PROPOSED SAND MINE ON PORTION 0 (REMAINING EXTENT) OF THE FARM AKERMANS KRAAL 11 NEAR ALIWAL-NORTH, EASTERN CAPE PROVINCE

RISK ASSESMENT

RISK MATRIX (Based on DWS 2015 publication: Section 21 c and I water use Risk Assessment Protocol)

NAME and REGISTRATION No of SACNASP Professional member: **Gerhard Botha**
Reg no. 400502/14

No.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Borderline LOW MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
1	Site preparation / Pre-construction	Site preparation	Vehicle/Machinery transport and access to the site	Removal of indigenous vegetation resulting in soil exposure and compaction leading to erosion and an increased runoff into downstream freshwater habitats. (No vegetation disturbance/clearance as the existing (old) footprint will be predominantly utilized, including existing access roads. No impact on aquatic, wetland and riparian vegetation).	1	1	2	1	1.25	1	1	3.25	1	1	5	2	9	29.25	Low	95	• Where possible undertake construction activities in the dry season. • Existing access roads to be used. • No activities or movement of any construction vehicles shall be allowed outside of the mining footprint. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. Access to the sandbar only via the existing access road through the riparian fringe • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	N/A	
				Accidental hazardous substances spillage during site establishment may spread into downstream freshwater habitats and may cause a reduction in water quality and threaten local and downstream habitats and biota.	1	3	1	3	2	3	2	7	1	1	5	1	8	56	Medium	95	• Operate using best practices by storing hazardous substances in an adequately sized bunded area outside of the riparian fringe and active flooding area. • Ensure that appropriate safety equipment is at all times present on site; • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages. • No refueling or servicing of vehicles and machinery may be allowed within the mining area. • Regular monitoring of mining site for potential oil spillages and prompt action (clean-up) if a spillage has been identified. • Ensure that contaminated soil is stored adequately within a bunded area along with the other hazardous substances and regularly removed by a licensed hazardous waste removal company. • Culprit vehicles and machinery responsible for such an oil spillage should be promptly removed of site to an acceptable servicing area where the vehicle/machine can be made safe.	Low	
			Removal and disturbance of vegetation and associated disturbances to soils	Exposure of soils and erosion, leading to increased runoff into downstream freshwater habitats resulting in vegetation disturbance, channel incision subsequently resulting in an increase in turbidity, suspended solids and sedimentation of nearby freshwater resources. (Absolute minimal potential vegetation clearing during site preparation as the existing (old) footprint will be predominantly utilized, including existing access roads, processing plant, material stockpiling area and location of mining area within the concerned sandbar. No impact on aquatic-, wetland- and riparian vegetation).	1	2	2	1	1.5	3	1	5.5	1	1	5	2	9	49.5	Low	95	• Maintain all activities within the proposed mining footprint. • No vegetation clearing/disturbance shall be allowed outside of this development footprint • The "intact" riparian fringe is regarded as a NO-GO Zone and the existing access road through this fringe should be used. • As far as possible undertake construction activities in the dry season. • All material stockpiles should be located outside of the riparian fringe and no stockpiled material shall remain within the sandbar overnight. • The existing stockpiling areas within the processing area shall be used. • Regular monitoring for erosion. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas.	N/A	
				Removal of indigenous vegetation may expose the bare areas to the establishment and proliferation of alien vegetation. Failure to initiate an Invasive Alien Plant Management Plan during the pre-construction phase may lead to the spread and establishment of such invasive alien plants (IAPs) within the freshwater habitats. This impact may lead to further impacts during the operational and post-operational phase. (Absolute minimal potential vegetation clearing subsequently, it is unlikely that any "new" areas will be cleared and exposed to IAP invasion. However, existing bare areas may be prone to IAP invasion from on-site sources and especially from vehicles carrying seeds and regenerative material form outside.	1	1	3	1	1.5	3	2	6.5	1	1	5	2	9	58.5	Medium	95	• The "intact" riparian fringe shall be regarded as a NO-GO Zone and no disturbance or destruction of vegetation within this area or within the aquatic habitat shall be allowed as these disturbed areas may become exposed to the establishment of Invasive Alien Plants. • No disturbance/destruction of vegetation outside of the mining footprint shall be allowed. • The management and eradication of IAPs should be addressed in the Management Plan. • Regular monitoring and eradication of IAPs within the mining footprint should occur on a regular basis (every second month during the dry season and on a monthly basis during the wet season). • Ensure that IAP material is disposed of in an appropriate manner (as specified with a Management Plan).	Low	
			Planning of infrastructure	Potential poor planning resulting in the placement of infrastructure within the watercourse and riparian fringe resulting in a loss of ecological structure and the alteration of a sensitive habitat No additional infrastructure will be erected and infrastructure currently present on-site will be utilised.	2	2	4	3	2.75	1	1	4.75	1	1	5	1	8	38	Low	95	• No equipment of any kind may be stored within the sandbar. • The "intact" riparian fringe shall be regarded as a NO-GO Zone. • Any new infrastructure may only be erected within the existing and already disturbed plant and stockpiling area.	Low	
			Miscellaneous activities by construction personnel	Increased anthropogenic activity within the freshwater feature as well as associated riparian fringe leading to an increased impact on the biological structure of these features and the associated effects that this will have on service provision.	1	2	2	2	1.75	1	3	5.75	1	2	5	1	9	51.75	Low	95	• All activities shall be confined to the mining footprint area with no movement or activities allowed outside of the footprint boundaries. • Existing access road to be used • The "intact" riparian fringe shall be regarded as a NO-GO Zone. • Where possible undertake construction activities in the dry season. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Implement appropriate measures to ensure strict use and management of all hazardous materials used on site. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.). • Waste should be stored on site in clearly marked containers in a demarcated area. • All waste material should be removed at the end of every working day to designated waste facilities at a suitable waste disposal facility. • All waste must be disposed of offsite. • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.	N/A	

2	Construction Phase	Stormwater management and control An existing drainage channel is present just upslope of the mining area draining and directing surface runoff into a settling pond and then into an irrigation dam. This existing drainage feature is deemed sufficient in avoiding clean water from entering the mining footprint and furthermore has reduced the potential total volume of water ("dirty" water) flowing through the mining footprint into the downstream freshwater resource. Subsequently potential impacts are already mitigated.	Debris from poor handling of materials and/or waste polluting downstream watercourse	Debris and waste carried into the downstream freshwater resource resulting in the pollution of this resources as well as potential blocing/impediment of the channel.	2		3		1		3		2.25	3	2		7.25		1	2	5	1		9	65.25	Medium	95	• Operate using best practices in separating waste streams and disposing of the waste correctly.	Low	
			Dirty water runoff	Dirty water runoff form the mining area carried into the downstream freshwater resource resulting in a reduction of local surface water quality as well as a potential increase in turbidity.	1		3		1		2		1.75	3	3		7.75		1	3	5	1		10	77.5	Medium	95	• As far as possible undertake construction activities in the dry season. • All material stockpiles should be located outside of the riparian fringe and no stockpiled material shall remain within the sandbar overnight. • Ensure that the vegetation of the 10m buffer around the riparian fringe is maintained in a vigorous and natural condition as this area will contribute to the trapping of sediment, protecting the riparian fringe and freshwater resources. • Regular monitoring for erosion. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Erosion can also be limited by ensuring that mine vehicles and human movement is limited to project specific dedicated access ways. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas. • Operate using best practices by storing hazardous substances in an adequately sized bunded area outside of the riparian fringe and active flooding area. • Ensure that appropriate safety equipment is at all times present on site; • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages. • No refueling or servicing of vehicles and machinery may be allowed within the mining area. • Regular monitoring of mining site for potential oil spillages and prompt action (clean-up) if a spillage has been identified. • Ensure that contaminated soil is stored adequately within a bunded area along with the other hazardous substances and regularly removed by a licensed hazardous waste removal company.	Low	
			Alteration in surface character and morphology (surface within and around the processing/screening plant and stockpiling area), subsequently impacting the nature and quality of surface water	Alteration in surface runoff: Increase in surface runoff and potentially contaminated water (especially with suspended sediments) impacting water quality of downstream freshwater resources.	2		3		2		3		2.5	3	2		7.5		1	3	5	2		11	82.5	Medium	95	• As far as possible undertake construction activities in the dry season. • Ensure that the vegetation of the 10m buffer around the riparian fringe is maintained in a vigorous and natural condition as this area will contribute to the trapping of sediment, protecting the riparian fringe and freshwater resources. • Regular monitoring for erosion. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Erosion can also be limited by ensuring that mine vehicles and human movement is limited to project specific dedicated access ways. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas.	Low	
			Alteration in surface character and morphology (surface of the sandbar that will be mined), subsequently impacting the nature and quality of surface water	Potential contaminated water (especially with suspended sediments) washing downstream and subsequently impacting the water quality of downstream freshwater resources.	2		3		3		2		2.5	3	2		7.5		1	3	5	2		11	82.5	Medium	95	• All activities shall be confined to the mining footprint area with no movement or activities allowed outside of the footprint boundaries. • No material (minded sand) may be stockpiled within the sandbar overnight. All material, equipment and machinery should be removed from the sandbar at the end of the working day and stored at designated area outside of the boundaries of the sandbar and riparian fringe. • Existing access road to be used • Where possible undertake construction activities in the dry season. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • Implement appropriate measures to ensure strict use and management of all hazardous materials used on site. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.).	Low	
			Vehicle, machinery and personnel movement in close proximity to the freshwater and riparian habitats	Accidental hazardous substances spillage during construction may spread into downstream freshwater habitats and may cause a reduction in water quality and threaten downstream habitats and biota.	1		4		1		4		2.5	3	3		8.5		1	2	5	1		9	76.5	Medium	95	• Operate using best practices by storing hazardous substances in an adequately sized bunded area outside of the riparian fringe and active flooding area. • Ensure that appropriate safety equipment is at all times present on site; • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages. • No refueling or servicing of vehicles and machinery may be allowed within the mining area. • Regular monitoring of mining site for potential oil spillages and prompt action (clean-up) if a spillage has been identified. • Ensure that contaminated soil is stored adequately within a bunded area along with the other hazardous substances and regularly removed by a licensed hazardous waste removal company. • Culprit vehicles and machinery responsible for such an oil spillage should be promptly removed of site to an acceptable servicing area where the vehicle/machine can be made safe.	Low	
		Site clearance and establishment Existing access roads and mining footprint (already cleared of vegetation) will be utilised subsequently no additional areas will have to be cleared of vegetation. However, uncontrolled movement and activities outside of the footprint area may result additional natural areas being impacted.		Loss of freshwater habitat and ecological structures as a result of site clearance activities and uncontrolled degradation.	2		2		4		3		2.75	1	3		6.75		1	1	5	1		8	54	Low	95	• Where possible undertake construction activities in the dry season. Existing access roads to be used. No activities or movement of any construction vehicles shall be allowed outside of the mining footprint. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. • Access to the sandbar only via the existing access road through the riparian fringe • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Low	

		No new/additional infrastructure will be erected as existing infrastructure will be utilised furthermore, the location of specific activities and infrastructure will remain mostly within the same locations as they are currently located in.		Impact on the hydrological functioning and sediment balance of the downstream freshwater systems.	2		3		2		2		2.25	3	2		7.25		1	1	5	2		9	65.25	Medium	95	• Where possible undertake construction activities in the dry season. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas.	Low	
				Increased runoff due to topsoil removal and vegetation clearance leading to potential erosion and sedimentation of downstream freshwater and riparian resources.	1		3		2		2		2	3	2		7		1	2	5	2		10	70	Medium	95	• Where possible undertake construction activities in the dry season. • Existing access roads to be used. • No activities or movement of any construction vehicles shall be allowed outside of the mining footprint. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. • Access to the sandbar only via the existing access road through the riparian fringe • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas.	Low	
			Miscellaneous activities by construction personnel	Increased anthropogenic activity within the freshwater and riparian features leading to an increased impact on the biological structure of these features and the associated effects that this will have on service provision.	1		2		3		3		2.25	1	2		5.25		1	2	5	1		9	47.25	Low	95	• All activities shall be confined to the mining footprint area with no movement or activities allowed outside of the footprint boundaries. • The "intact" riparian fringe shall be regarded as a NO-GO Zone. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Implement appropriate measures to ensure strict use and management of all hazardous materials used on site. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.). • Waste should be stored on site in clearly marked containers in a demarcated area. • All waste material should be removed at the end of every working day to designated waste facilities at a suitable waste disposal facility. • All waste must be disposed of offsite. • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.	N/A	
		Waste Management	Surface water runoff	Contamination of runoff by poor material/waste handling practices, impacting on the surface water quality of the downstream freshwater resource.	1		3		1		2		1.75	3	2		6.75		1	2	5	1		9	60.75	Medium	95	• Waste will be disposed of in accordance to the waste management procedure; Housekeeping will be kept up to standard. Housekeeping should be done after every shift.	Low	
3		Operation of the mine	Groundwater ingress into water resources	High rate of ground water ingress causing flooding of the pit.	1		3		2		2		2	1	1		4		5	1	5	2		13	52	Low	95	• Develop and implement controls to clean up oil/diesel leaks and spillages of any designated hazardous waste. • Avoid pumping of water from the pit back into the river as far as possible. • If pumping of water back into the river is regarded as the only solution, this water should be tested and the results should indicate that the water is of an acceptable quality to be pumped back into the river.	N/A	
		Maintenance and monitoring	Poor stormwater management and absence of affective monitoring and maintenance of stormwater management features.	Reduced ability to contain contaminated water within the mining area resulting in contaminated water entering the downstream freshwater resources subsequently impacted downstream water quality.	1		4		1		3		2.25	3	2		7.25		3	3	5	1		12	87	Medium	95	• Frequent monitoring of erosion protection features and sediment traps (earthen berms around stockpiles etc.). • Maintain the 20m NO-GO Buffer around the outer edge of freshwater bodies associated with the Orange River • Maintain the 10m NO-GO Buffer around the outer edge of the Riparian fringe • Monitor and maintain an acceptable, vigorous vegetation cover around the mining footprint to reduce runoff. • Develop and implement controls to pick up oil/diesel leaks and spillages of any designated hazardous waste	N/A	
			Waste management	Incorrect waste management practices that may lead to pollution of downstream freshwater resources	1		4		1		3		2.25	3	2		7.25		4	2	5	1		12	87	Medium	95	• A waste management plan will be compiled and approved for implementation of site. • This management plant should focus on the waste hierarchy of the NEM:WA; • No waste may be disposed of to land without the necessary legal permits; • Waste will be removed from site by an accredited waste removal company and legally disposed of. • Disposal certificates will be kept on site for audit purposes; • Sufficient waste receptacles will be placed around the site allowing the separation of waste as source.	N/A	

	Operational Phase	Operation of the mine	Miscellaneous activities by construction vehicles and personnel	Increased anthropogenic activity within the freshwater resource leading to an increased impact on the biological structure of the freshwater resource and the associated effects that this will have on service provision.	1		2		3		3		2.25	2	3		7.25		1	2	1	1		5	36.25	Low	95	• All activities shall be confined to the mining footprint area with no movement or activities allowed outside of the footprint boundaries. • The "intact" riparian fringe shall be regarded as a NO-GO Zone. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Implement appropriate measures to ensure strict use and management of all hazardous materials used on site. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.). • Waste should be stored on site in clearly marked containers in a demarcated area. • All waste material should be removed at the end of every working day to designated waste facilities at a suitable waste disposal facility. • All waste must be disposed of offsite. • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.	N/A	
				Vehicle and personnel movement within close proximity and/or within the downstream freshwater resources may result in the loss of habitat and ecological structure as a result of continual disturbance and uncontrolled degradation	1		2		3		3		2.25	1	2		5.25		5	2	5	1		13	68.25	Medium	95	• Where possible undertake construction activities in the dry season. • Existing access roads to be used. • No activities or movement of any construction vehicles shall be allowed outside of the mining footprint. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. • Access to the sandbar only via the existing access road through the riparian fringe • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Low	
				Vehicle and personnel movement within close proximity and/or within the downstream freshwater resources may impact the hydrological functioning of the freshwater resource as a result of a reduced intact habitat footprint and uncontrolled disturbance during maintenance activities	2		3		1		1		1.75	2	2		5.75		5	2	5	2		14	80.5	Medium	95	• Where possible undertake construction activities in the dry season. • The "intact" riparian fringe is regarded as a NO-GO Zone and no activities within or disturbances of this area shall be allowed. • Monitor flooding levels of river, especially around the sandbar. • All activities within the sandbar should be halted and the area cleared at least a week before the entire flooding of the sandbar. • A buffer of at least 20m should be placed around any waterbody (flowing or standing) associated with Orange river and no activities may be allowed within these buffer areas. This 20m buffer is regarded as a dynamic zone and should adjust with the rising and falling water level. • A buffer of 10m should be placed around the intact riparian fringe (apart from the access road through the riparian fringe) and should also be regarded as a NO-GO Zone. Natural vegetation should be encouraged within this 10m buffer. • Any erosion problems observed, to be associated with the relating activity, should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Silt traps should be used where there is a danger of topsoil or material stockpiles eroding and entering the river and other sensitive areas. • It is recommended that earthen berms / sediment traps are constructed within the downslope areas of stockpiles and screening plant areas.	Low	
				Vehicles and personnel entering the mining area may introduce regenerative invasive Alien Plant material that may germinate/establish within the mining area and spread into the riparian fringes and downstream freshwater habitats impacting these habitats' biological/ecological structure and services. The vegetation of freshwater habitats, including the riparian fringe (local, upstream and downstream) have already been significantly impacted by habitat transformations due to the establishment of alien plant species, such as *Salix babylonica, Nicotiana glauca, Salix fragilis, Populus deltoides* and *Eucalyptus camaldulensis* , which from the dominant plant cover within most of the riparian fringes of the area.	2		1		3		3		2.25	2	2		6.25		5	4	5	2		16	100	Medium	95	• The "intact" riparian fringe shall be regarded as a NO-GO Zone and no disturbance or destruction of vegetation within this area or within the aquatic habitat shall be allowed as these disturbed areas may become exposed to the establishment of Invasive Alien Plants. • No disturbance/destruction of vegetation outside of the mining footprint shall be allowed. • The management and eradication of IAPs should be addressed in the Management Plan. • Regular monitoring and eradication of IAPs within the mining footprint should occur on a regular basis (every second month during the dry season and on a monthly basis during the wet season). • Ensure that IAP material is disposed of in an appropriate manner (as specified with a Management Plan).	N/A	
				Accidental hazardous substances spillage during construction may spread into downstream freshwater habitats and may cause a reduction in water quality and threaten downstream habitats and biota.	1		4		1		4		2.5	3	3		8.5		5	2	5	1		13	110.5	Medium	95	• Operate using best practices by storing hazardous substances in an adequately sized bunded area outside of the riparian fringe and active flooding area, • Ensure that appropriate safety equipment is at all times present on site; • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages. • No refueling or servicing of vehicles and machinery may be allowed within the mining area. • Regular monitoring of mining site for potential oil spillages and prompt action (clean-up) if a spillage has been identified. • Ensure that contaminated soil is stored adequately within a bunded area along with the other hazardous substances and regularly removed by a licensed hazardous waste removal company. • Culprit vehicles and machinery responsible for such an oil spillage should be promptly removed of site to an acceptable servicing area where the vehicle/machine can be made safe.	N/A	