



LEEUBOSCH PV GENERATION (PTY) LTD

Proposed Construction of Solar Photovoltaic (PV) Energy Facilities (PV 1 & PV2) on Portion 37 of the Farm Leeuwbosch No. 44 near Leeudoringstad, North West Province

Wetland Rehabilitation Plan

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LEEUBOSCH PV GENERATION (PTY) LTD

PROPOSED CONSTRUCTION OF SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITIES ON PORTION 37 OF THE FARM LEEUBOSCH 44 NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE

WETLAND REHABILITATION PLAN

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LEEUBOSCH PV GENERATION (PTY) LTD

PROPOSED CONSTRUCTION OF UP TO A 9.9 MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY ON PORTION 37 OF THE FARM LEEUBOSCH 44 NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE

WETLAND REHABILITATION PLAN

1 REHABILITATION MANAGEMENT PLAN

This Wetland Rehabilitation Plan is designed to manage, maintain and improve the PES and EIS of the wetland areas and surrounding terrestrial areas within the study area, with particular emphasis on the impacts that the upgrading of a road crossing within the study area may have on the drainage line and wetland areas.

1.1 Rehabilitation objectives

The objectives of this plan are to:

- Ensure as far as is practicable that the measures contained in the report are implemented;
- Manage activities within the study area in order to maintain and/ or improve ecological integrity of the study area;
- Minimise adverse impacts on the receiving environment;
- Maximise the service provision and ecological functioning of the watercourse and wetland areas;
- Maximise the ecological functioning of the watercourse and wetland system and;
- Monitor the impact of the project on the receiving environment.

1.2 Rehabilitation context

The rehabilitation and management plan fits into the overall planning process of the development activities and should be implemented by the proponent as soon as possible once construction on the road has reached a stage where rehabilitation activities become viable. This document serves as a rehabilitation and management plan to manage the ecological characteristics of the study area during the design, construction/implementation and post-rehabilitation/operational phases of the development.

1.3 Monitoring of the rehabilitation works

During implementation/construction, the monitoring of the rehabilitation works will form part of the activities of the Environmental Control Officer (ECO). Monitoring should include, but not be limited to, the following parameters:

- Determining if the final landforms of backfilled and reprofiled areas are in line with the natural surroundings;
- Assessment of surface and slope stability;
- Assessment of adequate functioning of rehabilitation structures;
- Measuring the depth of topsoil replaced within rehabilitated areas;
- Determining erosion levels;
- Calculating ground cover percentages within revegetated areas including vegetation basal cover, litter and rock; and
- Determining plant community composition and structure of rehabilitated areas.

Upon completion of rehabilitation works on site, the ECO or a suitably qualified specialist should continue to monitor the rehabilitation works for three months on a monthly basis. Thereafter, one monitoring site visit is recommended after 6 months from completion of rehabilitation works and final sign-off of rehabilitation works should take place after one year.

1.4 Roles and responsibilities

The construction contractor or consulting engineers will be responsible for the appointment of the ECO and relevant specialists and contractors to perform rehabilitation and monitoring activities as well as alien vegetation removal and control.

Implementation/Construction Phase

- The ECO will ensure that the contractor and all subcontractors are aware of all the specifications pertaining to the project;
- Any damage to the environment will be repaired as soon as possible after consultation between the ECO, Consulting Engineer and Contractor;
- The ECO will ensure that the project staff and/or contractor are adhering to all stipulations of the Rehabilitation Management Plan;
- The ECO will be responsible for monitoring the rehabilitation works throughout the project by means of site visits and meetings. All site visits and meetings will be documented as part of the site meeting minutes which will be made available for inspection at any time;
- The ECO will ensure that all clean up and rehabilitation or any remedial actions required are completed swiftly as and when required.
- The contractor should not be permitted to leave site until the rehabilitation works have been signed off by a suitably qualified ECO.

Post-rehabilitation/Operational Phase

- During the operational phase, the body that presides over the administration of the development will be responsible for the maintenance of the rehabilitation plan and management thereof. This is particularly pertinent with reference to the two year monitoring of alien vegetation, as well as erosion and incision control for the operational life of the development as defined in this rehabilitation plan.

1.5 Mitigation and management

The section below will define and describe the various environmental impacts affecting the integrity of the wetland areas associated with the development activities and proposed management and mitigation measures related to each impact will be presented.

The table below serves to describe and explain the rehabilitation and management measures deemed necessary to effectively manage, maintain, rehabilitate and improve the ecological characteristics and functioning of the study area

2 WETLAND REHABILITATION PLAN

Table 1: Mitigation and Rehabilitation Measures

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
Sedimentation during construction.	Clearance of Vegetation and Levelling in the Local Catchment for PV array, Operation and Maintenance Buildings	<p>- Vegetation clearing must take place in a phased manner, only clearing areas where construction will take place and not additional areas where construction will only take place in the future.</p> <p>- Adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets or other appropriate measures along the boundaries of the PV array bases are to be used where necessary to prevent run-off containing sediment entering the watercourse as well as potential erosion in susceptible areas near to the watercourse and the associated buffer zone.</p> <p>- An appropriate construction storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off in the designated construction areas.</p>
Change in flow rate during construction	Clearance of Vegetation and Levelling in the Local Catchment for PV array, Operation and Maintenance Buildings	<p>- Adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets or other appropriate measures along the boundaries of the PV array bases can be used where necessary to prevent run-off containing sediment entering the watercourses as well as potential erosion in susceptible areas near to the watercourses and the associated buffer zones.</p>

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
<p>Vehicles and machinery may leak oil</p>	<p>Vehicles and machinery may leak oil which can accumulate in storm water run-off generated on the construction site and enter the wetlands downstream. Additionally, stored fuels, oils and other hazardous substances may leak from storage areas and enter the downstream wetlands via storm water run-off.</p>	<p>-All oils, fuels and hazardous substances or liquids must not be stored within 100m from the full extent of the watercourses and the associated buffer zones, unless such storage is unavoidable and approved by the ECO. Where these items are stored within 100m from the full extent of the watercourse, the storage area must be adequately bunded to contain any spillage from containers. Emergency spill kits must be available to clean up and remove spills.</p> <p>-All vehicles and machinery operating on the study site are to be checked for oil, fuel or any other fluid leaks before entering the construction areas. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place within 100m of the watercourses and the associated buffer zones.</p> <p>-The study site is to contain sufficient safety measures throughout the construction process. Safety measures include (but are not limited to) oil spill kits and the availability of fire extinguishers. Additionally, fuel, oil or hazardous substances storage areas must be bunded to 110% capacity to prevent oil or fuel contamination of the ground and / or nearby watercourses and the associated buffer zones.</p> <p>-No cement mixing is to take place in the watercourse or the associated buffer zones. In general, any cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Cement / concrete can also be trucked in readymix vehicles. Importantly, no mixing of cement or concrete directly within the watercourse and associated buffer zone.</p>

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
Sedimentation during operation.	Increased Hardened Surfaces in the Local Catchment due to PV array bases	<ul style="list-style-type: none"> - Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering the watercourse can be used. - An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.
Change in flow rate during operation.	Increased Hardened Surfaces in the Local Catchment due to PV array bases	<ul style="list-style-type: none"> - Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required (preferably surrounding the PV array bases and access roads) to prevent increased run-off and sediments contained in the run-off entering the watercourse can be used. - An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site. - An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.

3 CONCLUSIONS

A number of impacts including invasion of the wetland areas by alien plant species, further erosion, siltation, loss of bank stability and an increase in soil compaction have been identified, which may occur as a result of the proposed development and therefore requires suitable management during the implementation/construction and post-rehabilitation/operational phases thereof.

A Riparian and Wetland Rehabilitation Plan including management measures was developed to effectively manage, maintain and improve the ecological characteristics of the study area.

The measures as set out in the Riparian and Wetland Rehabilitation Plan are deemed sufficient for the conservation of ecological processes and provide a tool for managing and improving the current ecological state of the area. If the measures as set out in the rehabilitation plan are adhered to, ecological processes within the area will not only re-establish, but also allow for the continued improvement of the functionality of the wetland