

Environmental Management Plan Report & Rehabilitation Plan

Sand Mining, Permit Application
Sand Flats, Sisonke District Municipality

Prepared by:

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Impact Assessment

To ensure uniformity, the impacts are addressed in a standard manner so that their significance can be compared. Each impact is identified in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale). Each rating scale is assigned a numerical value and the sum of the numerical rating is multiplied by the probability of that impact occurring to give the resulting significance of the impact.

The numerical values used for each rating scale are presented in the tables below.

Table 1. Probability

Category	Rating	Description
Definite	3	More than 90 percent sure of a particular fact, or of the likelihood of that impact occurring
Probable	2	70 to 90 percent sure of a particular fact, or of the likelihood of that impact occurring
Possible	1	40 to 70 percent sure of a particular fact, or of the likelihood of that impact occurring
Improbable	0	Less than 40 percent sure of a particular fact, or of the likelihood of that impact occurring

Table 2. Extent

Category	Rating	Description
Site	1	Immediate project site
Local	2	Up to 5 km from the project site
Regional	3	20 km radius from the project site
Provincial	4	Provincial
National	5	South African
International	6	Neighbouring countries/overseas

Table 3. Duration

Category	Rating	Description
Very short-term	1	Less than 1 year
Short-term	2	1 to 5 years
Medium-term	3	5 to 10 years
Long-term	4	10 to 15 years
Very long-term	5	Greater than 15 years
Permanent	6	Permanent

Table 4. Intensity

Category	Rating	Description
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Category	Rating	Description
Very low	0	Where the impact affects the environment in such a way that natural, cultural and social functions are not affected
Low	1	Where the impact affects the environment in such a way that natural, cultural and social functions are only marginally affected
Medium	2	Where the affected environment is altered but natural, cultural and social function and processes continue albeit in a modified way
High	3	Where natural, cultural or social functions or processes are altered to the extent that they will temporarily cease
Very high	4	Where natural, cultural or social functions or processes are altered to the extent that they will permanently cease

Table 5. Significance Rating

Score	Significance Rating
2 – 4	Low
5 – 7	Low to Moderate
8 – 10	Moderate
11 - 13	Moderate to High
14 – 16	High
17 – 19	Very High

The potential impacts of the Sand Mining activity are tabulated below. The impacts are assessed in Table 6.

Table 6. Impact Assessment

IMPACT ASSESSMENT													
Phase	Activities	Receiving Environment		Impact	Status	Significance Scale	Significance Rating	Score	Probability	Extent	Duration	Magnitude	
Construction Phase	There are no construction related activities required for sand mining besides surveying and sampling. These activities are not anticipated to have any adverse impacts.												
Operational Phase	<p>Extraction: this will be facilitated by use of a single heavy machine (bulldozer/loader) which will move around the demarcated pit (within its boundaries), and will excavate and stockpile topsoil as well as excavate and load the desired material from the pit onto various transportation vehicles</p>	Biophysical Resources	Wetlands	Direct Impacts on Wetlands	No Impact, wetland areas will be buffered and avoided								
			Ground Water	Groundwater Contamination	- ve	Moderate	8	8	1	3	2	3	
				Groundwater Availability	- ve	None	0	9	0	3	3	3	
			Surface Water	Alteration to Streamflow Regulation & Runoff	- ve	Low to Moderate	6	6	1	2	2	2	
				Pollution/Sedimentation	- ve	Low to Moderate	6	6	1	2	2	2	
			Soil	Erosion	- ve	Moderate	10	5	2	2	2	1	
				Aquifer potential	- ve	Moderate	9	9	1	3	4	2	
			Vegetation	Destruction	- ve	Moderate to high	12	4	3	1	2	1	
				Species Diversity	- ve	Low	4	4	1	1	2	1	
				Alien Vegetation	- ve	Moderate	4	4	1	1	2	1	
			Wildlife	Disturbance	- ve	Moderate	8	4	2	1	2	1	
				Habitat loss	- ve	Low	4	4	1	1	2	1	
				Barrier to movement/Hazard	- ve	Low	4	4	1	1	2	1	
			Climate	Atmospheric Emissions	- ve	Very High	18	6	3	2	2	2	
			Socio-economic	Air Quality	Dust Generation	- ve	High	15	5	3	2	2	1
					Co and Co2 Emissions	- ve	Very High	18	6	3	2	2	2
				Noise	Noise Disturbance	- ve	Low to Moderate	5	5	1	2	2	1
Cultural and Heritage	Sites of significance	- ve		None	0	8	0	1	6	1			
	Aesthetic appeal/ Sence of Place	- ve		Low	3	3	1	1	2	0			

			Productive Land Use Potential	Affect the Agricultural Potential	- ve	Low	4	4	1	1	2	1
			Traffic Impact	Increased Traffic	- ve	Very High	18	6	3	3	2	1
				Safety	- ve	Low to Moderate	5	5	1	2	2	1
			Domestic Waste	Litter	- ve	Moderate	10	5	2	2	2	1
Access and Haulage: Involves the entry of vehicles for the collection of sand from the pit, entry is from the P606 along an existing haulage road to the edge of the pit where loading takes place.	Biophysical Resources		Wetlands	Direct Impacts on Wetlands	No Impact, wetland areas will be buffered and avoided							
			Ground Water	Groundwater Contamination	- ve	None	0	8	0	3	2	3
				Groundwater Availability	- ve	None	0	9	0	3	3	3
			Surface Water	Alteration to Streamflow Regulation & Runoff	- ve	None	0	6	0	2	2	2
				Pollution/Sedimentation	- ve	None	0	6	0	2	2	2
			Soil	Erosion	- ve	Moderate	10	5	2	2	2	1
				Aquifer potential	- ve	None	0	9	0	3	4	2
			Vegetation	Destruction	- ve	Moderate to high	12	4	3	1	2	1
				Species Diversity	- ve	Low	4	4	1	1	2	1
				Alien Vegetation	- ve	Low	4	4	1	1	2	1
			Wildlife	Disturbance	- ve	Moderate	8	4	2	1	2	1
				Habitat loss	- ve	Low	4	4	1	1	2	1
				Barrier to movement/Hazard	- ve	Moderate	8	4	2	1	2	1
		Climate	Atmospheric Emissions	- ve	Very High	18	6	3	2	2	2	
		Socio-economic	Air Quality	Dust Generation	- ve	High	15	5	3	2	2	1
				Co and Co2 Emissions	- ve	Very High	18	6	3	2	2	2
			Noise	Noise Disturbance	- ve	Moderate	10	5	2	2	2	1
			Cultural and Heritage	Sites of significance	- ve	None	0	8	0	1	6	1
				Aesthetic appeal/ Sence of Place	- ve	Low	3	3	1	1	2	0
			Productive Land Use Potential	Affect the Agricultural Potential	- ve	Low	4	4	1	1	2	1
	Traffic Impact		Increased Traffic	- ve	Very High	18	6	3	3	2	1	
		Safety	- ve	Low to Moderate	5	5	1	2	2	1		
	Domestic Waste	Litter	- ve	Moderate	10	5	2	2	2	1		
Broader Socio-		Employment	Job Creation	+ ve	High	15	5	3	1	2	2	

	Economic Benefits		Local Economic Development	Availability and Affordability	+ ve	High	16	8	2	3	3	2
				Business Development	+ ve	Very High	18	9	2	3	4	2
Decommissioning Phase	Rehabilitation: Involves the replacement of top soil and planting and re-establishment of vegetation	Biophysical Resources	Surface Water	Improve Streamflow Regulation & Reduce Runoff	+ ve	Very High	27	9	3	3	4	2
				Reduce Sedimentation	+ ve	Very High	24	8	3	2	4	2
			Soil	Reduce Erosion	+ ve	Very High	24	8	3	2	4	2
				0	0							
		Vegetation	Re-establish	+ ve	Very High	21	7	3	1	4	2	
			Improve Diversity	+ ve	Very High	21	7	3	1	4	2	
			Alien Plant Removal	+ ve	Very High	21	7	3	1	4	2	
Socio-economic	Productive Land Use Potential	Restore the Agricultural Potential	+ ve	Very High	21	7	3	1	4	2		

Environmental Management Programme

The Environmental Management Programme is presented in Table 7, below. It includes the necessary mitigation and recommended actions as well as the timeframe and person responsible for the actions.

Table 7. Environmental Management Programme

ENVIRONMENTAL MANAGEMENT PROGRAMME			
Objective		Timeframe	Responsibility
Minimise the potential for ground and surface water pollution	Ensure that the vehicle used for excavation is properly maintained. i.e. is regularly serviced and inspected to make sure there are no leaks	Monthly	Mine Manager
	Minimise petrol, diesel, oil leaks by allocating a loading zone, which is protected against such leaks.	Continuous	Mine Manager
	Bio-remediation of soils must take place after any accidental spills.	Immediate action	Mine Manager
	De-watering must not be practiced, as this will allow potentially polluted surface-water to pour into nearby water courses and would increase erosion and sedimentation. Instead the water accumulated within the pit must be contained within the pit.	Continuous	Mine Manager
	Water quality monitoring of the nearest watercourses should be implemented.	Monthly	Environmental Control Officer

Maintain the hydrology at the landscape level	The hydrology of the landscape will be maintained by ensuring that mining takes place sufficiently far enough away from the nearest wetland, to leave an intact levee in place to retain the hydrological integrity of the landscape.	When needed	Environmental Control Officer
	The creation of mosaics of depressions within the pit will ensure that runoff is reduced and stream flow regulation is maintained.	Continuous	Environmental Control Officer
	This mosaic of depressions will also prevent erosion and encourage sediment settling.	Continuous	Environmental Control Officer
	Storativity equivalent to that lost through the removal of rechargeable alluvium will be replaced through the creation of depressions	Not applicable	Environmental Control Officer
Minimise soil erosion	Rehabilitation will ensure that potential wind and water erosion is minimised.	On commencement of rehabilitation	Environmental Control Officer
Limit the disturbance and destruction of vegetation and habitat	The mining area and allowable disturbance footprint must be demarcated and all activity must be limited to within these boundaries.	Once off	Environmental Control Officer
	Disturbed areas will be rehabilitated and vegetation planted to resemble the area prior to mining, both in terms of vegetation cover and habitat.	Rehabilitation Phase	Environmental Control Officer
	Any alien plants which appear or begin to establish post rehabilitation will be removed.	Rehabilitation Phase	Mine Manager / ECO
Prevent the creation of hazards for fauna and barriers to movement	The depths of the pits must be limited so that animals do not get trapped in them.	Continuous	Mine Manager / ECO
Reduce atmospheric emissions	Inspection of vehicles and warning systems will be implemented for vehicles emitting excessive emissions.	Continuous	Mine Manager
Minimise dust generation	Handling must minimise the creation of dust and handling must be reduced during windy conditions.	On windy days	Mine Manager
	Rehabilitation will ensure good vegetative cover which will reduce dust creation.	Rehabilitation Phase	Mine Manager
	Speed limits will be imposed.	Continuous	Mine Manager
	Dust fallout monitoring will be introduced if dust becomes an on-going problem.	Monthly	Mine Manager
Control noise	Operational hours will be restricted from Monday to Friday between 6am and 6pm, and Saturday between 6am and 1pm. No noise producing activities may take place outside of these hours.	Continuous	Mine Manager
	Hearing protection will be provided for employees operating heavy or noisy machinery.	Continuous	Mine Manager
	Noise level monitoring will be implemented if necessary.	Monthly	Mine Manager

Reduce the visual impact	Stockpiles must be kept neat and tidy, equipment must be kept clean.	Continuous	Mine Manager
	No littering must be permitted, and bins must be placed at loading areas and along access road, as well as regular picking up of litter to be exercised.	Continuous	Mine Manager
Reduce the traffic impact of access and haulage	Access to haulage vehicles will be limited to Monday to Friday between 6am and 6pm, and Saturday between 6am and 1pm.	Continuous	Mine Manager
	A limit to the number of vehicles permitted access to the site per day will be enforced.	Continuous	Mine Manager
	Speed limits will be introduced for access and haulage roads and signs put up to indicate the limits.	Continuous	Mine Manager
	Access and haulage roads will be properly maintained, and this includes appropriate storm water management and dust control (i.e. wetting).	Continuous	Mine Manager
	Maintenance of access and haulage roads incl. storm water and wetting	Continuous	Mine Manager

Rehabilitation

Table 8. Rehabilitation Plan

REHABILITATION PLAN			
Objective	Action	Timeframe	Responsibility
Prevent erosion during sandmining and of stockpiled soils	Topsoil including and vegetation must be used to create a berm along the perimeter of the mining pit. The pile should be used as a windbreak to shield the pit and sand mining activities from the prevailing winds.	Continuous	Environmental Control Officer
	Stockpiles should be stabilised by seeding with a suitable grass mix or by securing with sheets of hessian or other suitable sheeting material.	Continuous	Environmental Control Officer
Reinstate the agricultural potential of the land	Once mining of the entire pit is complete, backfill the pit replacing the stockpiled soils and any vegetation that was removed initially.	Rehabilitation Phase	Environmental Control Officer
	Re-shape the area to remove any steep embankments and rather create a mosaic of gently sloped depressions, which will act to store water when the subsoils are saturated. This will improve streamflow regulation and reduce runoff.	Rehabilitation Phase	Environmental Control Officer
	Regrass the area using a suitable seed mix (with good grazing potential) which can be scattered over the area and raked into the topsoil.	Rehabilitation Phase	Environmental Control Officer
	Cordon off the area under rehabilitation as a no-go area	Rehabilitation	Environmental Control

		Phase	Officer
	During re-establishment, control weeds by inspection and mechanical removal	Monthly	Environmental Control Officer
Monitoring	Monthly Environmental Control Officer Inseptions will take place during mining and rehabilitation to ensure that objectives are being met	Monthly	Environmental Control Officer

Table 9, below presents the impact significance of impacts that have been scored with the mitigation and management actions having been undertaken. The scores reflect that once mitigation has taken place the impact significance of all negative impacts is reduced to no impact or very low to moderate impacts.

Post Mitigation Impact Assessment

Table 9. Impact Assessment with Mitigation Implemented

IMPACT ASSESSMENT												
Phase	Activities	Receiving Environment		Impact	Status	Significance Scale	Significance Rating	Score	Probability	Extent	Duration	Magnitude
Construction Phase	There are no construction related activities required for sand mining besides surveying and sampling. These activities are not anticipated to have any adverse impacts.											
Operational Phase	Extraction: this will be facilitated by use of a single heavy machine (bulldozer/loader) which will move around the demarcated pit (within its boundaries), and will excavate and stockpile topsoil as well as excavate and load the desired material from the pit onto various transportation vehicles	Biophysical Resources	Wetlands	Direct Impacts on Wetlands		No Impact, wetland areas will be buffered and avoided						
			Ground Water	Groundwater Contamination	- ve	None	0	8	0	3	2	3
				Groundwater Availability	- ve	None	0	9	0	3	3	3
			Surface Water	Alteration to Streamflow Regulation & Runoff	- ve	None	0	6	0	2	2	2
				Pollution/Sedimentation	- ve	Low	4	4	1	1	2	1
			Soil	Erosion	- ve	Low	4	4	1	1	2	1
				Reduce aquifer potential	- ve	Low to Moderate	7	7	1	2	4	1
			Vegetation	Destruction	- ve	Moderate	9	3	3	1	2	0
				Species Diversity	- ve	Low	4	4	1	1	2	1
Alien Vegetation	- ve	None	0	4	0	1	2	1				

			Wildlife	Disturbance	- ve	Low	3	3	1	1	2	0		
				Habitat loss	- ve	Low	4	4	1	1	2	1		
				Barrier to movement/Hazard	- ve	Low	4	4	1	1	2	1		
			Climate	Atmospheric Emissions	- ve	Low to Moderate	5	5	1	2	2	1		
		Socio-economic	Air Quality	Dust Generation	- ve	Moderate	8	4	2	2	2	0		
				Co and Co ² Emissions	- ve	Moderate	10	5	2	2	2	1		
			Noise	Noise Disturbance	- ve	Low to Moderate	5	5	1	2	2	1		
			Cultural and Heritage	Sites of significance	- ve	None	0	8	0	1	6	1		
				Aesthetic appeal/ Sence of Place	- ve	Low	3	3	1	1	2	0		
			Productive Land Use Potential	Affect the Agricultural Potential	- ve	Low	4	4	1	1	2	1		
			Traffic Impact	Increased Traffic	- ve	Moderate	10	5	2	3	2	0		
				Safety	- ve	Low to Moderate	5	5	1	2	2	1		
			Domestic Waste	Litter	- ve	Low	3	3	1	1	2	0		
		Access and Haulage: Involves the entry of vehicles for the collection of sand from the pit, entry is from the P606 along an existing haulage road to the edge of the pit where loading takes place.		Biophysical Resources	Wetlands	Direct Impacts on Wetlands	No Impact, wetland areas will be buffered and avoided							
					Ground Water	Groundwater Contamination	- ve	None	0	8	0	3	2	3
Groundwater Availability	- ve					None	0	9	0	3	3	3		
Surface Water	Alteration to Streamflow Regulation & Runoff				- ve	None	0	6	0	2	2	2		
	Pollution/Sedimentation				- ve	None	0	6	0	2	2	2		
Soil	Erosion				- ve	Low	4	4	1	1	2	1		
	Reduce aquifer potential				- ve	None	0	9	0	3	4	2		
Vegetation	Destruction				- ve	Moderate	9	3	3	1	2	0		
	Species Diversity				- ve	Low	4	4	1	1	2	1		
	Alien Vegetation				- ve	Low	4	4	1	1	2	1		
Wildlife	Disturbance				- ve	Low	3	3	1	1	2	0		
	Habitat loss				- ve	Low	4	4	1	1	2	1		
	Barrier to movement/Hazard				- ve	Low	4	4	1	1	2	1		
Climate	Atmospheric Emissions				- ve	Low to Moderate	5	5	1	2	2	1		
Socio-economic	Air Quality				Dust Generation	- ve	Moderate	8	4	2	2	2	0	
		Co and Co ² Emissions	- ve	Moderate	10	5	2	2	2	1				

			Noise	Noise Disturbance	- ve	Low to Moderate	5	5	1	2	2	1	
			Cultural and Heritage	Sites of significance	- ve	None	0	8	0	1	6	1	
				Aesthetic appeal/ Sence of Place	- ve	Low	3	3	1	1	2	0	
			Productive Land Use Potential	Affect the Agricultural Potential	- ve	Low	4	4	1	1	2	1	
			Traffic Impact	Increased Traffic	- ve	Moderate	10	5	2	3	2	0	
				Safety	- ve	Low to Moderate	5	5	1	2	2	1	
			Domestic Waste	Litter	- ve	Low	3	3	1	1	2	0	
			Broader Socio-Economic Benefits	Employment	Job Creation	+ ve	High	15	5	3	1	2	2
				Local Economic Development	Availability and Affordability	+ ve	High	16	8	2	3	3	2
					Business Development	+ ve	Very High	18	9	2	3	4	2
Decommissioning Phase	Rehabilitation: Involves the replacement of top soil and planting and re-establishment of vegetation	Biophysical Resources	Surface Water	Improve Streamflow Regulation & Reduce Runoff	+ ve	Very High	27	9	3	3	4	2	
				Reduce Sedimentation	+ ve	Very High	24	8	3	2	4	2	
			Soil	Reduce Erosion	+ ve	Very High	0	0					
			Vegetation	Re-establish	+ ve	Very High	21	7	3	1	4	2	
				Improve Diversity	+ ve	Very High	21	7	3	1	4	2	
				Alien Plant Removal	+ ve	Very High	21	7	3	1	4	2	
			Socio-economic	Productive Land Use Potential	Restore the Agricultural Potential	+ ve	Very High	21	7	3	1	4	2