

**HUMANSRUS SOLAR 4 PV FACILITY:  
REVEGETATION & REHABILITATION PLAN**



**PRODUCED FOR CAPE EAPRAC  
ON BEHALF OF HUMANSRUS SOLAR 4 (PTY) LTD**

**BY**



[Simon.Todd@3foxes.co.za](mailto:Simon.Todd@3foxes.co.za)

**April 2016**

## ***REVEGETATION & REHABILITATION PLAN - BACKGROUND & PURPOSE***

---

The purpose of the Humansrus Solar 4 PV Facility revegetation and rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the proposed Facility are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation at the site can be summarized as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential;
- Re-vegetate all disturbed areas with suitable local plant species;
- Minimise visual impact of disturbed areas; and
- Ensure that disturbed areas are safe for future uses.

It is also important to recognize that the rehabilitation plan should be closely aligned with the erosion control plan as the two factors are inextricably linked.

## ***ECOSYSTEM CONTEXT***

---

The site occurs within a semi-arid environment and a fundamentally different approach to rehabilitation efforts in such areas is required as compared to traditional rehabilitation approaches within more mesic areas. In addition, rehabilitation techniques which rely on agricultural techniques such as the application of fertilizer and the planting of annual grasses or other alien species are not appropriate. The major implication of the semi-arid nature of the site is that the use of appropriate species and techniques is key in order to achieve long-term success.

## ***REHABILITATION MANAGEMENT PRINCIPLES***

---

### *Topsoil management*

Effective topsoil management is a critical element of rehabilitation, particularly in arid and semi-arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Although some parts of the site consist of exposed bedrock, most parts of the site have at least some topsoil. Where any excavation or topsoil clearing is required, the topsoil should be stockpiled and later used to cover cleared and disturbed areas once construction activity has ceased.

- Topsoil is the top-most layer (0-25cm) of the soil in undisturbed areas. This soil layer is important as it contains nutrients, organic matter, seeds, micro-organisms, fungi and soil fauna. All these elements are necessary for soil processes such as nutrient cycling and the growth of new plants. The biologically active upper layer of the soil is fundamental in the maintenance of the entire ecosystem.
- Topsoil should be retained on site in order to be used for site rehabilitation. The correct handling of the topsoil is a key element to rehabilitation success. Firstly it is important that the

correct depth of topsoil is excavated. If the excavation is too deep, the topsoil will be mixed with sterile deeper soil, leading to reduction in nutrient levels and a decline in plant performance on the soil.

- Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil. Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to revegetate more rapidly than topsoil that has been in stockpile for long periods.
- If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for a long time and should be used as soon as possible. The longer the topsoil is stored, the more seeds, micro-organisms and soil biota are killed.
- Ideally stored topsoil should be used within a month and should not be stored for longer than three months. In addition, topsoil stores should not be too deep, a maximum depth of 1m is recommended to avoid compaction and the development of anaerobic conditions within the soil.

## **MULCHING**

---

Mulching is the covering of the soil with a layer of organic matter of leaves, twigs bark or wood chips, usually chopped quite finely. The main purpose of mulching is to protect and cover the soil surface as well as serve as a source of seed for revegetation purposes.

- During site clearing the standing woody vegetation should not be cleared and burned, removed or mixed with the soil, but should be cleared separately. The cleared vegetation should be stockpiled and used whole or shredded by hand or machine to protect the soil in disturbed areas and promote the return of indigenous species. Where there is a low shrub or grass layer, this material can be cleared and mixed as part of the topsoil as this will aid revegetation and recovery when it is reapplied.
- Mulch should be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants;
- No harvesting of vegetation may be done outside the area to be disturbed by construction activities;
- Brush-cut mulch should be stored for as short a period as possible, and seed released from stockpiles can also be collected for use in the rehabilitation process.

## **SEEDING**

---

In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed should be collected from plants present at the site and should be used immediately or stored appropriately and used at the start of the following wet

season. Seed can be broadcast onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch.

- Indigenous seeds may be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites;
- Seed may be harvested by hand and if necessary dried or treated appropriately
- Seed gathered by vacuum harvester, or other approved mass collection method, from suitable shrubs or from the plant litter surrounding the shrubs must be kept apart from individually harvested seed;
- No seed of alien or foreign species should be used or brought onto the site.

Appropriate species for use at the site for rehabilitation and revegetation include the following:

Grasses:

- *Fingerhuthia africana*
- *Stipagrostis ciliata* & *S.obtusa*
- *Eragrostis lehmanniana*
- *Cynodon dactylon*

Shrubs

- *Pentzia incana* & *P.globosa*
- *Ruschia spinosa*
- *Rosenia humilis*

## **TRANSPLANTS**

---

Where succulent plants are available or other species which may survive translocation are present, individual plants can be dug out from areas about to be cleared and planted into areas which require revegetation. This can be an effective means of establishing indigenous species quickly, this is however unlikely to be a viable option at the current site as there are few suitable species present, but if the conditions are wet then most species have some probability of surviving. In addition, even if transplanted plants do not survive, they provide shelter for seedlings and more favourable microclimates.

- Plants for transplant should only be removed from areas that are going to be cleared.
- Perennial grasses, shrubs, succulents and geophytes are all potentially suitable candidates for transplant.
- Transplants should be placed within a similar environment from where they came in terms of aspect, slope and soil depth.

- Transplants must remain within the site and may not be transported off the site.
- Some species can also grow from cuttings and branches of many succulent species can be rooted in the field.

### ***USE OF SOIL SAVERS***

---

On steep slopes or areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.

- In areas where soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface.
- Soil saver may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination. Alternatively, fresh mulch containing seed can be applied to the soil saver.
- The site is however generally flat or gently sloping and it is not likely that there would be disturbance at the site which requires the use of soil savers, but may be useful in situations where wind erosion is problematic.

### ***GENERAL RECOMMENDATIONS***

---

- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- Once revegetated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced.
- Fencing should be removed once a sound vegetative cover has been achieved.
- Any runnels, erosion channels or wash ways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

### ***MONITORING REQUIREMENTS***

---

As rehabilitation success, particularly in arid areas is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection.

- Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.

- Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated;
- Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

## ***CONCLUSIONS AND RECOMMENDATIONS***

---

- The most cost-effective way to reduce the cost and effort for rehabilitation is to reduce and minimize the disturbance footprint. If the panel arrays can be constructed without clearing the site, then the amount of rehabilitation required would be low and any cleared areas would quickly become revegetated.
- Where the vegetation is too tall for construction, a brush-cutter or tractor driven mower can be used to cut the bush down to a lower height, this is preferable to wholesale clearing as it leaves the soil surface intact.
- The solar panels and roads within the development represent hard surfaces that will generate a lot of runoff. As a result, effective runoff management is essential as is an effective vegetation cover to prevent widespread erosion across the site. As the majority of the site is gently sloping, the risk of erosion is moderate and retaining vegetation cover between the rows of panels during construction is strongly recommended as a general strategy to reduce the overall management requirements of the facility.
- The fire risk at the site is very low as there is not sufficient cover to carry a fire and therefore, there should not be a constraint on allowing the persistence of some vegetation within the site.