

## APPENDIX 7: IMPACT ASSESSMENT

### METHODOLOGY USED IN DETERMINING SIGNIFICANCE OF POTENTIAL IMPACTS

Potential environmental impacts on the environment will be determined in terms of the following in order to determine the significance of each impact:

- Probability (how likely is it that the impact will occur?)
- Magnitude (how severe will the impact be?)
- Duration (how long will the impact last?)
- Scale of the impact (what size of the area will be affected?)

Thereafter, mitigation measures will be proposed in order to reduce or eliminate negative impacts and enhance positive impacts. The impact of the proposed activity on the environment will be considered for the pre-construction, construction and operational phases. The necessary mitigation measures will be consolidated in the form of an Environmental Management Programme (EMPr).

#### Assessment of significance – method

The significance of every environmental impact identified will be determined using the following approach:

In assessing the potential significance of an impact two aspects will be considered:

- i) Occurrence
  - ii) Severity
- Occurrence will be sub-divided into:
- Probability of occurrence
  - Duration of occurrence
- Severity will be sub-divided into:
- Magnitude (severity) of impact
  - Scale/extent of impact

In order to assess each of these factors for each impact, ranking scales were employed as follows:

<b>Probability:</b>	<b>Duration:</b>
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term*
3 - Medium probability	3 - Medium-term (5-15 years)
2 - Low probability	2 - Short-term (0-5 years)
1 - Improbable	1 - Immediate
0 - None	0 - None
<b>Scale:</b>	<b>Magnitude:</b>
5 - International	10 - Very high/don't know
4 - National	8 - High
3 - Regional	6 - Moderate
2 - Local	4 - Low
1 - Site only	2 - Minor
0 - None	0 - None

\*impact ceases after operational life of the activity

Once the above factors had been ranked for each impact, the overall risk (environmental significance) of each impact will be assessed using the following formula:  $SP = (magnitude (M) + duration (D) + scale(S)) \times probability (P)$ . The maximum value is 100 significance points (SP). Environmental impacts will be rated as either of **High**, **Moderate** or **Low** significance on the following basis:

- SP  $\geq$  60 indicates high environmental significance;
- SP 31  $\geq$  59 indicates moderate environmental significance;
- SP  $\leq$  30 indicates low environmental significance.

**ASSESSMENT OF IMPACTS:**

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION						RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION					
		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
<b>AIR AND DUST POLLUTION</b>														
Possible air and dust pollution	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	6	2	2	4	40	M	<ul style="list-style-type: none"> <li>Dust will be suppressed through a watering management programme, especially during windy conditions.</li> <li>Dust generated will be carefully monitored by the OHS&amp;E and should be suppressed by means of watering regularly.</li> <li>Access roads will be watered regularly, especially in the dry winter months and in periods of high wind.</li> <li>Vegetation will not be unnecessary stripped.</li> <li>Domestic fires will be prohibited on site.</li> <li>Heavy vehicle will be serviced regularly to ensure emission control.</li> <li>All heavy vehicles, excavators and generators used for the mining will be in good working condition and will be serviced regularly.</li> <li>Should a vehicle have a break down, it will be serviced immediately.</li> </ul>	2	2	3	1	8	L

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION						RECOMMENDED MITIGATION MEASURES/REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION					
		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
<b>SOIL EROSION</b>														
Possible soil erosion	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	4	2	2	2	16	L	<ul style="list-style-type: none"> <li>• Topsoil will be removed over the whole mining area and stored in a perimeter berm. The height of the topsoil berm will not exceed 3m.</li> <li>• The topsoil berm will be inspected for erosion daily.</li> <li>• Minimal amounts of topsoil shall be lost due to erosion, either by wind or water. This can be facilitated through the grassing of topsoil stockpiles.</li> <li>• Condition of soil in walk or drive areas should be checked daily for erosion.</li> <li>• Access road condition will be checked daily.</li> <li>• If erosion is noted at walk and drive areas, access road or topsoil berms, the erosion channel will be fixed by placing cut vegetation, sandbags or rocks within the erosion channel and the cause of the erosion will be mitigated through the creation of runoff channels.</li> </ul>	2	2	2	2	12	L

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION						RECOMMENDED MITIGATION MEASURES/REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION					
		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
NOISE														
Possible Noise Impact	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	8	2	2	5	60	H	<ul style="list-style-type: none"> <li>The working hours shall be limited to between 07:00 hrs and 18:00 hrs on weekdays, and 07:00 hrs and 16:00 hrs on Saturdays, or as per contract documentation.</li> <li>Vehicles must be driven at a moderate speed (50 kph) on private roads.</li> <li>Noise generated from the trucks that transport the material and the excavator that is used to mine the material shall only be carried out during normal working hours.</li> <li>Extended working hours will be in accordance with contract documentation.</li> <li>SANRAL shall be obligated to maintain vehicles used at the mining area in a good condition;</li> <li>SANRAL will be obliged to ensure that all personnel on site apply occupational health and safety requirements with respect to hearing protection.</li> </ul>	2	2	2	5	30	L

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION						RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION					
		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
VISUAL														
Possible visual impacts	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	2	2	2	3	18	L	<ul style="list-style-type: none"> <li>Concurrent rehabilitation of the mining area will take place.</li> <li>The stockpiles shall be vegetated with an indigenous grass seed to maintain fertility.</li> <li>All unused material would be levelled to ensure that the mining area blends back into the existing landscape fabric.</li> <li>No stockpiled material is to be retained on site.</li> <li>The mining area will be shaped to ensure no stockpiled heaps and that the area blends in with the existing landscape.</li> <li>All stockpiled topsoil and vegetative material will be spread over the bottom of the mining area to ensure proper seed bed for the re-establishment of vegetative growth. Placing a berm of topsoil along the perimeter of the mining site to obscure the visual impact of the excavation.</li> <li>Re-vegetation of the mining area after mining operation has ceased.</li> <li>The access gravel road to the mining areas will be rehabilitated and the fencing of the mining areas reinstated following the mining of the area.</li> </ul>	2	2	2	2	12	L

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION						RECOMMENDED MITIGATION MEASURES/REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION					
		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
<b>TERRESTRIAL ECOLOGY</b>														
Possible impacts on terrestrial ecology	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	6	2	2	4	40	M	<p><b>Construction &amp; Operation Phase</b></p> <ul style="list-style-type: none"> <li>No temporary accommodation or temporary storage facilities may be setup within 100m of the any river, stream, drainage line, wetland or farm dam.</li> <li>No temporary accommodation or temporary storage facilities may be setup within 500m of the outer boundary of any pans in the area.</li> <li>No temporary facilities (including portable toilets) to be positioned within a 50m bufferzone of the edge of any watercourses.</li> <li>Only existing roads to be used by vehicles during construction as far as possible. Especially in terms of crossing over watercourses.</li> <li>No vehicles may drive through wetland areas and no new service road may be made through wetland areas.</li> <li>Project activities close to watercourses to be carefully monitored in terms of erosion and possible resulting siltation of watercourses. Weekly inspection of work areas around watercourses to be conducted. Any signs of new erosion and siltation to be rectified immediately.</li> <li>Disturbed surface areas in the construction &amp; operation phases to be</li> </ul>	4	2	2	2	16	L

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		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
								rehabilitated. <ul style="list-style-type: none"> <li>All construction material, equipment and any foreign objects brought into the area by contractors to be removed immediately after completion of the construction phase.</li> <li>Proper rubbish/waste bins to be provided. These to be emptied weekly and the waste to be removed to an official waste disposal site.</li> </ul> <b>Maintenance phase (to be implemented in defect liability period for 1 year)</b> <ul style="list-style-type: none"> <li>Mechanical control of alien plants around disturbed areas caused by construction need to be implemented within three months of completion of construction. Thereafter every six months. Mechanical control to be of such a nature as to allow local, indigenous grasses and other pioneers to colonise the previously disturbed areas, thereby assisting in keeping out invasive weed species.</li> <li>No chemical control (herbicides) of alien plants to be used within 100m of any watercourses.</li> <li>Areas around foundations, culverts, gabions, etc. need to be check before and after the summer rainy season for signs of soil erosion due to stormwater run-off. Such sites need to be modified and</li> </ul>						



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		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
								rehabilitated to prevent ongoing erosion. These sites need to be monitored more closely than other sites which show no or minimal signs of erosion. <ul style="list-style-type: none"> <li>• Inspection of road shoulders in areas of steep topography to be inspected after the summer rainy season for signs of erosion and rehabilitated and rectified as required.</li> </ul>						
<b>HYDROCARBON SPILLAGES</b>														
Increased soil erosion, increased in silt load and sedimentation	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	6	3	2	3	27	L	<ul style="list-style-type: none"> <li>• All heavy vehicles, excavators and generators used for the mining will be in good working condition.</li> <li>• A drip tray will be available to place underneath haul vehicles while the vehicles are parked at night.</li> <li>• Should a vehicle have a break down, it will be serviced immediately. If soil contamination with diesel and oils occurred, the spill will be cleared up promptly. If the spill is small, it will be cleaned with a spill kit. if the spill is large, a spill clean-up company will be used to clean-up the spill;</li> <li>• Proper functioning of heavy vehicles will be ensured.</li> </ul>	2	3	2	2	14	L

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		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
<b>ALIEN VEGETATION</b>														
Possible alien vegetation infestation	<p><b>Construction Phase:</b> Vegetation, stripping, stripping and stockpiling of topsoil, subsoil, overburden and spoil</p> <p><b>Operational Phase:</b> Excavations, Stockpiling and Transporting of gravel material</p> <p><b>Decommissioning Phase:</b> Sloping and Landscaping during rehabilitation, Replacing the topsoil and revegetating the disturbed area</p>	6	2	2	4	40	M	<ul style="list-style-type: none"> <li>Every 3 months casual labour will be employed to circumnavigate the site to hand pull out known alien vegetation that may have established in the disturbed area. Special attention will be given to the perimeter topsoil berm.</li> <li>Casual labour will be provided with photographs of the alien vegetation that could establish.</li> </ul>	4	2	2	2	16	L
<b>SANITATION FACILITIES</b>														
Provision and management of sanitation facilities	All phases	8	2	2	4	48	M	<ul style="list-style-type: none"> <li>Chemical toilet facilities shall preferably be used on site. The toilets shall be services every second week by a service provider.</li> </ul>	4	2	2	3	24	L
<b>HERITAGE, ARCHAEOLOGICAL AND PALEONTOLOGICAL ISSUES</b>														
Possible archaeological sites and graves to be affected	Construction phase	6	5	1	5	60	H	<ul style="list-style-type: none"> <li>It is recommended that the burial site is retained and it should be fenced off for the duration of the quarrying activities, leaving a buffer zone of at least five metres from the outer edge of the graves. If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures.</li> </ul>	6	5	1	2	24	L

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		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP
								<ul style="list-style-type: none"> <li>It is recommended that the railway culverts are retained and that it is fenced off with danger tape if quarrying activities take place in its vicinity. If that is not possible and must be demolished or upgraded, it should be documented in full prior to development taking place.</li> <li>It is recommended that the sheep dip is retained and that it is fenced off with danger tape if quarrying activities take place in its vicinity. If that is not possible and must be demolished or upgraded, it should be documented in full prior to development taking place.</li> <li>If an artefact or grave on-site is uncovered, work in the immediate vicinity shall be stopped immediately and it should immediately be reported to a heritage consultant so that an investigation and evaluation of the finds can be made. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article.</li> <li>The South African Heritage Resources Agency (SAHRA) shall be contacted such that an archaeological/heritage resources consultant can be appointed to record the</li> </ul>						

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		M	D	S	P	TOTAL	SP		M	D	S	P	TOTAL	SP	
								site and excavate if necessary. Work may only resume once clearance is given in writing by the archaeologist/heritage resources consultant.							
<b>SAFETY</b>															
Safety of sloped areas and safety of employees	All phases – employees Decommissioning phase – sloped areas	6	5	1	5	60	H	<ul style="list-style-type: none"> <li>All unused material should be levelled. No stockpiled material is to be retained on site.</li> <li>The mining area will be shaped to ensure no stockpiled heaps.</li> <li>The slopes will be shaped as per the approved EMPr.</li> <li>Appropriate safety clothing will be worn at all times i.e. head gear, shoes, ear plugs.</li> </ul>		5	1	2	24	L	