construction. The construction method statement will need to detail the timing of the wetland rehabilitation actions in relation to the construction timeline for the site. The wetland construction statement must be approved by the independent wetland specialist prior to the commencement of construction. **1.2. Appointment of a Contractor and all required specialists** During the planning phase certain aspects need to be considered to effectively implement this plan. This includes: ➢ Appointment of a suitably qualified Contractor(s) to undertake the required work; ➢ Appointment of an independent wetland specialist to undertake compliance monitoring of the wetland rehabilitation activities as well as to undertake the required post rehabilitation monitoring. **1.3. Timing and Co-ordination of Wetland Rehabilitation** Pre-construction planning must be undertaken to ensure that infrastructure construction activities are timed to occur in conjunction with / immediately following wetland rehabilitation measures within the wetland areas on the site in order to: ➢ limit unnecessary disturbance and impacts on wetlands; ➢ avoid leaving wetland areas un-rehabilitated for a period of time; and ➢ save costs associated with rehabilitation of works in wetland areas. It is strongly recommended that construction of infrastructure in wetland areas and immediately adjacent surrounding areas be phased and divided up into smaller blocks / sub-areas (recommended to be 1-3ha in size) and include both the construction of infrastructure, as well as the respective rehabilitation measures that have been earmarked to occur in that particular part of the site. The objective of this measure is to consolidate all physical modifications to wetland habitat and to avoid the re-impacting of newly rehabilitated wetland habitat, thus potentially compromising the success of rehabilitation efforts. As such construction in wetland areas is recommended to be undertaken occur in the following manner: 1. Construction associated with wetland rehabilitation measures – i.e. re-profiling of ridges / furrows (drains) and headcuts and associated gullies must occur first; 2. This must be followed by the necessary earthworks and construction activities associated with placement (ramming) of pilings for solar panels, trenching and reinstatement for cables and where relevant, civil works for stormwater control measures and construction of a part of the perimeter road; and 3. Lastly the completion of rehabilitation in the form of re-vegetation / hydroseeding and protecting of newly laid topsoils (e.g. covering with geotextiles) must then occur. **1.4. Pre-Construction Design of Roads in Wetlands** Certain roads, including a boundary road and internal roads in between the solar panel array blocks are included in the layout of the development. Roads could adversely affect the wetlands on the site and a number of specifications relating to road design need to be adhered to, as detailed below. ➢ No formalised roads (i.e. surfaced gravel roads) must be constructed between each panel array, and road infrastructure must be limited to the external perimeter road, access road to the office complex, and internal roads to access the panels; ➢ Where the boundary road crosses wetlands – i.e. the valley bottom wetland unit Neo1_Wetl_Site_1b and the seep wetlands Neo1_Wetl_Site_1c and Neo1_Wetl_Site_2, on the northern perimeter of the site, culverts or drainage features must be included in the design of the road; ➢ The installation of culverts in the valley bottom wetland Neo1_Wetl_Site_1b is important as this wetland is likely to be characterised by surface flows in periods of high rainfall. The presence of outcropping of / shallow sandstone bedrock at the location at which the road crosses the wetland must be considered in the road design, and if possible, the outcropping can be used as the road surface to allow surface flows flow over the road and not become impounded;

Step 1: Planning
➢ The perimeter road that crosses the seep wetlands on the north-eastern site and the road substrate must not be impermeable, thereby preventing the lateral movement of subsurface flows (interflow). If the road design includes a sub-surface road base, this base must allow the movement of subsurface water.

3.2.2 Step 2: Site-Specific Wetland Rehabilitation

A detailed site-specific WRMP has been developed for the proposed rehabilitation measures. Successful rehabilitation depends upon cogent conceptual planning, research and design flexibility. The proposed site-specific mitigation measures for the rehabilitation and monitoring phases are listed in Table 5.

Table 5 – Proposed Rehabilitation for existing wetland impacts on the development site.

Step 2: Implementation
There are a number of physical impacts on the wetlands on the site that are suitable for consideration of rehabilitation actions. The primary physical features that are suitable for rehabilitation are: 1. Ridging and furrowing (including drains) within wetlands; and 2. Headcut and gulley erosion. Various sites for rehabilitation action have been identified in the wetlands on the site. A few sites just outside of the site boundaries had been flagged as problematic as these impacts, if left unattended, will affect the wetlands on the site. These sites will not be subject to direct rehabilitation interventions as they are outside of the site boundaries and the proponent does not have authorisation to undertake interventions in these areas. However as part of the environmental operational control on the site the proponent must monitor these sites and if impacts (especially headcuts) threaten the integrity of the wetlands on the site, interventions on the site boundaries must be taken. The location of the intervention points within the wetlands, and the proposed rehabilitation measure for each such feature has been detailed in Table 6 and Figures 6-8. The general rehabilitation measures for the different types of impact are detailed below: **2.1. Proposed Rehabilitation Measures for Headcuts and Gullies** Two primary options for the rehabilitation of headcuts and gullies are recommended: ➢ The reprofiling of headcuts and the infilling of gullies with associated stabilisation and revegetation; and ➢ The use of rock gabion baskets and reno mattresses. The use of earth moving equipment to infill the feature and to re-profile the erosion feature to re-establish the natural slope is the technically favoured method to deal with gully and headcut erosion on the site. This rehabilitation method is feasible due to a number of reasons: ➢ Most of the headcuts and associated gullies on the site are shallow thus able to be re-profiled and infilled; and ➢ The southern wetland tongue of wetland unit Neo1_Wetl_Site_1a in which most of the headcuts are located is not hydrologically characterised as a fluvial environment – i.e. no permanent / seasonal surface flows are present in the wetland. Headcut reshaping must restore the slope to as close a slope as was naturally present, and the slope must not be reshaped to a slope of >20%. For the infilling / backfilling of gullies, soil material that is cohesive must be used. Layers of clayey soils must be used as part of the systematic backfilling of material into the gulley. It is important that the systematic layering be accompanied by compaction of soils. The reprofiling / re-landscaping of the headcut features must be accompanied by the infilling and stabilisation of these areas immediately surrounding the headcut(s) / gully(gullies) characterised by sheet erosion and smaller lateral headcuts and rills with topsoil and the stabilisation of such areas with hydroseeding, pegging with geotextiles etc. Due to the loss of

Step 2: Implementation

topsoil from the headcuts/gullies and the areas of sheet erosion that surround most of the headcuts, importation of topsoil as part of the rehabilitation is considered critical to many of the rehabilitation efforts.

Revegetation of restored areas is critical and must be undertaken through the use of hydroseeding and / or the use of vegetation plugs to stabilise restored soils. For certain headcuts a combination of gabions and slope reprofiling and importation of topsoil and associated revegetation is recommended (refer to Table 6).

2.2. Proposed Rehabilitation Measures for Ridges and Furrows (Drains)

Ridging and furrowing is present across most of the site, both inside the wetlands and outside of the wetlands. The infilling of drains is the primary measure proposed in most parts of the wetlands on site to remediate the effects of drains / furrows. Drains / furrows can either be entirely filled to restore the natural ground level (preferred in the context of the shallow depth of most of the drains / furrows on the site), or soil plugs (comprised of a soil type that is largely impermeable – preferably clay) can be placed at 5m intervals within the drains to impound flows that are concentrated within the drain.

In certain cases, ridding and furrowing has occurred to the extent that a terraced effect has been created. In such cases the reprofiling of the 'terraced' area to restore the natural slope is recommended. This must be accompanied by the requisite revegetation of topsoil (e.g. through hydroseeding) and the protection of soils, e.g. with the use of measures such as geotextile pegged into soils to protect exposed soils from erosional forces such as wind and water.

Table 6 below details the rehabilitation measures to rehabilitate headcuts and gullies as well as ridging and furrowing on the development site. Note sites 40 A & B and sites 42A-D are located out of the site boundaries and are not included in the updated list of rehabilitation intervention points.

Table 6 – Site-specific wetland interventions proposed.

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 1A	29°47'57.99"S	27°20'6.36"E	▪ Headcut and associated gulley.	▪ Reprofile slope to stabilise gulley and headcut; stabilise re-profiled slope with geotextile and revegetate (e.g. hydroseeding). ▪ Topsoil lost so topsoil inputs may be required to promote revegetation.
Site 1B	29°47'57.87"S	27°20'6.61"E	▪ Smaller lateral headcuts and rills.	▪ Reprofile slope as with primary headcut; ▪ Stabilise re-profiled slope with geotextile and revegetate (e.g. hydroseeding).
Site 2A	29°47'55.98"S	27°20'6.68"E	▪ Headcut and associated gulley; ▪ Smaller rills on either side of main headcut.	▪ Construct gabions to stabilise the headcut; **or** reprofile slope to stabilise gulley with associated soil stabilisation (with Geotextile) and revegetation.

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 2B	29°47'55.75"S	27°20'6.95"E	▪ Smaller lateral headcuts and rills; ▪ Area of sheet erosion above the small headcuts.	▪ Reprofile slope and stabilise re-profiled slope with geotextile and revegetate (e.g. hydroseeding). ▪ Revegetate sheet eroded area and stabilise with geotextile.
Site 2C	29°47'55.62"S	27°20'6.73"E	▪ Small headcut and associated rills and sheet erosion.	▪ Reprofile slope and stabilise re-profiled slope with geotextile and revegetate (e.g. hydroseeding). ▪ Revegetate sheet eroded area and stabilise with geotextile.
Site 3A1	29°47'53.99"S	27°20'8.37"E	▪ Headcut fed by water captured by 2 drains / furrows.	▪ L -shaped gulley and headcut - gulley and headcuts quite shallow so reprofile slope to stabilise gulley and headcut. ▪ For the dog leg (3A2) reprofile the shallow gulley side and stabilise.
Site 3B1	29°47'53.99"S	27°20'8.38"E	▪ 2 drains / furrows running down slope.	▪ Plug the 2 parallel-running drains **or** reprofile slope to infill drains and restore natural slope (i.e. stop inflow of water feeding the headcut).
Site 3B2	29°47'54.61"S	27°20'10.02"E	▪ 2 drains / furrows running down slope.	
Site 3A2	29°47'53.56"S	27°20'8.20"E	▪ Extension of the wider gulley - shallow erosion face (dog leg).	▪ For the dog leg (3A2) reprofile the shallow gulley side and stabilise.
Site 4	29°47'52.73"S	27°20'8.79"E	▪ Headcut and associated gulley.	▪ Construct gabions to stabilise the headcut; **or** reprofile slope to stabilise gulley and headcut.
Site 5A	29°47'52.32"S	27°20'9.32"E	▪ Headcut and associated gulley.	▪ Construct gabions to stabilise the headcut; **or** reprofile slope to stabilise gulley and headcut; ▪ Address topsoil loss (sheet erosion) adjacent to the 2 heads as part of reprofiling of area (i.e. ensure topsoil at surface and revegetate and stabilise);
Site 5B	29°47'52.36"S	27°20'9.55"E	▪ Lateral Headcut associated with larger gulley.	▪ Reprofile the shallow headcut face and stabilise; ▪ Address topsoil loss (sheet erosion) adjacent to the 2 heads as part of reprofiling of area (i.e. ensure topsoil at surface and revegetate and stabilise).
Site 6	29°47'51.77"S	27°20'10.04"E	▪ Small Headcut and associated gulley.	▪ Reprofile slope to remove headcut, stabilise with geotextile and reseed.

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 7A	29°47'50.86"S	27°20'11.02"E	▪ Small headcut and associated shallow gulley.	▪ Reprofile slope to infill headcut and associated gulley, stabilise with geotextile and reseed.
Site 7B	29°47'50.95"S	27°20'11.25"E	▪ Small scarp face.	▪ Reprofile slope to remove the scarp face stabilise with geotextile and reseed.
Site 8	29°47'50.04"S	27°20'12.48"E	▪ Headcut and associated gulley.	▪ Reprofile the shallow headcut face and stabilise and revegetate.
Site 9A	29°47'49.01"S	27°20'13.76"E	▪ Headcut and associated gulley.	▪ Due to concentration of headcuts and drains, along with the presence of ridging (terracing), recommendation to reprofile the entire area to cover headcuts and to infill the drain feeding Site 9B1 headcut; ▪ Ridges can be used to infill the drain; ▪ The gulley / channel downstream of Site 9B1 must be reprofiled to even the slope **NB - action in conjunction with Site 22.**
Site 9B1	29°47'49.29"S	27°20'14.16"E	▪ Headcut and associated gulley.	
Site 9B2	29°47'49.37"S	27°20'14.10"E	▪ End point of drain feeding headcut.	
Site 9B3	29°47'49.88"S	27°20'14.32"E	▪ Upper end of drain (feeding headcut).	
Site 10	29°47'52.95"S	27°20'0.29"E	▪ Shallow furrow / drain.	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 11	29°47'52.70"S	27°19'59.40"E	▪ Shallow furrow / drain.	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 12	29°47'52.84"S	27°19'58.65"E	▪ Series of furrows / drains.	▪ Infill or plug the deeper furrows.
Site 13	29°47'51.68"S	27°20'1.36"E	▪ Series of furrows / drains.	▪ The furrows are associated with parallel ridges (thus slightly terraced); need to reprofile the area and restore an even slope.
Site 14	29°47'52.67"S	27°20'2.45"E	▪ Ridge running east-west (in direction of wetland flow).	▪ Flatten this ridge (remove material).
Site 15	29°47'52.43"S	27°20'3.08"E	▪ Shallow drain.	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 16A	29°47'47.81"S	27°20'4.44"E	▪ Shallow drain running across wetland.	▪ Infill drain completely to restore the natural ground level.
Site 16B	29°47'48.69"S	27°20'4.60"E		

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 16C	29°47'50.79"S	27°20'5.01"E		
Site 17	29°47'49.08"S	27°20'7.75"E	▪ Shallow headcut; shallow drains feeding into the headcut.	▪ Infill headcut and even surface; protect with geotextile and revegetate; ▪ Drains are feeding into the headcut from both the north and south sides - these need to be infilled.
Site 18	29°47'49.24"S	27°20'7.56"E	▪ Ridge running across the wetland.	▪ Flatten this ridge (remove material).
Site 19A	29°47'49.60"S	27°20'8.23"E	▪ Series of north-south aligned drains.	▪ Infill the drains completely to restore the natural ground level.
Site 19B	29°47'48.59"S	27°20'8.02"E		
Site 20	29°47'48.22"S	27°20'10.86"E	▪ Series of drains in more steeply sloping ground.	▪ Infill the drains completely to restore the natural ground level.
Site 21A	29°47'48.21"S	27°20'11.48"E	▪ Long drain running across wetland.	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 21B	29°47'49.87"S	27°20'11.93"E		
Site 22	29°47'49.60"S	27°20'12.32"E	▪ Series of drains - **NB - these drains feed the headcuts at Site 9.**	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level **NB - action related to Site 9.**
Site 23	29°47'49.89"S	27°20'11.60"E	▪ North-south aligned drains within wetland.	▪ Plug drains with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 24	29°47'49.92"S	27°20'10.96"E	▪ North-south aligned drains within wetland.	▪ Plug drains with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 25	29°47'49.95"S	27°20'10.24"E	▪ North-south drains within wetland.	▪ Plug drains with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 26A	29°47'48.98"S	27°20'15.03"E	▪ Headcut and adjacent scarp face associated with shelf (ridge).	▪ The scarp face associated with the shelf / ridging needs to be 'collapsed' into the lower part of the wetland - i.e. the slope reprofiled to create an even slope into the lowest part of the valley floor; ▪ All parallel-running drains and associated headcuts need to be infilled and the area stabilised with geotextile and revegetated.
Site 26B	29°47'48.94"S	27°20'14.94"E	▪ Parallel drain associated with headcut.	
Site 26C1	29°47'49.28"S	27°20'15.22"E	▪ Downstream point of drain with headcut in valley floor.	

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 26C2	29°47'49.47"S	27°20'14.72"E	▪ Upstream point of drain i.e. headcut in valley floor.	
Site 26D	29°47'49.73"S	27°20'14.57"E	▪ 2 active headcuts.	
Site 26E	29°47'49.13"S	27°20'15.53"E	▪ Active headcut.	
Site 26F	29°47'48.93"S	27°20'15.43"E	▪ Active headcut.	
Site 27A	29°47'48.69"S	27°20'16.05"E	▪ Depression (gulley) associated with headcut (at 27B).	▪ The shelf / ridging needs to be 'collapsed' into the lower part of the wetland - i.e. the slope reprofiled to create an even slope into the lowest part of the valley floor, thereby filling the depression and the headcut; ▪ As with the area to the west the reprofiled slope needs to be stabilised with geotextile and revegetated.
Site27B	29°47'48.78"S	27°20'15.72"E	▪ Active headcut at head of depression (gulley).	
Site 28A	29°47'48.41"S	27°20'16.74"E	▪ Drain aligned parallel to natural flow direction above valley floor.	▪ Plug drain with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 28B	29°47'47.22"S	27°20'20.32"E		
Site 28C	29°47'46.89"S	27°20'21.75"E		
Site 28D	29°47'46.54"S	27°20'22.36"E	▪ Outlet of drain.	
Site 29	29°47'48.55"S	27°20'17.38"E	▪ Shallow drain.	▪ Infill drain completely to restore the natural ground level.
Site 30	29°47'48.39"S	27°20'18.54"E	▪ Drain running down slope.	▪ Infill drain completely to restore the natural ground level.
Site 31	29°47'49.05"S	27°20'19.20"E	▪ Drain aligned parallel to natural flow direction.	▪ Infill drain completely to restore the natural ground level.
Site 32	29°47'49.54"S	27°20'19.36"E	▪ Shallow drains.	▪ Infill drain completely to restore the natural ground level.
Site 33A	29°47'51.33"S	27°20'20.09"E	▪ Headcut and associated gulley; ▪ Eroded channel above headcut; associated sheet erosion and loss of topsoil adjacent to feature.	▪ Construct gabions to stabilise the headcut **or** Reprofile slope to stabilise gulley and headcut; stabilise re-profiled slope with geotextile and revegetate (e.g. hydroseeding); ▪ Topsoil has been lost so topsoil inputs may be required to promote revegetation; ▪ Stop concentrated drainage from upstream that is feeding the erosion feature.

SITE NAME	LATITUDE	LONGITUDE	TYPE OF IMPACT	PROPOSED REHABILITATION ACTION
Site 33B	29°47'51.18"S	27°20'20.60"E	▪ Small lateral headcut.	▪ Reprofile slope to stabilise gulley and headcut.
Site 34	29°47'48.63"S	27°20'21.81"E	▪ Ridges and drains parallel to slope.	▪ Reprofile the ridges to create an even surface; stabilise with geotextile and revegetate.
Site 35A	29°47'48.22"S	27°20'21.33"E	▪ Series of parallel running drains on the low point of the valley floor.	▪ infill to even the slope (and stabilise and revegetate) **or** insert plugs every 5m within each drain.
Site 35B	29°47'47.75"S	27°20'21.63"E		
Site 36A	29°47'46.80"S	27°20'21.73"E	▪ Drain aligned parallel to natural flow direction above valley floor.	▪ Plug drain with less permeable soil (clay) plugs every 5m or infill drain completely to restore the natural ground level.
Site 36B	29°47'46.61"S	27°20'22.71"E	▪ Outlet of drain.	
Site 37	29°47'46.95"S	27°20'22.78"E	▪ Small headcut.	▪ Reprofile slope to restore headcut.
Site 38	29°47'46.15"S	27°20'23.96"	▪ Small headcut and rills.	▪ Infill and stabilise with geotextile and revegetate.
Site 39	29°47'43.85"S	27°20'27.52"E	▪ Short but deepish drain.	▪ Infill drain completely to restore the natural ground level.
Site 41A	29°47'39.11"S	27°20'40.28"E	▪ Series of drains running down the slope.	▪ Plug drains with less permeable soil (clay) plugs every 5m **or** infill drain completely to restore the natural ground level.
Site 41B	29°47'39.32"S	27°20'40.41"E		
Site 43A	29°47'42.05"S	27°20'39.84"E	▪ Large headcut; active seepage (spring), thus head of seep.	▪ Construct gabions to stabilise the headcut; **or** reprofile slope to stabilise gulley and headcut; ▪ The entire width of the erosion face needs to be stabilised; ▪ A form of reno mattress at or just below ground level is proposed to allow for active seepage; ▪ The entire area must be stabilised (headcut associated with extensive topsoil loss - 43B) and revegetated; ▪ Topsoil import may be required to allow revegetation.
Site 43B	29°47'41.75"S	27°20'39.51"E	▪ Part of extended erosion (scarp face).	
Site 43C	29°47'41.40"S	27°20'40.11"E	▪ Outflow of gulley.	
Site 44A	29°47'40.17"S	27°20'39.98"E	▪ Series of shallow drains / furrows running down the slope.	▪ Infill drains or scarify to block these.
Site 44B	29°47'39.96"S	27°20'38.49"E		
Site 45	29°47'39.39"S	27°20'38.46"E	▪ Deeper drain.	▪ Infill drain or plug.

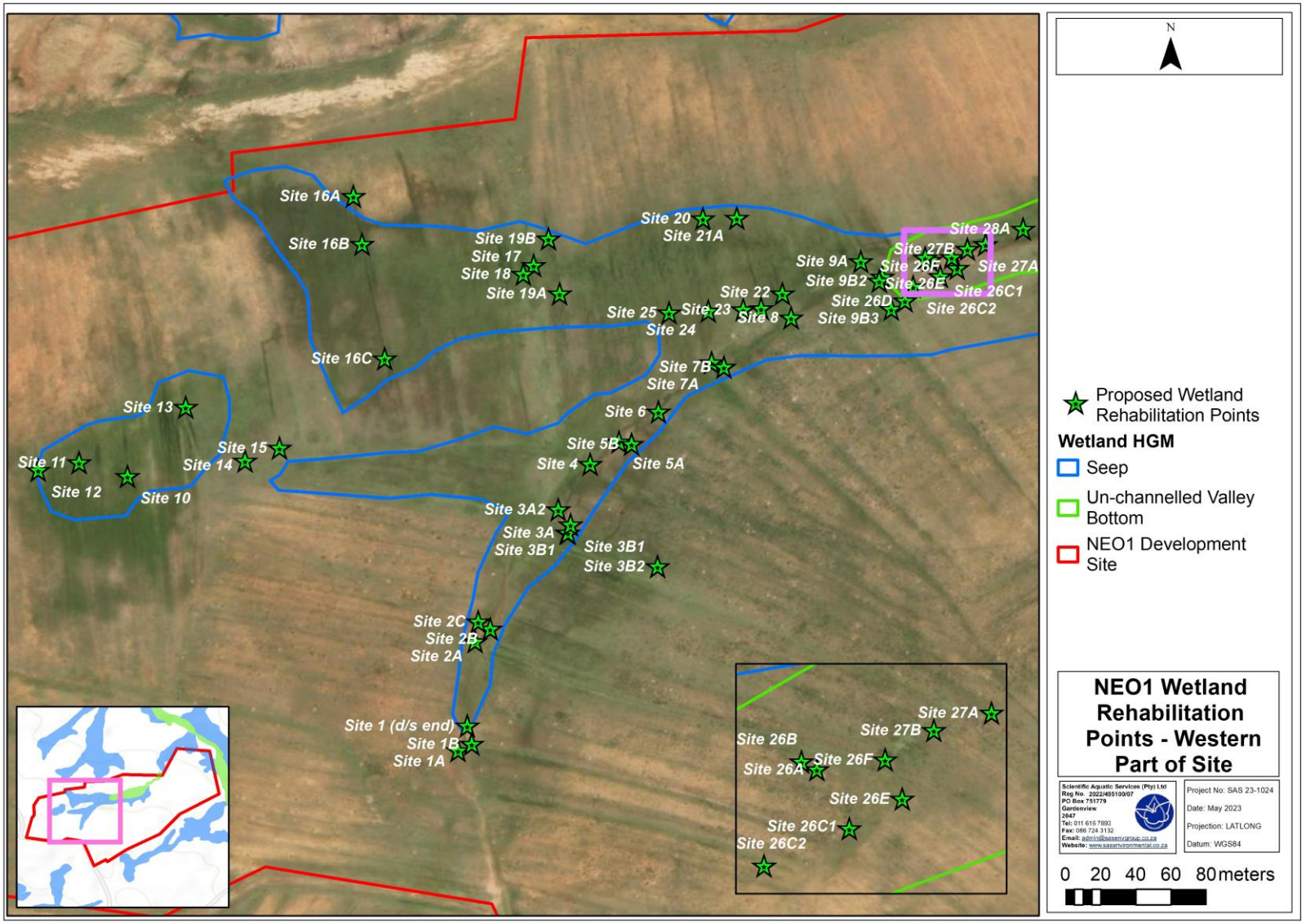


Figure 6 – Proposed Wetland Rehabilitation Points in the Western Part of the development site

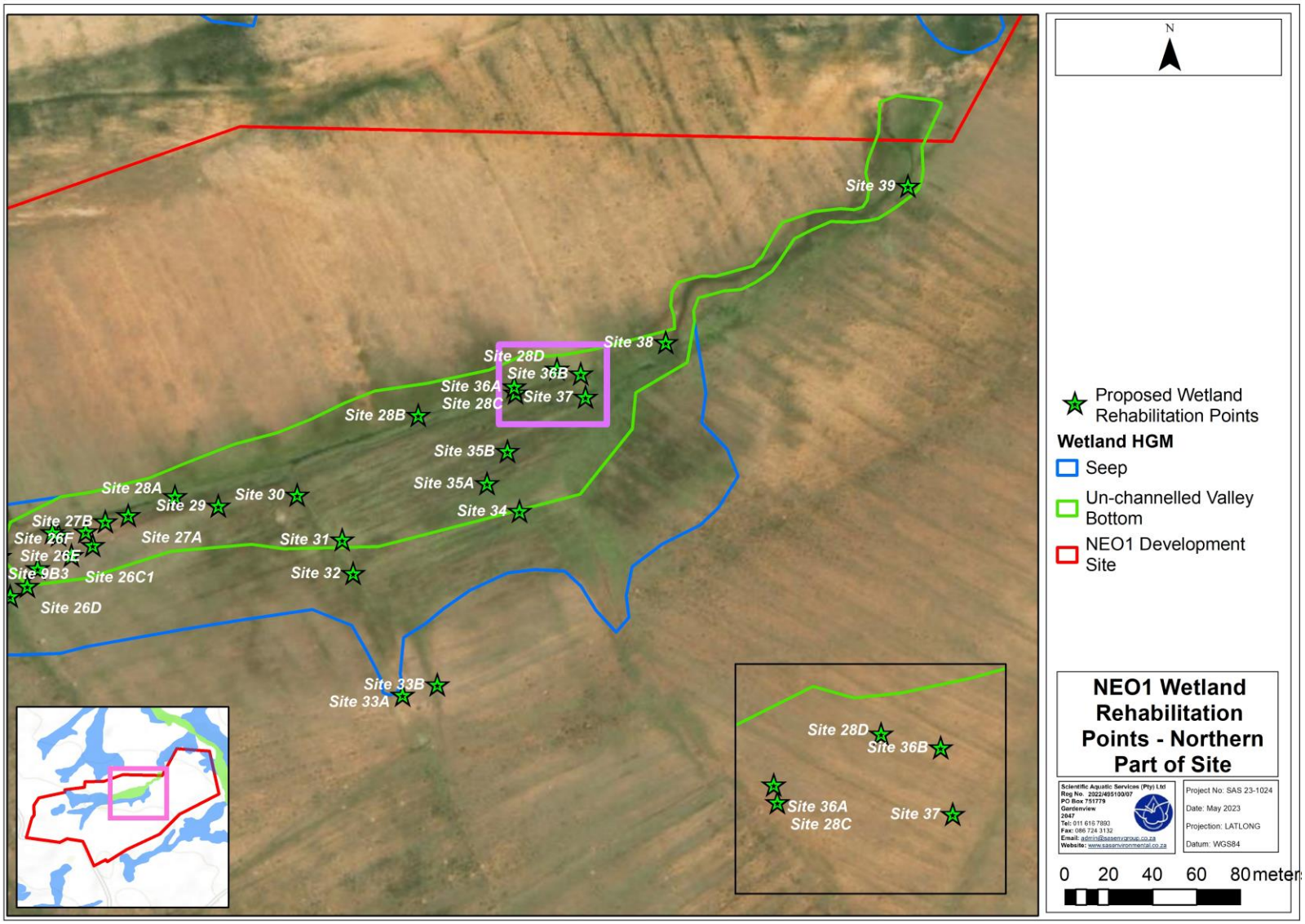


Figure 7 – Proposed Wetland Rehabilitation Points in the Western Part of the development site

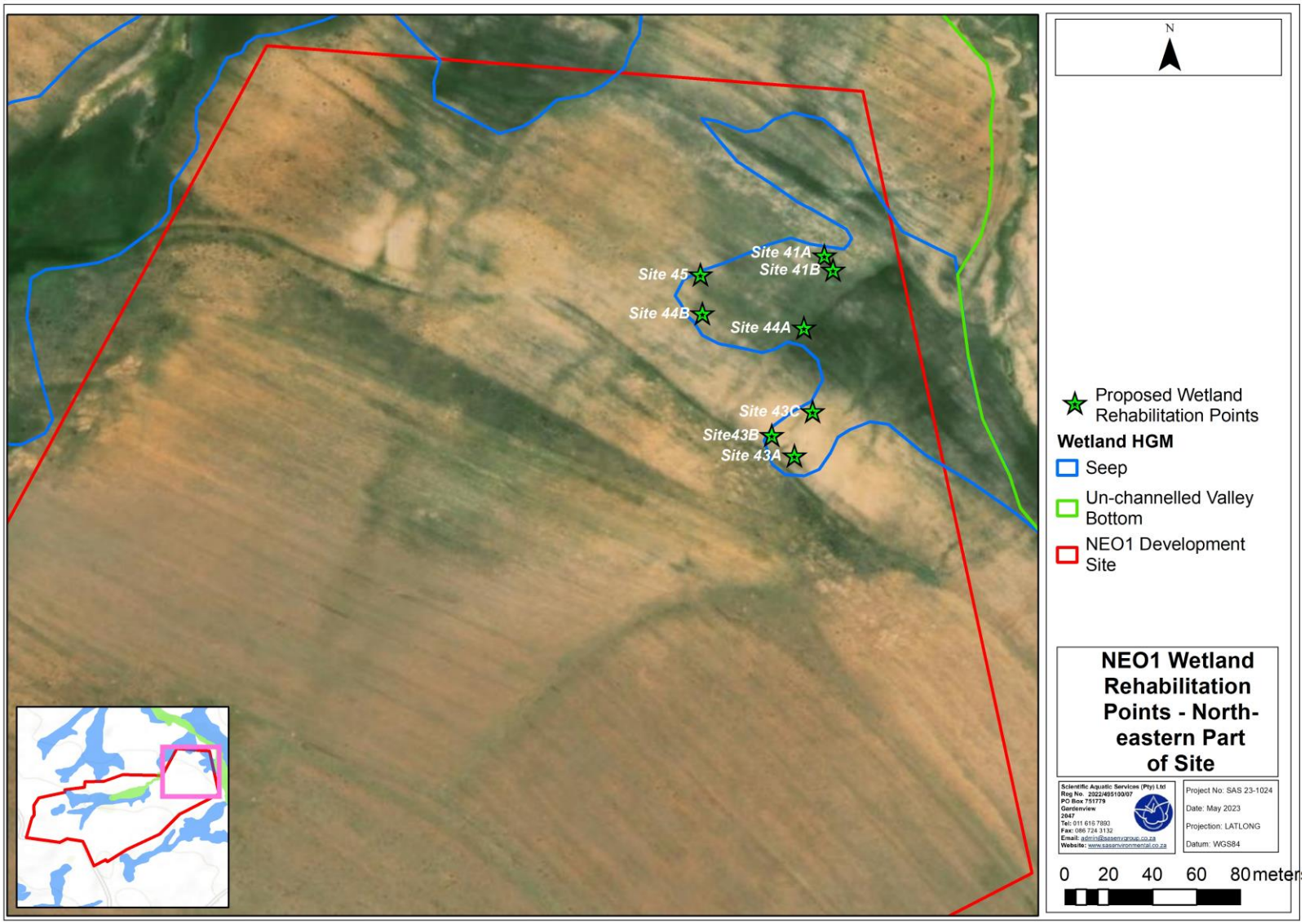


Figure 8 – Proposed Wetland Rehabilitation Points in the North-eastern Part of the development site

It should be noted that as general construction measures are likely to be undertaken in conjunction with wetland rehabilitation, a series of general mitigation / control measures that are applicable to the wetland rehabilitation interventions as well have been stipulated in Table 7 below:

Table 7: General Wetland Rehabilitation and mitigation measures, with associated compliance measures.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
Wetland Pre-construction requirements	➢ A construction method statement for the rehabilitation measures – i.e. generic rehabilitation of headcuts & gullies, and rehabilitation of ridges and furrows, detailing inter alia: the type of plant (vehicles and equipment) to be used, construction practices, sourcing of materials, methods for restoration, must be compiled by the engineering team and contractor prior to the commencement of construction in the wetlands. ➢ The method statement must be reviewed and approved by the wetland specialist prior to commencement of construction.	➢ The compilation of the wetland rehabilitation construction method statement and its subsequent approval by the wetland specialist.
	➢ A construction schedule for wetland rehabilitation measures (as well as for construction of solar infrastructure in wetlands) must be compiled at the commencement of construction related to the wetland rehabilitation measures. ➢ The construction schedule must include details of how wetland rehabilitation is to be co-ordinated with construction of solar infrastructure in the respective parts of the wetland and how construction of infrastructure in wetlands and rehabilitation will be phased. ➢ The construction schedule must be approved by the wetland specialist prior to the onset of construction.	➢ The compilation of the wetland rehabilitation and in-wetland construction schedule and subsequent approval by the wetland specialist.
	➢ Immediately prior to the onset of construction, the wetland specialist must undertake an assessment of PES, EIS and wetland ecoservice provision for all wetland units in which wetland construction and rehabilitation actions are to be undertaken, in order to determine a pre-construction baseline against which to measure the success of rehabilitation efforts	➢ The undertaking of PES, EIS and wetland ecoservice provision assessments for all wetland units affected, immediately prior to the start of construction.
Wetland Construction Monitoring	➢ A wetland specialist must be appointed to oversee all construction of infrastructure and wetland rehabilitation efforts for the duration of the works in the wetlands on the site. A monthly site visit by the wetland specialist for the duration of the works in the wetlands must be made. The compilation of wetland rehabilitation and construction compliance reports on a monthly basis must form part of the scope of the wetland specialist.	➢ The appointment of a wetland specialist and the monthly undertaking of site inspections and monthly compliance report by the wetland specialist for the duration of the in-wetland construction, as well as the undertaking of three post-construction inspections with an accompanying close out report.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
	➢ Following the completion of construction, 3 site inspections on a quarterly basis, and which includes one site inspection at the start of, and at the end of the first rainy season following the works completion must be undertaken by the wetland specialist. A close out report must be compiled by the wetland specialist which includes an assessment of post rehabilitation PES, EIS and wetland ecoservice provision.	
Wetland Construction Activities	➢ All wetland rehabilitation works and in-wetland construction work must be undertaken during the drier winter months (May to October) to reduce damage to wetland vegetation and substrate that increases when work is conducted in saturated settings; ➢ If construction occurs in the summer (wet season), movement of vehicles across wetland areas on the construction site must be limited to designated rights of way, with no indiscriminate movement of vehicles across the site. ➢ Footprint areas for equipment must be kept as small as possible. ➢ No indiscriminate, large scale clearing of all vegetation across the entire extent of the solar plant footprint within the site wetlands is permitted to be undertaken. The objective of the wetland rehabilitation plan is to ensure that no nett loss of biodiversity occurs on the development site and thus as much natural vegetation cover as possible must be maintained within the wetlands on the site.	➢ If wet season construction is unavoidable: - Vehicle access in wetlands to be restricted to approved rights of way within wetlands. ➢ Phased construction and retention of natural vegetation outside construction footprint (e.g. in trenching and panel support footprints). ➢ No large scale clearing of vegetation at the start of, and during the construction period.
Access into the works areas	➢ Access into the wetlands where works are being undertaken must be carefully controlled. ➢ Parts of the site wetlands located outside of the active areas of construction / rehabilitation must be avoided as far a possible when accessing works areas. Wetlands located in close proximity to the development site, in particular components of wetlands that straddle the site boundaries must be maintained as strict no-go areas for the duration of construction. As such no entry of plant (equipment and vehicles) and construction workers must be permitted into wetland areas outside of the site, except for locations where wetland rehabilitation efforts are being undertaken close to the site boundaries. ➢ The entire development area must be fenced prior to the start of construction to ensure that construction impacts are limited to the development site. ➢ Running tracks for access of construction personnel and equipment must be constructed into the wetland if large numbers of personnel or heavy plant / equipment are required to be used, or if saturated conditions are	➢ No instances recorded of entrance by vehicles / equipment and construction workers into wetlands outside of the site or where construction / rehabilitation actions are not actively occurring. ➢ Fencing of the entire development site prior to the start of construction and the maintenance of fencing for the duration of the construction period. ➢ The utilisation of running tracks where deemed necessary by the wetland specialist or ECO.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
	encountered at the time of construction; different options exist for the construction of such running tracks – bog mats or similar can be used, or a geotextile-based running track overlaid with fines (crushed gravel) are two potential options. Due to cost and availability, the geotextile / fines material running track is likely to be the more practical option. ➢ Light machinery / plant rather than heavy tracked machinery must be utilised where saturated soils / surface water is encountered in parts of the wetlands where rehabilitation efforts are planned to occur. ➢ The wetland specialist and resident engineers must be consulted on a monthly basis at least prior to each rehabilitation effort being commenced in order to determine the degree of saturation and permitted plant / machinery to undertake each rehabilitation effort. This must coincide with the monthly construction site inspection by the wetland specialist in order to allow specialist to determine conditions in the part of the wetland in which the rehabilitation effort is planned.  **Figure 9 -Example of a bogmat running track in a wetland with geotextile placed parallel to it.**	➢ Approval of plant to be used in individual rehabilitation measures prior to commencement of individual rehabilitation measures, on a monthly basis by the wetland specialist
Trenching and excavation within wetlands	➢ It is recognised that trenching will need to be undertaken for cables to be laid between the various panel arrays, and that fines material will need to be placed around the cables to allow heat transfer from the cables to take place. This fines material could become a sub-surface preferential flow path for subsurface (vadose) water flow within the wetlands that could alter the hydraulic regime of the wetland. In order to mitigate against the impact of such preferential flow, trench (flow) breakers must be installed within the fines material at intervals of every 5m as a minimum. The trench breaker can take the form of clayey material which is less pervious than the fines material and which will prevent the lateral development of subsurface drainage;	➢ Installation of trench breakers in all cable trenches that run down the slope of the site. ➢ Separation of excavated topsoils and subsoils and the correct reinstatement of subsoils, overlain by topsoil. ➢ Temporary storage of excavated material according to the specifications of the WRMP.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
	➢ With the exception of the fines material surrounding the cables, the natural soils must be reinstated in the reverse order in which they were extracted – i.e. with topsoil returned last. ➢ The exact technical details and specifications regarding methods of constructing supports for the PV panels are not available at the time of the updating of the wetland rehabilitation plan, but a method that has as limited a footprint as possible must be used. ➢ Excavated trench material (soil substrate) must ideally be laid upon geotextile that is placed adjacent to the working area / right of way to prevent damage to wetland vegetation when this material is reinstated. Any excess material, especially subsoil, must not be left in the wetland but rather stockpiled outside of the wetland for use as general fill, or to be disposed of, as necessary. ➢ When reinstating the material (backfilling), the level of the trench must be slightly raised above the natural ground level to allow for natural subsidence of reinstated soils and to prevent the development of shallow linear depressions along the trench line that will adversely affect the surface hydrology	
Construction laydown area	➢ One single lay down area must be established outside the boundary of the wetlands on the site. ➢ It is recommended that this area not be stripped of vegetation, rather that the natural grassland vegetation be mowed to ground level to protect soils and facilitate rehabilitation. ➢ The laydown area must be located at least 50m away from a delineated wetland boundary.	➢ The location of a single, consolidated laydown area located 50m away from the wetland boundary through the duration of the construction works
Stormwater Management	➢ Construction storm water management measures must be put into place prior to the start of the works; ➢ Management measures should include berms, silt fences and hessian curtains. Care must be taken to avoid additional disturbance during the implementation of these measures.	➢ Installation and maintenance of construction stormwater controls to the satisfaction of the ECO / wetland d specialist.
General Good housekeeping	**Waste and Litter Problems** ➢ Suitable ablution facilities need to be provided for all personnel; ➢ General waste and litter must be cleared and be disposed of at a registered and approved disposal site; ➢ Suitable general waste receptacles must be provided that are primate proof; and ➢ Disposal of waste or litter must be prohibited within the works area and surrounds. Any general waste noted must be cleared immediately and disposed of in a responsible manner.	➢ Maintenance and control of waste in line with the stipulations of the ESMP and to the satisfaction of the ECO.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
Pollutant and Waste Management	➢ All static machinery (such as diesel pumps) that could leak oil / fuel into the soil must operate on drip trays. ➢ Drip trays must be checked for the presence of oil and leaked oil must be safely disposed of, not into the environment. ➢ Refuelling of vehicles must not be undertaken in the works area but must rather be undertaken at a suitable location on the site such as a repair workshop or vehicle storage area located away from the works area. ➢ If soil contamination occurs (due to a petro-chemical spill), the contaminated soil should be removed from the site and disposed of and treated appropriately at a hazardous waste landfill site.	➢ Universal use of drip trays for all non-static machinery operating on the construction site. ➢ No refuelling of vehicles on-site to be undertaken in the works area ➢ Disposal of any leaked oil and associated bagged soil as part of the hazardous waste disposal system for the site. ➢ Correct remediation of all spills in line with the stipulations of the ESMP.
Hazardous Substances	➢ No storage areas for hazardous materials must be located within 100m of the outer edge of any wetland area on or surrounding the site. ➢ All fuel storage drums and other hazardous chemicals must be designed in accordance with the relevant oil industry standards, SANS Code and other relevant requirements.	➢ Storage of hazardous materials at least 100m distant from the edge of any wetland and in line with the stipulations of the ESMP.
Post Works Measures	➢ Once works are completed in parts of the wetland in which rehabilitation efforts / in wetland construction has occurred, the following measures must be immediately undertaken: ➢ All construction-related material, including all material related to running tracks, laydown areas, construction signage and demarcation, etc. must be removed from the construction footprint; ➢ Any damage to wetland soils and vegetation during construction of solar panels and other related infrastructure must be fully repaired. ➢ Any damage noted to wetland substrate due to construction access, especially if rutting has been created or subsidence of soils along vehicle / plant access right of ways has occurred must be noted, and in consultation with the ECO and the wetland specialist, measures identified to remediate the damage. Shallow rutting must be lightly ripped / scarified to prevent to collection of surface drainage along the ruts. ➢ Natural wetland vegetation is likely to recolonise the affected areas, but these disturbed areas must be monitored for the development of erosion and for the regrowth of vegetation. ➢ No livestock must be allowed to enter the construction footprint. ➢ Post-construction rehabilitation monitoring must be undertaken by the appointed wetland specialist for after the completion of in-wetland construction. 3 site assessments must be undertaken at a 3-month interval and must	➢ Rehabilitation of works areas to the satisfaction of the ECO and independent wetland specialist. ➢ Rehabilitation of all damage to soils and vegetation related to construction and vehicle movement. ➢ Mitigation of any erosion that develops as soon as possible. ➢ Complete regrowth of vegetation within the construction footprint (including construction access footprint) at the end of the next rainy / wet season. ➢ Restriction of livestock entry onto the site. ➢ The undertaking of 3 post wetland construction audits by the wetland specialist, including 2 summer (rainy season audits and 1 audit undertaken at the end of the first rainy season after the end of construction.

Objective/ Requirement	Construction Management Task / Mitigation	Compliance Measure
	include two summer audits, including an audit at the end of the first rainy season after the completion of construction.	

3.2.3 Operational phase management

In addition to monitoring, operation mitigation measures related to wetlands and associated compliance measures are stipulated in Table 8 below.

Table 8 – Operational tasks / aspects of plant operation, associated mitigation, and related compliance measures

Operational Task / Mitigation	Compliance Measure
➢ All wetlands should be treated as sensitive areas. Access into wetlands must be limited as far as possible. and be strictly maintained as 'no-go' areas.	➢ Limiting of all vehicular / equipment access into the wetlands on the development site, except for maintenance and solar panel cleaning.
➢ Unless in an emergency situation or due to a critical maintenance need, no vehicle access must be allowed into the wetlands during parts of the wet / rainy season when soils are saturated in order to limit the damaging of soils.	➢ No vehicle / equipment entry into wetland areas during periods in which soils are saturated except under emergency circumstances or for critical maintenance needs.
➢ With the exception of the perimeter road that crosses the wetland on the site northern perimeter, no roads must be created within wetlands. ➢ Solar panel washing or other maintenance must be undertaken with use of as light a vehicle as possible – e.g. a pick-up (bakkie) or SUV.	➢ No creation of roads / tracks within wetlands. ➢ No access of heavy machinery into wetlands.

3.3 Monitoring

Monitoring must be undertaken at certain prescribed minimum intervals for the duration of the construction period, as well as for a period following the end of construction as detailed in this report and in terms of the project ESMP. A monitoring programme must be in place not only to ensure compliance with the ESMP and the wetland rehabilitation plan through the duration of in-wetland construction activities, but also to monitor any environmental issues and impacts which have not been accounted for in the afore-mentioned documents that are/ or could result in significant environmental impacts for which corrective action is required.

A monitoring programme specific to the wetlands on the site must be implemented for the duration of the construction phase of the project as it applies to both in-wetland construction and wetland rehabilitation. This programme is based on the visual monitoring of all construction and post-construction aspects of wetland works and must include:

- Daily site visits and monitoring must be conducted by the Environmental Site Officer (ESO) to ensure daily implementation of the ESMP conditions and provide corrective actions where required;
- Monthly compliance assessments that must be conducted by the appointed wetland specialist for the duration of the construction phase as it relates to construction of solar power infrastructure in wetlands and for wetland rehabilitation actions;
- Compilation of a monthly wetland construction compliance report by the wetland specialist which must document findings and recommend corrective action to be taken. Subsequent reports will provide feedback on whether previous non-conformance raised has been resolved, thereby ensuring continual improvement of the site's environmental performance.

Table 9 details monitoring frequencies for different aspects of the works, including post-construction rehabilitation.

Table 9 – Monitoring Requirements

Aspect	Monitoring Requirement		
	Time Period	Responsible Person	Frequency
In-wetland construction of solar power infrastructure.	Duration of the Construction *within the wetlands.*	ESO / ECO Wetland Specialist	Daily (ESO) Monthly (ECO & Wetland Specialist)
Wetland Rehabilitation Actions.	Duration of Wetland Rehabilitation Works.	ESO / ECO Wetland Specialist	Daily (ESO) Monthly (ECO & Wetland Specialist)
Immediate Post-Construction Works Rehabilitation Monitoring.	9 months post the end of in-wetland construction (3 audit visits at 3-month intervals).	Wetland Specialist	Every 3 months for 9 months (3 seasonal audits)
Operational Monitoring.	Duration of Operational Life of Power Plant.	Plant Environmental Officer	6-monthly audits.

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Kotze D.C., Marneweck G.C., Batchelor A.L., Lindley D.S. and Collins N.B. 2009. WET-EcoServices: A technique for rapidly assessing ecosystem services supplied by wetlands. WRC Report No. TT 339/09. Water Research Commission, Pretoria.

Macfarlane, D., Kotze, D.C. Ellery, W., Walters, D., Koopman, V, Goodman, P and Goge, M., 2009, WET-Health - A technique for rapidly assessing wetland health. Water Research Commission Wetland Management Series - WRC Report TT 340/09, March 2009

Rountree, M.W., Malan, H.L., and Weston, B.C., (eds.), 2013, Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0). Report to Report to the Water Research Commission and Department of Water Affairs: Chief Directorate: Resource Directed Measures. WRC Report No. 1788/1/12

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APPENDIX A – TERMS OF USE AND INDEMNITY

INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as the 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 and its staff reserve the right to, at their sole discretion, 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 – Specialist information

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 and Environmental Studies) (University of the Witwatersrand)

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

Company of Specialist:	Scientific Aquatic Services (Pty) Ltd.		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	1401	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc: Environmental Management (University of Johannesburg) BSc (Hons): Zoology (Aquatic Ecology (University of Johannesburg) BSc: Zoology, Geography and Environmental Management (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health Practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum Member of the Gauteng Wetland Forum; Member of International Association of Impact Assessors (IAIA) South Africa; Member of the Land Rehabilitation Society of South Africa (LaRSSA)		

1. (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

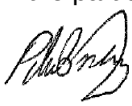
1. (a) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services (Pty) Ltd.		
Name / Contact person:	Paul da Cruz		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	084 224 0088
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	paul@sasenvgroup.co.za		
Qualifications	BA (Hons) Geography and Environmental Studies (University of the Witwatersrand)		

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

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

DEVELOPMENT SECTORS OF EXPERIENCE

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

5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

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

Freshwater Assessments

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

Aquatic Ecological Assessment and Water Quality Studies

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

Biodiversity Assessments

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

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

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

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF PAUL DA CRUZ

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

DEVELOPMENT SECTORS OF EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

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

Freshwater Assessments

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

Biodiversity Assessments

- Avifaunal Assessments
- Strategic Biodiversity Assessment

Visual Impact Assessment

- Visual Impact Assessments

GIS / Spatial Analysis

- GIS Spatial Analysis and Listing Notice 3 mapping.