19.1 Preferred liner for the PCD

4 PCD's are required at 4 the 4 operational areas (Somnaas, Koingnaas, Langklip and Mitchell's Bay). In line with GN 704 requirements, the PCD's must be lined. A liner is required to protect the groundwater resource by reducing infiltration. The secondary function is to reduce water losses, thus reducing pumping rates at the abstraction points. Two liner options for the containment of sea water were investigated. The sustainability of a clay liner was compared to High Density Polyethylene (HDPE) liner.

The water storage facility (PCDs) for the diamondiferous mining activity at the West Coast Resources will be used to store seawater. Sea-water is an aqueous solution containing a variety of dissolved solids and gases, and is very high in soluble sodium chloride. Whilst the study area is characterized by Aeolian sandy soil that is sensitive due to its vulnerability to erosion (ENVIROBRO, 2015), a liner for the PCD is needed. The clay soil chemically reacts with seawater where cations get exchanged allowing clay to change its primary form.

Clay has properties of swelling when in contact with water. The reduction in the swelling of the clay soils is proportional to the rate of saltwater infiltration.According to Elmashad and Atta (2015) swelling soil deposits are mainly in arid and semi-arid areas of which the study area is situated at in the Northern Cape.

Normally arid climate where strong heat is present high evaporation occurs. It is also common along coasts. Because of high temperatures in Northern Cape there is likelihood that the water from PCD will evaporate living high concentration of salts behind.

Research shows that high salt concentrations in the hydrating fluid increased the hydraulic conductivity (Petrov and Rowe, 1997).

Because of the abilities of seawater to react with the clay through exchange mechanisms a clay liner is not recommended for such activity. Suitable liner with excellent chemical resistant properties needs to be used and such is a geomembrane. HDPE geomembrane liner should be used for the PCD and according to the best practice guideline (2007) a minimum of 1.5 mm

is recommended for geomembranes. However due to response of HDPE to high temperatures a 2 mm liner is recommendable.

19.2 Monitoring

No flow was observed during field investigations. No water quality samples could be collected. However, as part of the monitoring program, the Upstream and Downstream monitoring points are recommended. Chemical analysis is the only way to obtain indicative data for potential water quality deterioration. Two (2) monitoring points are recommended and indicated on the layout map (Figure 14). The monitoring points were strategically located to monitor water quality trends in the sensitive nearby water resource.

19.3 Re-use of water

Water that collects at the PCD/RWD can be used at the plant. During significant storm events that result in surplus water, excess water must be pumped to the pollution control dams.

19.4 Water balance

The ongoing management and update of water balance is critical. It is important that a review and management programme be developed and implemented in order to actively manage the water systems on the basis of the information provided by the balances.

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