



GEOHYDROLOGY

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14/12/16/3/3/2/2169

# EROSION MANAGEMENT PLAN FOR THE PROPOSED LICHTENBURG SOLAR PARK

July 2022

Commissioned by: Matrigenix (Pty) Ltd  
Document version 1.0



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**EROSION MANAGEMENT PLAN FOR THE PROPOSED  
LICHTENBURG SOLAR PARK**

July 2022

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**DOCUMENT HISTORY**

<b>Report No</b>	<b>Date</b>	<b>Version</b>	<b>Status</b>
14/12/16/3/3/2/2169	July 2022	1.0	Final

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## 1. INTRODUCTION

A major component of construction at solar PV sites is the clearing and grading of land, which exposes, disturbs, and moves the soil. This inevitably increases an area's susceptibility to erosion. Since in these situations it is not feasible to eliminate all erosion risk factors and, thus, all erosion, the goal of implementing erosion control measures is primarily to minimise erosion. Therefore, an erosion management plan for monitoring and rehabilitation erosion events associated with the facility is required and appropriate erosion mitigation must form part of the EMP to prevent and reduce the risk of any potential erosion.

Erosion, by the action of water and wind, is a natural process in which soil and rock material is loosened and removed. There are two major classifications of erosion:

(1) Geological erosion, and (2) Man-made erosion.

**Geological erosion**, which includes soil-forming as well as soil-removing, has contributed to the formation of soils and their distribution on the surface of the earth.

**Man-made erosion**, which can greatly accelerate the natural erosion process, includes the breakdown of soil aggregates and the increased removal of organic and mineral particles; it is caused by clearing, grading, or otherwise altering the land. Erosion of soils that occurs at construction sites is **man-made erosion**.

Human activities can cause compaction of the soil, or disturbance of the soil. This hardening of the soil prevents water from effectively infiltrating the soil. This results in larger volumes of water which moves quickly across a site carrying sediment to streams and rivers away from the site.

The main factor causing or helping erosion on is erosion by water. This is the loosening and removal of soil and rock particles from a piece of land by running water, mostly caused by rainstorms. There are several factors influencing or affecting erosion namely soil characteristics, climate, rainfall intensity and duration, vegetation or other surface cover and topography

## 2. PROBLEMS CAUSED BY EROSION

The most important effect of erosion is the permanent loss of valuable topsoil at a site. If it is not controlled from the onset of a project and through the duration of the project, it will cause a loss of topsoil and can degrade the area permanently. The sediment that is transported by the rainwater can end up in surface streams and drainage lines and other water bodies.

## 3. ACTIONS TO STOP OR MINIMISE EROSION ON A SITE

The affected area must be stabilised as soon as possible during or after construction.

### 3.2 Preserving of Natural Vegetation

Preserving of existing vegetation or re-vegetation of disturbed soil as soon as possible after construction is usually the most effective way of controlling erosion.

A vegetation cover acts in the following ways to reduce potential erosion:

- Shielding the soil against the direct impact of rain drops falling on the ground.
- It improves the soil water storage porosity, and more water filters into the ground.

- It slows down runoff so that the sediment can settle on the land.
- It holds the soil in place through the plant root system.

Areas which cannot be re-vegetated must be shaped or changed to effectively slow down the speed of water or by preventing water to flow over such an area by diverting it away from the site. Mechanical ways can also be used to minimise or control erosion on a site.

By preserving natural vegetation, especially grasses, on the site that does not interfere with the construction process, should be left undisturbed or maintained to minimise damage. It will minimise erosion potential and aesthetically is pleasing which beneficial. The more vegetation area that is preserved the less area exposed to erosion. This is important to the areas between the panels where reseeding of the area afterwards is difficult. This should be planned still before the construction activities on site starts. The trees and shrubs in the area between the panels will unfortunately have to be removed.

- Do not grade the area to a “clean” state before constructing the panel supports and panels. Only remove the rocks and vegetation that will be in the way of the panels. The grass cover can be slashed or sprayed with an herbicide to temporarily slow down the regrowth of the grasses during construction.
- Do not let any vehicles drive around in the veld where the panels must be constructed apart from a few designated driveways. This will prevent the compaction of the soil and the destruction of the vegetation in those areas.

### **3.2.1 Advantages of preserving natural vegetation**

- Can handle higher volumes of storm water runoff than newly seeded areas.
- Does not require time to establish and increases filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas
- Enhances aesthetics
- Provides areas for infiltration, reducing volume and velocity of storm water runoff.
- Usually requires less maintenance (e.g., irrigation, fertiliser) than planting new vegetation.

It requires good planning to be able to preserve natural vegetation.

### **3.3 Planting of new vegetation**

It is important to establish permanent vegetation to minimise soil exposure to water and wind erosion. Vegetation/plants that have fibrous root system with fast establishment of roots and ground cover are good options. The grass cover can be sown by hand or machine sowing after scarifying the soil. Keep the planted area moist if possible so that the seeds can germinate quickly.

Do not move over these areas again until a grass cover has been established.



### **3.4 Mulching**

Similar to seeding, mulching is a method of applying plant or non-plant materials on the surface of land to cover bare soil surface. Materials used are grass, hay, woodchips, wood fibres, straw, or gravel that is placed on the soil surface. The main goal of mulching is to protect the soil surface from impacts of erosive forces like the falling raindrops. In construction sites, mulch can be placed to minimise wind and water erosion.

However, the type of mulching selection depends on the land (i.e., slope). Heavy and large sized mulch would be more appropriate for a steep slope. In steep or gentle slopes, matting can be done to hold the mulch in place and reduce its movement by wind or water.

When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilisers, and topsoil in place, by helping to retain moisture (conserve moisture), and by insulating against extreme temperatures. If the mulch is plant-based or organic, it also increases the soil fertility. Mulching can provide immediate, effective, and inexpensive erosion control.

#### **3.4.1 Advantages of mulching**

- Provides immediate protection to soils that are exposed and that are subject to heavy erosion
- Retains moisture, which may minimise the need for watering
- Requires no removal because of natural deterioration of mulching

#### **3.4.2 Disadvantages of mulching**

- It can delay germination of some seeds because cover reduces the soil surface temperature
- Mulch can be easily blown or washed away by runoff if not secured
- Mulch may absorb nutrients necessary for plant growth

### **3.5 Structural measures to control erosion**

#### **3.5.1 Berms**

Berms can be constructed around a site on especially the upstream side to keep extra water out of the site. This will minimise the volume of water flowing over a site which limits the erosion on the site. Berms can also be constructed on road surfaces with a gradient to slow down the velocity of the water and to divert the water off the road into storm water drains on the site.

#### **3.5.2 Storm water drains**

Storm water drains can be packed with rocks on short intervals and at the end to slow down the velocity of the flowing water and to dissipate the energy of the water where it leaves the site.

#### **3.5.3 Gabions**

Gabions of wire packed with rocks and lined with geotextile can slow down the water especially where the slope is steep. The geotextiles can also aid in trapping the sediment. This can be used in storm water drains next to roads by installing flat gabions on the drain surface to prevent unnecessary scouring of the soil surface in the drains if it is not constructed of concrete.

#### **4. MONITORING OF EROSION ON SITE**

Before construction commences, the site manager must appoint a person to be on site for the construction phase. He/she will have the responsibility to monitor the risk and actual erosion arising from activities on site. His/her responsibilities will include:

- Monitoring the movements of vehicles and construction equipment on site to ensure that there is minimal movement in the veld areas off the normal roads and agreed drive lanes between the solar PV panels.
- Monitor the preservation of the vegetation in open spaces to ensure the integrity of the vegetation and soil is kept intact.
- Ensure that only areas are cleared of vegetation according to the site plans
- Ensure that only the planned roads are graded on the site.
- Ensure that gravel roads are kept moist during dry times to prevent the wind from blowing dust away and thus causing erosion in this manner.
- Regular monitoring for erosion to ensure that no erosion problems are occurring at the site because of roads and other infrastructure. All erosion problems observed should be rectified as soon as possible.
- Monitor any erosion damage after rains events so that repairs to damaged areas can be done before the next rain event.
- Oversee the re-vegetation/mulching of cleared areas as soon as possible to prevent unnecessary re-entry or movement in these areas.