No.	Receptor / Resource	Environmental Aspect	Environmental Impact	Impact Effect	Magnitude (M)	Duration (D)	Scale (S)	Probability (P)	Significance		Mitigation and Management Measures	Monitoring	Time Frame	Responsible Officer	Cost PA
									Rating	Value					
1	Surface Water During Construction Phase	Surfaces will be cleared to make way for mine surface infrastructure as well as the areas that would be mined as opencast areas. Vegetation will be removed from the original land surfaces and the berms and canals intended to both contain contaminated water and to divert clean water around these surfaces will not have been constructed yet, or will only be partially constructed	Increased run-off coefficient (n), potentially giving rise to a greater measure of erosion while construction is underway if this aspect is done during the rainy season • Greater erosion will lead to greater siltation to the surrounding Nyl River and its wetland; however, it is actual normal for the Nyl River wetland to receive silt from its catchment. Subsequently this impact will not have significant negative effects on the wetland	Negative	2 [2]	1 [1]	1 [1]	2 [2]	Low [Low]	8 [8]	• The Drainage density of the catchment of the Nyl River up to the mine is low (in the region of ~0.1 Km^{-1}). Such a low drainage density will not encourage erosion to any great extent. This is a natural mitigation measure over which the mine has no control, and they are subsequently lucky to have such low drainage densities in this particular area • Limit the construction phase to the dry months if possible • Create diversion berms as soon as possible once construction commences to divert clean surface run-off around the sites under construction • Create small earth dams to intercept any surface run-off during construction. These dams could be located in the same place as where the final PCD would be located. The purpose of the dams would be to intercept silt and not to contain the water as such. Subsequently the dams described above would act as silt traps and would not be meant to contain all the run-off water.	• Visual inspection of dams/silt traps after rainstorms. Record breaches of dams and propose amelioration • Visual inspection after rainstorms of site, specifically to identify erosion channels resulting from surface run-off. Recommend diversion/amelioration measures.	While construction phase is underway or until permanent storm water installations have been completed	Site Foreman or delegated person	
2	Surface Water during Operational Phase	Surface run-off entering potentially contaminated areas from outside mining areas	Clean surface water could potentially acquire contaminated substances (AMD, oils, fuel, greases, other) from mining infrastructure areas	Negative	6 [2]	4 [1]	2 [1]	3 [0]	Moderate [Low]	36 [0]	• Berms will be constructed along all up-gradient areas along the boundaries of the areas where potentially contaminated surfaces may develop. • These berms will divert all surface run-off from uncontaminated upgradient areas around the said surfaces into the local streams • No water will flow onto contaminated surfaces from outside the area	• Regular inspections of the site after rainfall to ID any breach in the storm water conduits • Regular maintenance (cleaning) of storm water canal system in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years • Automatic control gear will ensure that pumps are started timeously to transfer water from any of the smaller PCDs that may be constructed, before the minimum freeboard in these dams is reached • Ensure that all dams are operated within their limits, i.e. do not overfill dams and keep the freeboard in mind	LOM (While operating)	Manager Engineering or delegated responsible person	
		Rainwater falling on potentially contaminated surfaces will flow away from these surfaces into the nearby Nyl River and its associated wetland	Contaminated water will reach the aquatic environment and cause environmental degradation of aquatic ecosystems	Negative	6 [2]	4 [1]	2 [1]	3 [1]	Moderate [Low]	36 [4]	• A storm water drainage system will be installed that will comply with the conditions of GN704, i.e. the clean and dirty water system will be adequately sized to prevent mixing of water in separate clean and dirty water systems, produced by a storm with a return period of up to 50 years • All contaminated water will be diverted into the adequately-sized PCD		LOM (While operating)	Manager Engineering or delegated responsible person	

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		Interception of surface run-off to the Nyl River	Limited impact in relation to the catchment of the Nyl River	Negative	2 [2]	3 [3]	1 [1]	1 [1]	Low [Low]	7 [7]	• Surfaces disturbed and intercepting surface run off to the Nyl River will be rehabilitated in order to restore the natural run-off to the Nyl River • The mine will produce excess water throughout its life and it will be to the mine's own benefit to minimise the surface that will intercept surface water run-off	• No monitoring required	LOM (While operating)	Manager Engineering or delegated responsible person	
		Mining or constructing surface infrastructure within the riparian zone or flood zones of a stream/river	By mining within or in close proximity to the riparian or flood zones of a stream, no allowance is made for a buffer zone between the mine and the watercourse and impacts will be transferred immediately from the place where the incident occurred to the watercourse. Likewise, a section of the wetland will be destroyed to access the ore body at the North Pit.	Negative	6 [2]	4 [1]	3 [0]	4 [0]	Moderate [Low]	52 [0]	• All other mining will take place within the confines of GN704, i.e.: • Volspruit will not locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood-line or within a horizontal distance of 100 metres from any watercourse, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked; • Permission will be obtained from DWA to mine within the flood line at North Pit. • Apart form the North Pit, for which permission will be obtained, Volspruit will not carry out any opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse, whichever is the greatest; • Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance, which causes or is likely to cause pollution of a water resource within the 1:50 year flood-line of any watercourse.	• This work is done while mine planning is taking place • No monitoring afterwards is required unless mine layout plan is amended	LOM (While operating)	Mine Manager	

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									Rating	Value					
		Releasing pollution into the surface water environment	AMD and other pollutants could be released into the aquatic environment by discharging water into the Nyl River or its wetland from discharges such as water pumped from the mine workings	Negative	4 [2]	5 [5]	3 [0]	3 [0]	Moderate [Low]	36 [0]	• The mine will produce surplus water throughout its life and subsequently the mine will be geared to utilise mine water wherever possible. • To accomplish this, an exceptionally large mine water dam was designed to store water. • Significant quantities of water are currently abstracted from boreholes for agricultural purposes. Where possible, the mine will provide water of an equivalent quality to the neighbouring farmers for irrigation, leading to less water being abstracted from their boreholes. This will offset the total water volume being abstracted from the aquifer. • The ore that will be mined has a low AMD production potential and water seeping through the waste rock dump or being pumped from underground should have relative low sulphate concentrations • The mine will re-use all water that is contaminated on site and only "export" the better quality water, such as the water that will be pumped from the two pits.	• Monitoring will comprise of ensuring that clean and dirty streams of water is never mixed and that only the poor quality water is used on site, leaving the better quality of water to be "exported" off the mine for other uses.	LOM (While operating)	Manager Engineering or Health & Safety Manager	
3	Surface Water after closure	Mine infrastructure continues to contaminate surface streams after closure of the mine.	Seepage through the tailings dam or surface run-off from the waste rock dump would continue to pollute the aquatic environment	Negative	4 [2]	5 [5]	2 [2]	3 [2]	Moderate [Low]	33 [18]	• The ore body that will be mined by Volspruit does not contain significant amounts of sulphide minerals and whatever remains on surface after closure of the mine will be low in pollution potential. • Both pits will be backfilled with the material removed from the pits. The south pit will be closed completely, it will be capped and its surface rehabilitated. The north pit will be backfilled to below the surrounding groundwater level and the mine pit will become a lake and will be used for recreational purposes. • The overburden and other material above the ore body have a high buffer capacity. This is also reflected in the water quality of the water sample collected from the quarry, which is influenced by the local geology. With a pH of >9 and high alkalinity values, the local geology has adequate buffer capacity to neutralise the limited AMD that may be produced at the mine. • Although water would decant from the north pit, the same applies for AMD production from this water as for the water seeping through the waste rock dump. Subsequently this particular mine is lucky, as all the above mitigation factors are of natural origin, costing the mine nothing!	A surface water-monitoring programme will be implemented when mining begins. This monitoring programme will not only be carried out while the mine is actively operating, but will continue after closure or until the authorities are satisfied that no further pollution is emanating from the mine.	Until closure certificate is obtained	Environmental Manager or delegated responsible person	
			Water decanting from the flooded underground mine voids will continue to pollute surface streams	Negative											