PRINCIPLES FOR EROSION MANAGEMENT PLAN

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this Erosion Management Plan and the Revegetation and Rehabilitation Plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion during the operation phase. The objective of the plan is to provide:

» A general framework for soil erosion and sediment control, which enables the identification of areas where erosion have not occurred as of yet and is likely to occur.

» An outline of general methods to monitor, manage and rehabilitate erosion prone areas, ensuring that all erosion that resulted from the construction activities are addressed.

2. RELEVANT ASPECTS OF THE SITE

Detailed soil information is not available for the broader area, however a surrogate land type data was used to provide a general description of soil in the affected properties (land types are areas with largely uniform soils, typography and climate). The entire catchment area is situated within the Bb1 land type.

Bb land type (Plinthic Catena – Dystrophic and/or mesotrophic yellow soils) refer to areas characterised with mainly yellow, apedal (structureless) soils, moderately (mesotrophic) to highly (dystrophic) leached (low to moderate fertility status), with a wide textural range, mostly sandy loam to sandy clay loam. Soils contain a greyish subsoil layer (plinthic) where iron and manganese accumulate in the form of mottles, due to a seasonally fluctuating water table. With time, these mottles may harden (or even cement) to form concretions. These plinthic layers will case restricted water infiltration and root penetration. In drier areas, however, they may help to hold water in the soil the plants can use.

Within the mid- and footslopes of the affected properties (terrestrial habitat), a slight decrease in ground cover density has resulted in small areas prone to sheet erosion and soil compaction. The level of erosion is regarded as mostly low in its current condition but may be accelerated and aggravated if the vegetation cover is for some reason significantly disturbed and reduced. Topsoil erosion may expose the harder underlying horizons of soils such as Wasbank, Glenco and Glenrosa which may provide obstruction to root penetration thus, hindering re-growth and stabilisation of these potential areas. The lower lying aquatic habitat (northern channel and dammed area) is prone to sediment deposition, although the source of this sediment is likely from upstream disturbances.

As the channel enters the affected properties through the Pierre Road culvert system, it is characterised by a narrow channel with exposed bedrock (granite) and relative steep stream banks along the northern periphery. The stream bank to the south is less prominent and gradually increases in elevation. The steeper, northern embankments are potentially prone to erosion (erosion along the northern embankment have been mitigated with gabions). These exposed bedrocks disappear downstream as these areas are covered with soil. Channel bank erosion is probably the most important form of erosion within the aquatic
habitat, although the level of this form of erosion in its current state is regarded as moderate-low with most of the vulnerable areas being stabilised with gabions.

3. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during the operation phase should be to:

» Protect the land surface from erosion;
» Intercept and safely direct run-off water from undisturbed upslope areas through the properties without allowing it to cause erosion or become contaminated with sediment; and
» Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

» Any eroded areas observed should be rehabilitated as soon as possible.
  • Re-instate as much or the eroded area to its pre-disturbed, “natural geometry (no change in inelevation and any banks not to be steepened);”
  • Install protective works (e.g. gabions, reno-mattresses) to stabilise and protect unstable banks.
  • Earthen berms or plugs, rock packs or gabions may be used for the plugging of erosion gullies.
  • For the earthen structures used to fill erosion points, the soil used needs to be properly compacted to ensure this is not vulnerable to erosion.
  • The area should then be allowed to re-vegetate itself (any activities and human movement within these areas should be avoided as far as possible).
  • If natural re-introduction and settling of indigenous vegetation is not according to satisfactory standards, a specialist should be contacted to re-assess the current condition of the site and provide additional recommendation which may include using artificial techniques including re-seeding and the use of sediment barriers (sandbags, retaining walls etc.) to prevent erosion (i.e. sheet erosion) in these areas.
» Soil loss will be greater on steeper slopes. Ensure that steep slopes are not de-vegetated unnecessarily and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
» Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore rehabilitation should commence as soon as possible.
» The disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
» All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
» Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
» Regular monitoring of the site for erosion problems during operation (once every year) is recommended, particularly after large summer thunderstorms have been experienced.

» In the case where severe blockage of the watercourse has occurred (accumulation over a long period) clearing of some of the organic debris within the channel may be allowed.

» Organic debris blocking the culverts and building up against the bridges should however be removed.

3.2. Erosion control mechanisms

The following mechanisms (whichever proves more appropriate/ effective) may be used to combat erosion when necessary:

» Reno mattresses;
» Slope attenuation;
» Hessian material;
» Shade catch nets;
» Gabion baskets;
» Silt fences;
» Storm water channels and catch pits;
» Soil bindings;
» Geofabrics;
» Hydro-seeding and/or re-vegetating;
» Mulching over cleared areas;
» Boulders and size varied rocks; and
» Tilling.

3.3. Monitoring

The site must be monitored continuously during operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on-site, the Applicant (during operation) must:

» Assess the significance of the situation.
» Determine the cause of the soil erosion.

4. CONCLUSION

The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure further compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the operation and maintenance phases of the (if and where applicable).
REFERENCES


Land Type Survey Staff (1972-2006). 1:250 000 scale Land Type Survey of South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

