SOIL EROSION MANAGEMENT PLAN

Reference 2017/BES/MPR/01

Erosion and sediment control principles
On-site Erosion Management
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1.1 Background and objectives of an Erosion management Plan

Exposed and unprotected soils are the main cause of erosion. This erosion management plan and the revegetation and rehabilitation plan are closely linked to one another. The Erosion Management Plan addresses the management and mitigation of significant impacts relating to soil erosion. Therefore, it is crucial to construct a general framework for soil erosion and sediment control and to provide an outline of general methods to monitor, manage and rehabilitate erosion throughout all the phases of development.

The technology used for this development is known as the Screw-In Pilon technology, which eliminates the problem of topsoil stripping, terracing or concrete mattress foundation systems. This technology ensures minimal environmental disturbance therefore a Soil Management Plant will not be acquired.

1.2 Relevant Aspects of the Site

One land type (Ag3) dominates the entire study area. According to the Land Type Survey Staff (2003), 40% of land type Ag3 consists of freely drained, shallow (< 300 mm deep), red, eutrophic, apedal soils with yellow-brown soils comprising less than 10% of this land type. The average depth of all soils is 280.5 mm. Approximately 77% of land type Ag3 consist of soils with a depth of ≤ 300 mm (depth class D1), whereas 12.5% consist of soil with a depth of 901

mm to 1200 mm (depth class D4). The average topsoil clay percentage of land type Ag3 is 10.7%. Around 88.5% of land type Ag3 consist of loamy sand soils (clay class C2) with an average clay percentage of 6.1% to 15% in the topsoil, whilst 1% consist of sandy loam soils (clay class C3) with an average clay percentage of 15.1% to 25% in the topsoil (Land Type Survey Staff, 2003).

The soils of land type Ag3 can be divided into three soil classes. Table 9 illustrates the different soil classes, description of soil classes, soil forms and percentage occupancy of each soil class within land type Ag3.

Table 1: Description of soil classes within land type Ag3 (Land Type Survey Staff, 2003).

Soil Classes	Description	Soil Form	Percentage occupancy
S2	Freely drained, structureless soils.	*Hutton, Clovelly, Griffen, Shortlands, Oakleaf.*	58,3%
S13	Lithic soil (shallow soils on hard weathering rocks).	*Mispah, Glenrosa.*	31,2%
S16	Non-soil land classes	*Pans, rivers, stream beds, erosion structures, marshes, reclaimed land, dunes, gravel, etc.*	0,5%

Approximately 58.3% of land type Ag3 consists of freely drained, structureless soils, whereas 31.2% consist of characteristic lithic soils. A small part (0.5%) of land type Ag3 is occupied by structures like pans, rivers, stream beds, erosion structures, marshes, reclaimed land, dunes and gravel.

Due to climatic restrictions as well as poor quality and lack of water, the major use of this area is for grazing. The expected impact of the proposed solar facility on soils is considered to be low, however, mitigation measures need to be implemented in order to prevent and contain erosion associated with soil disruptions during the construction phase.

1.3 Erosion and sediment control principles

In order to control and prevent soil erosion during and after construction it is important to:

- Protect the land surface from erosion;
- Avoid the disturbance of natural drainage systems; or intercept and redirect run-off water; and
- Progressively revegetate the disturbed areas.

The following management practices are described for the purpose of preventing soil erosion.

1.3.1 On-site Erosion Management

Note the following factors regarding erosion risk at the site:

- Soil erosion will be greater during wet periods (occasional summer thunder storms), therefore precautions to prevent soil erosion should be present throughout the year.
- Steeper slopes are more prone to soil erosion, therefore, no not disturb or remove vegetation on steep slopes, as it will increase erosion potential.
- The time passed before rehabilitation will also influence soil loss. Keep the gap between construction activities and rehabilitation to a minimum.
- Erosion is also influenced by the extent of disturbance; therefore, site clearance should be restricted to areas required for construction purposes. According to the design specifications used for this proposed project, the only site clearing necessary is for access and maintenance roads, the lay-down area, the substation, temporary workshops, mobile offices vehicle parking areas etc. and for permanent buildings. No soil stripping is acquired for the area where the solar panels are places.
- The planning and construction of roads and infrastructure should occur in a manner to minimise erosion potential. Roads should follow the contour as far as possible and be built on water sheds.
- Constructed roads should include water diversion structures if necessary according to the Storm Water Management Plan.
- Disturbed areas should be regularly monitored for erosion during the routine maintenance program. Erosion problems should be rectified and monitored thereafter.
- Drainage systems are required for compacted areas. Heavy machinery, which causes surface compaction, should keep on the constructed roads or directed areas as described by engineers.
- Revegetation of bare areas with appropriate locally occurring species is necessary to limit erosion potential.
- On-site activity after rainfall should be kept to a minimum to keep erosion risk at a minimum.
- Regular monitoring of erosion problems during construction and operation phase is recommended.

1.3.1.1 Erosion control mechanisms

The following mechanisms can be used in order to minimise erosion:

- Reno Mattresses
- Gabion Baskets
- Storm water channels and catch pits
- Soil stabilisation chemicals approved by the Department of Agriculture
- Hydro-seeding or revegetation together with rock rip rap or rock armour covers
- Boulders and rocks of different sizes

1.3.2 Engineering Specifications

A detailed Storm Water Management Plan describing and illustrating the proposed storm water control measures is attached to the EMP report. Requirements for project design include the following:

- Erosion control measures including the final Storm Water Management Plan, should be implemented before and during the construction period.
- An on-site Environmental Officer will be responsible for ensuring the implementation of the erosion control measures on site during the construction period.
- The Developer holds ultimate responsibility for remediation in the event of damage to the environment.

1.3.3 Monitoring

Continuous monitoring during construction and operational phase is required, in order to establish the indication and degree of erosion. If erosion features as a result of the activities on site are recorded, the Environmental Officer (construction phase) or Environmental Manager (operational phase) must:

- Assess the degree of erosion.
- Take photographs and notes of the soil degradation.
- Determine the cause of soil erosion.
- Inform the operator about the problem and that rehabilitation must take place. The operator must implement a rehabilitation method statement and management plan.
- Report and monitor the process of rehabilitation weekly and record all findings in a site register.

- All actions with regard to the incidents must be reported monthly by means of a monthly compliance report which will be submitted to the Competent Authority (construction phase) and filed for consideration during annual audits (construction and operational phase).

1.4 Conclusion

The Erosion Management Plan assist the Developer with guidelines on how to manage erosion. This document forms part of the EMPr and is required to be considered during the design, construction, operation and decommissioning phases of the project.

2 Mitigation Considerations

With respect to erosion control and minimising of dust generation, it is important to implement measures to minimise these problems.

Objective	**Erosion Control**	
Project components	Erosion control measures: Soil stabilisation, construction of impoundments and erosion mitigation structures.	
Potential impact	Water erosion, loss of topsoil, erosion gullies.	
Activity risk/source	Inadequate planning of road network and poor planning of rainfall surface and storm water management.	
Mitigation objectives	Prevent soil erosion.	
Action/control	**Responsibility**	**Timeframe**
Adequate planning of roads, contour walls and other erosion control measures if necessary.	Civil engineers and construction team.	Throughout the duration of the project.
Performance indicator	That no soil erosion occurs on and/or directly downstream of the site (with specific reference to gully erosion) as result of overland flow from the proposed development. Assessment of storm water structures and erosion mitigation measures.	
Monitoring	Periodic visual site inspections, especially following rain events. Use updated satellite imagery to compare with imagery prior to development, in order to determine whether existing erosion drainage systems expanded. If expansion did occur, more intensive monitoring will be acquired where suspended sediments are measured during and after rain events to ensure that rehabilitation actions are effective.	

Objective	Dust generation due to vehicle activity on the site	
Project components	Limit the generation of dust associated with vehicle activity.	
Potential impact	Dust generation, potential health risk for humans and animals.	
Activity risk/source	Excessive traffic on dirt roads.	
Mitigation objectives	Prevent soil erosion.	
Action/control	**Responsibility**	**Timeframe**
Restrict vehicle movement to a minimum, ensure that dirt roads are moist using dust suppressants during peak construction periods.	Civil engineers and construction team.	Throughout the duration of the project.
Performance indicator	Excessive dust generation does not degrade natural veld, no complaints from excessive dust from local inhabitants.	
Monitoring	Visual observations and ensure compliance with National Dust Control Standards.	