

**VAST MINERAL SANDS (Pty) Ltd - HEAVY MINERAL PROSPECTING,
ALEXANDER BAY, NORTHERN CAPE**

ENVIRONMENTAL IMPACT ASSESSMENT

PHS CONSULTING

PAUL SLABBERT

B ART ET SCIEN (EAPSA, APHP & IAIA)

METHODOLOGY

Table 1: Criteria used to determine the consequence of the impact

Rating	Definition of Rating	Score
A. Extent– the area in which the impact will be experienced		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. Intensity– the magnitude or size of the impact		
Low	Site-specific and wider natural and / or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and / or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and / or social functions or processes are severely altered	3
C. Duration– the time frame for which the impact will be experienced		
Short-term	For the duration of project activities / up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years	3

The combined score of these three criteria corresponds to a consequence rating, as set out in Table 2 below. (Note that the lowest possible consequence score is 3.)

Table 2: Method used to determine the consequence score

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence is derived, the probability of the impact occurring is considered, using the probability classifications presented in Table 3 below.

Table 3: Probability classification

Probability of impact – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall significance of impacts is determined by considering consequence and probability using the rating system prescribed in Table 4 below.

Table 4: Impact significance ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERYHIGH	VERY HIGH

Finally the impacts are considered in terms of their status (positive or negative) and the confidence in the ascribed impact significance rating is noted. The classification for considering the status of impacts and the confidence in assessment is laid out in Table 5.

Table 5: Impact status and confidence classification

Status of impact	
Indication whether the impact is adverse (negative) or beneficial	+ ve (positive – a 'benefit')
	- ve (negative – a 'cost')
(positive).	Neutral
Confidence of assessment	
The degree of confidence in predictions based on available information, the environmental consultant's judgment and / or specialist knowledge.	Low
	Medium
	High

Different types of impacts were also considered in the impact ratings, as listed:

Direct – impacts that result from the direct interaction between a project activity and the receiving environment (e.g. dust generation which affects air quality).

Indirect – impacts that result from other (non-project) activities but which are facilitated as a result of the project or impacts that occur as a result of subsequent interaction of direct project impacts within the environment (e.g. reduced water supply that affects crop production and subsequently impacts on subsistence-based livelihoods).

Cumulative – impacts that act together with current or future potential impacts of other activities or proposed activities in the area / region that affect the same resources and / or receptors (e.g. combined effects of waste water discharges from more than one project into the same water resource, which may be acceptable individually, but cumulatively result in a reduction in water quality quality).

There is no statutory definition of 'significance' and its determination is therefore necessarily partially subjective. Criteria for assessing the significance of impacts arise from the following key elements:

Status of compliance with relevant local legislation, policies and plans, any relevant or industry policies, environmental standards or guidelines and internationally accepted best practice:

- The consequence of the change to the biophysical or socio-economic environment (e.g. loss of habitats, decrease in water quality) expressed, wherever practicable, in quantitative terms. For socio-economic impacts, the consequence must be viewed from the perspective of those affected, by taking into account the likely perceived importance of the impact and the ability of people to manage and adapt to the change;
- The nature of the impact receptor (physical, biological, or human). Where the receptor is physical (e.g. a water resource) its quality, sensitivity to change and importance must be considered. Where the receptor is biological, its importance (e.g. its local, regional, national or international importance) and its sensitivity to the impact must be considered. For a human receptor, the sensitivity of the household, community or wider societal group must be considered along with their ability to adapt to and manage the effects of the impact; and
- The probability that the identified impact will occur. This is estimated based upon experience and / or evidence that such an outcome has previously occurred.

The impact significance rating also reflects the need for mitigation. While low significance impacts may not require specific mitigation measures, high significance negative impacts demand that adequate measures be put in place, to reduce the residual significance (impact significance rating, after mitigation), as described below:

Insignificant: the potential impact is negligible and no mitigation measures or environmental management is required.

Very Low & Low: no specific mitigation measures required, beyond normal environmental good practices.

Medium - High: specific mitigation measures should be devised, to reduce the impact significance to an acceptable level. If mitigation is not possible, compensation measures should be considered.

Very High: specific mitigation measures should be identified and implemented, to reduce the impact significance to an acceptable level. If such mitigation is not possible, very high significance negative impacts should be considered in the project's authorisation process.

NAME OF ACTIVITY	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts)	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated					MITIGATION TYPE (modify, remedy, control, or stop) Through	SIGNIFICANCE if mitigated
				Extent	Intensity	Duration	Probability	Rating		
<p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>(E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>(E.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc.....etc...)</p>		<p>(E.g. Construction, commissioning, operational, Decommissioning, closure, post closure)</p>						<p>(E.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>(E.g. Modify through alternative method. Control through noise control. Control through management and monitoring through rehabilitation</p>	
<p><u>Site establishment activities</u></p> <p>- Vegetation clearance</p> <p>- Topsoil stripping & stockpiling</p> <p>- Drill area compaction</p> <p>- Vehicle movements</p> <p>- Waste management</p>	<p>Cultural and Heritage (-ve)</p>	<p>Destruction or loss of Cultural and Heritage Resources</p>	<p>Set-up</p>	<p>1</p>	<p>3</p>	<p>1</p>	<p>Possible</p>	<p>5 L</p>	<p>A red-flag area of 300m be implemented from the high water mark where extra care is taken in terms of avoiding impacts to significant archaeological resources including an archaeological and palaeontological awareness program implemented prior to prospecting . A Fossil Finds Procedure be implemented.</p>	<p>4 VL</p>
	<p>Noise (-ve)</p>	<p>Noise Generation</p>	<p>Set-up</p>	<p>1</p>	<p>2</p>	<p>1</p>	<p>Possible</p>	<p>4 VL</p>	<ul style="list-style-type: none"> • Setup, operational and decommissioning activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays; • Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings; 	<p>3 VL</p>

									<ul style="list-style-type: none"> • Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition; and • If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved after 3 hours of drilling 	
Visual (-ve)	Visual intrusion	Set-up	1	1	1	Possible	3 VL	<ul style="list-style-type: none"> •The drilling rig and other visually prominent items on the site will be located in consultation with the landowner if deemed problematic; •Rig will move on after 2-3 hours of drilling •Drilling takes place inside mine area, plus very short duration 	3 VL	
Traffic (-ve)	Increase in traffic volumes in the vicinity of the drilling site	Set-up	1	2	1	Probable	4 VL	<ul style="list-style-type: none"> •Obey traffic signs around the site • Vehicles to make trips on/off site only when necessary •Vehicles to adhere to local speed limits as far as possible when driving in around site 	3 VL	
Dust fall (-ve)	Dust fall & nuisance from activities	Set-up	1	2	1	Definite	4 VL	<ul style="list-style-type: none"> •Wet suppression is not feasible due to the availability of water and the extent of the site •Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings; and •Low vehicle speeds will be enforced on unpaved surfaces 	3 VL	

	Soil & vegetation (-ve)	The potential impact of the proposed prospecting on the vegetation would occur at proposed drilling sites and the off-road access routes used to get to these sites		1	2	2	Define	4 VL	<ul style="list-style-type: none"> • The soil disturbance and clearance of vegetation at drill areas will be limited to the absolute minimum required; • No clear scraping (dozing) be carried out to establish a level drill site. • Avoid surface vegetation clearance to leave the roots intact so that vegetation can coppice and regrow; or avoid intact virgin areas and move drill hole • Use existing tracks as far as possible and if the rig drive off-road, rake tracks and compacted drill area after works 	3 VL
	Animal life (-ve)	Animal life will be affected in the immediate vicinity of the drilling rig. It is anticipated that the noise and general activity will keep the animal life away from the site while the prospecting is ongoing.	Set-up	1	2	1	Define	4 VL	<ul style="list-style-type: none"> • Environmental awareness training sessions should be part of the workers' induction • On site geologist need to avoid any nesting or manure sites • If any animals are encountered they must not be killed or injured, but should rather be removed or chased away from the site 	3 VL
	Social (-ve)	Friction between operators/land owners and construction personnel	Set-up	1	2	1	Possible	4 VL	<ul style="list-style-type: none"> • All operations will be carried out under the guidance of a strong, experienced geological manager with proven skills in public consultation and conflict resolution; • All prospecting personnel will be made aware of the local conditions and 	3 VL

									sensitivities in the mine area •There will be a strict requirement to treat local residents and operators with respect and courtesy at all times.	
	Job creation (+ve)	Employment will be sustained by appointment of drilling contractor	Setup	2	1	1	Definite	4 VL	No mitigation measures required	4 VL
<u>Exploration drilling</u> - Drilling - Drill maintenance & refuelling - Core sample collection & storage - Vehicle movements - Waste generation & management	Cultural and Heritage (-ve)	Destruction or loss of Cultural and Heritage Resources	Set-up	1	3	1	Possible	5 L	A red-flag area of 300m be implemented from the high water mark where extra care is taken in terms of avoiding impacts to significant archaeological resources including an archaeological and palaeontological awareness program implemented prior to prospecting . A Fossil Finds Procedure be implemented.	4 VL
	Noise (-ve)	Noise Generation	Operations	1	2	1	Definite	4 VL	• Operational and decommissioning activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays; •Separation of distance of minimum 500m, but preferably 1000m to be maintained between drill sites and dwellings; Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition; and • If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, rig is	3 VL

									only 2-3 hours on a site then it move on.	
	Visual (-ve)	Visual intrusion	Operations	1	2	1	Define	4 VL	<ul style="list-style-type: none"> •The drilling rig and other visually prominent items on the site will be located in consultation with the landowner if in sensitive area; •Rig will move on after 2-3 hours of drilling •Drilling takes place inside mine area, plus very short duration 	3 VL
	Dust fall (-ve)	Dust fall & nuisance from activities	Operations	1	2	1	Define	4 VL	<ul style="list-style-type: none"> • The soil disturbance and clearance of vegetation at drill areas will be limited to the absolute minimum required; • No clear scraping (dozing) be carried out unless absolutely necessary to establish a level drill pad. Rather that surface vegetation be cleared to make way for the drilling rig leaving the roots intact so that vegetation can coppice and regrow; and •Low vehicle speeds will be enforced on unpaved surfaces 	3 VL
	Animal life (-ve)	Animal life will be affected in the immediate vicinity of the drilling rig. It is anticipated that the noise and general activity will keep the animal	Operations	1	2	1	Define	4 VL	Measures implemented during site establishment should apply in this phase as well.	3 VL

		life away from the site while the prospecting is ongoing.								
	Social (-ve)	Friction between local mine operator/land owners and construction personnel	Operations	1	2	1	Definite	4 VL	<ul style="list-style-type: none"> • All operations will be carried out under the guidance of a strong, experienced geological manager with proven skills in public consultation and conflict resolution; • All prospecting personnel will be made aware of the local conditions and sensitivities in the area • There will be a strict requirement to treat local mine operator with respect and courtesy at all times. 	3 VL
	Job creation (+ve)	Employment will be sustained by using local drill contractors	Operations	2	2	1	Definite	5 L	No mitigation measures required.	5 L