mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

(Part A, Volume 2: Impacts and risks identified and management measures (Section 3 g (v) – 3v))

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PART A : (Volume 2) - Numbering continuing for Part A : Volume 1

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v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be mitigated identified

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability and duration of the impacts).

Table g (v) -1 presents identified impacts. The impact assessment criteria is provided in Section g(vi).

As part of the stakeholder engagement for this EMPR amendment, meetings were held with commenting authorities and this detail of these meetings and issues raised is provided under Table g-(ii)-1 and Table g (ii)-2.The environmental impacts were determined through site investigations, data collection, desktop studies of existing documents and reports on the study area, Inputs from specialist studies and taking cognisance of the Input from stakeholders and IAPs.

Table (g) (v) 1 - 1: Impact Assessment Table (C-Construction; O Operation; D-Decommissioning)

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>1. The development of processing activities including associated structures and infrastructure e.g. construction and/or establishment of screening and processing plants, crushing plants, pans and classifiers, mobile treatment plants,
- The construction and maintenance of sea water abstraction pumps and pipelines for pumping to treatment plants and the</td>
<td>a) Possibility of sterilisation of the mineral reserves/resources due to improper placement of infrastructure.
b) Changes to surface topography due to placement of infrastructure and development of residue deposits
c) Visual intrusion and slimes dams as permanent features of the landscape.
d) Crossing over of streams and</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Fully reversible</td></tr>
<tr><td>Loss of resource</td><td colspan="2">Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">High</td></tr>
</table>
</td>
<td>P&D, C,O</td>
<td>- Proper planning as supported by 50 years' worth of data
- Plan and place structures with also closure in mind
- Ensure that the slimes dams are deposited with the key landscape considerations of the surrounding areas. Where feasible existing voids will be utilised. The disturbed areas will be rehabilitated with due considerations of the landscape character and ecosystem dynamics
- Utilise a detailed civil engineering design that was completed for each of the slime dam sites. As was done during feasibility site selections, continue for all the slimes dam positions to ensure that the bedrock profiles in each of these areas are checked to ensure that the bedrock slope dipped towards the coast and that the sites are within 1 km from</td>
</tr>
</table>

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
construction of slimes delivery or deposition pipelines. • Establishment of ablution facilities • Establishment of parking areas	alteration of river banks e) Deterioration of water quality due to spillages			the coastline. • Avoidance of seepage and slumping by continuous monitoring and routine scheduled monitoring by a professional registered engineer. Interpret results of bedrock elevation studies, those sites that seep into aquifers be identified. • Consider the flow characteristics and considered in the placement of the structures. • Provide mobile chemical toilets at convenient points to serve construction and operational teams • Properly dispose of septic tank contents • Adhere to licensing stipulations regarding

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td></td><td></td><td>sewage handling and disposal</td></tr>
<tr>
<td>2. The clearance of the area for proposed mine blocks, overburden areas, new plants at Mitchell’s Bay, Koingnaas and elsewhere (mobile plant) as required and
new slimes dam areas
Construction of 200 tonnes per hour (tph) screening and scrubbing plant
Construction of 450 tph tailings treatment facility</td>
<td>Soils
a) Loss of soil resources due to topsoil removal and wind erosion susceptibility
Vegetation
b) Loss of species of conservation value
c) Fragmentation and loss of habitats
d) Impact on faunal migration due to fencing
e) Proliferation of alien invasive species and disturbance of fauna
Land capability
f) Impact on soil capability</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Partially reversible</td></tr>
<tr><td>Loss of resource</td><td>Low</td><td>Low</td></tr>
<tr><td>Degree to which the impact can be</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td>C</td>
<td>• Limit vegetation clearing to the areas that will be used
• Align all sensitive areas with the mine plan and determine which areas will need to be priorities and which areas require environmental interventions prior to mining. As such, utilise sensitivity map to ensure the identified sensitive areas are avoided
• Rehabilitate disturbed areas utilising adopted appropriate strategies
• Adopt soil amelioration strategies
• Conduct dust monitoring and align this to health and safety dust monitoring
• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor’s contracts</td>
</tr>
</table>

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
	and quality, e.g. loss of seedbed ecosystems, degraded agricultural potential g) Dust generation h) Impact on health and safety such as occupational health and safety; i) Positive impacts on community well-being i.e. prosperity of the community, employment and general significant economic stimulation of the local economy through job creation; j) Impact on land use and availability i.e. restricted access due to diamond	**mitigated**				• Consider the land capability and current land uses before placement of new structures and ensure planned rehabilitation strategies are such that the post-mining land use can still be for the benefit of the post-mining land users.

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>security;</td><td></td><td></td><td></td></tr>
<tr><td>3 (continued)</td><td>a) Surface water deterioration in water quality due to suspended solids from erosion of disturbed soil
Lack of storm control structures will lead to erosion of the stockpiled materials during heavy rains and run – off will thus carry suspended solids into the downstream environment, causing high silt load and affecting stream flow. Water quality might p deteriorate due to sewage effluents, surface run-off.</td><td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td></tr>
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<tr><td>Degree to which the impact can be</td><td>Medium</td><td>Medium</td></tr>
</table>
</td><td>C,O,D</td><td>• Mine infrastructure will have clean water diversions (these will be built prior to construction to minimise the impact of construction activities
• The surface area of clean water areas should be maximised and the size of dirty water management areas minimised within the mine boundary area;
• All storm water management measures should be designed to separate clean water from dirty water (and vice versa);
• All storm water management structures such as the return water dams and catchment paddocks in the slimes dams, will be designed to require minimum maintenance, including maintenance required after floods exceeding the design capacity</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td><table><tr><td>mitigated</td><td></td><td></td></tr></table></td><td></td><td>For the IWWMP, haul and access roads were not included as part of the dirty water management except, where the roads are established on dirty water areas; and
Concurrent rehabilitation will be essential to reduce the recharge of rain water through the overburden dumps and to increase clean surface runoff to the clean environment. Surface water management infrastructure is designed to cater for 5 year intervals. This will require that clean and dirty water berms and trenches be placed in locations to minimise the dirty water catchment during a 5-year stage.</td></tr>
<tr><td>3. The construction and maintenance of access roads to beach mining areas, sea-water intake pumps, land mining areas, overburden</td><td>a) Impacts on the natural landscape due to vegetation clearing
b) Impact on soil capability and quality e.g. loss of seedbed ecosystems,</td><td><table><tr><td></td><td>Without mitigation</td><td>With mitigation</td></tr><tr><td>Severity</td><td>Medium</td><td>Medium</td></tr><tr><td>Duration</td><td>Medium</td><td>Medium</td></tr><tr><td>Extent</td><td>Medium</td><td>Medium</td></tr></table></td><td>C&O</td><td>Implement all required safety measures when collecting road construction material and during transport thereof.
Rehabilitate or remove any access roads, gates or fences constructed, as per approved rehabilitation plan.</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>dumps, tailing dumps and slimes dams and processing plants, including road maintenance</td>
<td>and reduced land capability to potential soil erosion</td>
<td>
<table>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td></td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td></td><td></td></tr>
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<td></td>
<td></td>
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<tr>
<td>4. Overburden stripping and mechanical extraction of ore and mine block development, including blasting activities
Establishment of temporary</td>
<td>a) Noise
b) Damage to archaeological and heritage sites.
c) Dust generation
d) Deterioration in water quality due to</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td>C,O,D</td>
<td>• Compile a rehabilitation plan that is safe and non –polluting.
• Notify stakeholders of blasting times when blasting will be done in areas of public access.
• Adhere to Mine health and safety noise regulations</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTSAND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>stockpiles and/or residue deposits during mining operations;
Re-mining of residue stockpiles or residue deposits;
Certain mine residue deposits (CRD's) at the existing Koingnaas and Michell's Bay plant sites that will be re-mined and reclaimed.
Some overburden dumps will be used in continuous rehabilitation.
Mobile treatment plant stockpiles and residue dumps that will be processed and rehabilitated on an ongoing basis.</td>
<td>elevated nitrate levels associated with blasting
e) Noise generation
f) Topsoil removal
g) Loss of soil resources due to wind erosion susceptibility
h) Surface water deterioration due to suspended solids from erosion of disturbed soils
i) Vegetation clearing
i. Loss of species of conservation value
i. Fragmentation and loss of habitats</td>
<td>
<table>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
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<tr><td>Degree to which the impact can be mitigated</td><td></td><td></td></tr>
</table>
</td>
<td></td>
<td>• Avoid disturbance of archaeological sites and notify SAHRA, through the appointed archaeologist, should there be archaeological finds.
• Strip and store topsoil prior to placement of infrastructure as far practical as possible and avoid sterilization of such soil stockpiles by ensuring for adequate windrows and heights (generally not more than 2 m where possible to avoid loss of seedbank)
• Adopt soil amelioration strategies
• Conduct dust monitoring and align this to Health and Safety dust monitoring.
• The requirement that any removal of surface vegetation be restricted to as small a footprint as possible.
• Regular monitoring (approximately every 6 months) should be carried out across all</td>
</tr>
</table>

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	i. Impact on faunal migration due to fencing v. Proliferation of alien invasive species and disturbance of fauna j) Removal and loss of Namaqualand Seashore Vegetation and Namaqualand Coastal Duneveld.			areas of mining activity. This can be done visually, but any signs of soil loss by wind or water, should be reported in order that preventative measures can be taken before any problem becomes worse. • Within the broader study area, there are no specific sensitive areas that need to be avoided, in terms of the soils or agricultural potential.
5 (continued)				• Limit vegetation clearing to the areas that will be used • Utilise and continuously update sensitivity map to ensure the identified sensitive areas are avoided • Rehabilitate disturbed areas utilising adopted appropriate strategies

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				• An important objective should be to reduce negative edge effects by ensuring that all regularly used informal roads have acceptable surfaces, are free from erosion, and have effective drainage. • New and existing mining pits will be backfilled, where appropriate, with existing spoil and any new spoil generated according to a systematic plan. • New soil dumps will not be positioned within areas of intact habitat adjacent to mining pits, but will be used to backfill or rehabilitate existing disturbed areas. • Material for coffer dams will be sourced from existing disturbed sites, as far as possible. Existing roads will be used wherever possible and they will be constructed so as to avoid undisturbed habitat. • An ECO will be appointed who will be

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				involved with planning of roads and other infrastructure and who will monitor and audit impacts on the undisturbed natural environment. • A long-term monitoring program will be developed for the site that monitors and should aim to quantify changes in habitat. • ECO to keep a log of activities which must be inspected and signed off once monthly by the relevant manager. • The mine should appoint a suitably qualified restoration specialist to compile a vegetation rehabilitation plan for areas deemed necessary. The restoration specialist must submit the vegetation rehabilitation plan to the ECO and mine management for approval.
5 (continued)	k) Impact on Land capability			• Restricted footprint: as little surface disturbance as possible so that there is

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	i. Impact on soil capability and quality, e.g. loss of seedbed ecosystems and loss of agricultural potential; i. Loss of agricultural land due to low prevailing agricultural potential i. Whenever any excavation or other surface disturbance is involved, the possibility of increased erosion exists. In the case of the West Coast Resources mining project, due to the sandy nature of the topsoils, coupled with the dry climate, the erosion hazard will be in the form of increased			minimum disturbance • Removal and storage of cover soil (>0.5 m, if possible). Soil should be stored for the shortest possible time (<2-3 yrs, if possible) and stored to a height of less than 2-3 metres, if possible before being replaced for rehabilitation. • Effective re-establishment of natural vegetation (in consultation with vegetation specialists), with appropriate soil conservation n measures during this phase. • Regular monitoring (at least every 6 months) to check on progress of rehabilitation.

ACTIVITIES	IMPACTSAND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	susceptibility to wind erosion, whereby any activity that removes the vegetation cover (no matter how sparse) will expose the topsoil to the possibility of removal and re-deposition at a distance, by wind action.			

vi) Methodology used in determining the significance of environmental impacts

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

The significance of the impacts was determined through the following:

For each impact, the SEVERITY (size or degree scale), DURATION (time scale) and EXTENT (spatial scale) are described (Tabel (g) (vi) 1-1. These criteria are used to determine the CONSEQUENCE of the impact (**Error! Reference source not found.**), which is a function of severity, spatial extent and duration.

Table (g) (vi) 1 - 1: Ranking criteria for environmental impacts

SEVERITY/INTENSITY	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Limited loss of resources.
DURATION	L	Quickly reversible. Less than the project life. Short term (0-5 years).
	M	Reversible over time. Life of the project. Medium term (6-15 years).
	H	Permanent. Beyond closure. Long term (>15 years).
SPATIAL SCALE	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary, local.
	H	Widespread – Far beyond site boundary, regional/ national.

Table (g) (vi) 1 - 2: Determining the Consequence

SEVERITY	**DURATION**		**SPATIAL SCALE**		
			Site Specific (L)	**Local (M)**	**Regional/ National (H)**
Low	Long term	H	Medium	Medium	Medium
	Medium term	M	Low	Low	Medium
	Short term	L	Low	Low	Medium
Medium	Long term	H	Medium	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Low	Medium	Medium
High	Long term	H	High	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Medium	Medium	High

The SIGNIFICANCE of an impact is then determined by multiplying the consequence of the impact by the probability of the impact occurring (Table (g) vi 1-3), with interpretation of the impact significance outlined in Table (g) (vi) 1-4 and that of the status of the impact is outlined in Table (g) (vi) 1-5.

Table (g) (vi) 1 - 3: Determining the Significance Rating

PROBABILITY (of exposure to impacts)		**CONSEQUENCE**		
		L	**M**	**H**
Definite/ Continuous	H	Medium	Medium	High
Possible/ frequent	M	Medium	Medium	High
Unlikely/ seldom	L	Low	Low	Medium

Table (g) (vi) 1 - 4: The interpretation of the impact significance

SIGNIFICANCE	CRITERIA
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

Table (g) (vi) 1 - 5: The interpretation of the status of the impact

IMPACT STATUS	CRITERIA
Positive	The impact benefits the environment.
Negative	The impact results in a cost to the environment.
Neutral	The impact has no effect on the environment.

Once the significance of an impact has been determined, the CONFIDENCE in the assessment of the significance rating is ascertained using the rating systems outlined in table (g) (vi) 1-6.

Table (g) (vi) 1 - 6: Definition of Confidence Ratings

CONFIDENCE RATINGS*	CRITERIA
High	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact. Greater than 70% sure of impact prediction.
Medium	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact. Between 35% and 70% sure of impact prediction.
Low	Limited useful information on and understanding of the environmental factors potentially influencing this impact. Less than 35% sure of impact prediction.

The level of confidence in the prediction is based on specialist knowledge of that particular field and the reliability of data used to make the prediction. The degree to which the impact can be reversed is estimated using the rating system outlined in Table (g) (vi) 1-7.

Table (g) (vi) 1 - 7: Definition of Reversibility Ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	Where the impact is permanent.
Partially Reversible	Where the impact can be partially reversed.
Fully Reversible	Where the impact can be completely reversed.

The degree to which there will be a loss of resources (Table (g) (vi) 1 – 8) refers to the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable.

Table (g) (vi) 1 - 8: Definition of Loss of Resources

LOSS OF RESOURCES	CRITERIA
Low	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
Medium	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
High	Where the activity results in an irreplaceable loss of a resource.

Lastly, the degree to which the impact can be mitigated or enhanced is described below:

Table (g) (vi) 1 - 9: Degree to which impact can be mitigated

DEGREE TO WHICH IMPACT CAN BE MITIGATED	CRITERIA
None	No change in impact after mitigation.
Very Low	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
Low	Where the significance rating drops by one level, after mitigation.
Medium	Where the significance rating drops by two to three levels, after mitigation.
High	Where the significance rating drops by more than three levels, after mitigation.

vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties).

The alternatives considered include the following:

- Site alternatives i.e. location of slime dams
- Design alternatives i.e. designs for the coffer dams
- Activity alternatives i.e. mining methodology
- The option of not implementing the activity i.e. “No-go alternative”

Site Alternatives

Over the history of the Koingnaas mine slime generated by the processing plants was disposed either to slime dams constructed on surface, or was backfilled into selected mining voids in the vicinity of the plants. The slime generated by the plants in Koingnaas are classified as Sand-Silt under the USCS system. The historic slime facilities that were created on surface by De Beers have a negative impact on the environment due to windblown dust that is generated. Placement of future slime facilities should therefore take cognisance of this fact and attempt to minimize the negative impact of windblown dust and sand.

The general philosophy that WCR has adopted is that any material excavated, moved or processed as part of any new mining or plant activity should be placed in such a way that it is part of the final rehabilitation solution. This will ensure that all operations are aligned with good environmental practice and will reduce the final closure liabilities and as such planning with closure with mind is adopted in the selection criteria. Backfilling existing mining voids with slime generated from the processing plants is seen as the most effective and environmentally friendly way of disposing of slime material.

Existing mining voids in mined out areas were identified in central areas where processing plants would be placed over the life of the operation. The bedrock profiles in each of these areas were checked to ensure that the bedrock slope dipped towards the coast and that the site was within 1 kilometre from the coastline. These attributes would ensure that any seapage of seawater associated with the slime would end up back in the ocean. There are no fresh water sources, other than rain water in the region of the selected slime sites. Placing of the fine fraction of the waste below natural ground level or behind existing overburden dumps will reduce windblown dust. No chemicals are used in the beneficiation process. The material is mainly transported quartzite, with no Acid Mine Drainage (AMD) potential. A detailed civil engineering design was completed for each of the sites. The proposed slime facilities are indicated in Figure (g) (i) 4.1-2.

This process culminated into the production of the final site selection. There are currently nine alternatives that are considered. The preferred slime dam sites are A, C, H, G, D and E. There are alternatives 1, 2 and 3 which are alternatives to sites H, sites A, C and G and alternatives to Sites D and E, respectively. Six sites have subsequently been chosen as the preferred sites in order to accommodate all the anticipated mine residue as the Life of Mine is approximately 11 years.

The impacts that were associated with specifically the existing slime 1, and 2, were the current dust plumes and as such these sites were not preferred. The advantages and disadvantages of the sites are provided in Section h. The other key consideration in determining the preferred sites was the proximity to the plant and the available sizes of the voids to accommodate the life of mine. The slime dams were incorporated into the integrated water and waste management plan, which was compiled as part of the water use licence application and any impacts associated with these water uses will be managed as part of a valid license.

General Design Alternatives

There are two alternative approaches to accessing diamond resources seaward of the low water mark, namely:

- Temporary accretion of the beach in the immediate vicinity of the mining target using overburden material available on the beach or from adjacent onland mining sites; or
- The construction of a rock berm or coffer dam using non-native rocks and boulders sourced from rock stockpiles near Koingnaas. Both statistically stable and dynamically stable rock berms are being considered.

Up to six potential sites harbouring surf zone resources have been identified. However, the nature of the specific target area determines which of the alternative approaches is most suitable. For example, the exposed nature of the coastline and high long shore sediment transport rates, in combination with insufficient overburden sands available on the beach to maintain accretion under the resulting high erosion rates, negates the application of beach accretion using sand anywhere but in very sheltered bays.

Using information summarised from WSP (2015) the alternative mining approaches are detailed below.

The 68/69 design

Along the typically wave exposed coastline of the project area, rock berms or coffer dams are the only feasible alternative to effectively reclaiming a mining area located beyond the low water mark. The procedure for construction of a protective rock berm is described briefly below:

- On both the northern and southern side of the mining target area a rock berm is built by progressively end-tipping rock and boulder core material from trucks perpendicular to the oncoming waves and shoreline. Dozers and excavators subsequently shape the profile and dress the slope with a suitable armour layer of larger rocks;
- The berms extend from above the storm high water mark into the surf zone until the seaward extent of the mining block is reached and a shore-parallel berm is constructed linking the two shore-perpendicular berms;

- Once the berm is in place and the mining block is enclosed overburden stripping and gravel extraction can be undertaken using conventional open-cast mining approaches;
- Once the area has been mined out, the rock berm would be progressively extended offshore to enclose the next mining block, potentially enabling mining up to 300 m seawards of the low water mark.

The material used to construct such breakwaters typically consists of an underlying core of quarried material, which gets progressively coarser towards the outside and is covered by an outer layer of large armour rock. Geotextile sandbags commonly used for coastal protection works may also be used in areas of low wave energy, as temporary emergency measures or above the high water mark on the wall itself. The seaward extent of the berm and prevailing wave conditions determine the size/mass of the rock required for the armour layer. Berm can be extended in phases as far offshore as conditions allow. Although four phases have been assumed for this project the material requirements for Stages 3 and 4 would necessitate the use of very large armour rocks that would be difficult to produce, transport and place, thereby reducing the feasibility of these structures. Possible alternatives for Stage 4 include the use of concrete armour units on the seaward face of the berm, or constructing the berm as a dynamically reshaping profile using smaller rocks (see later).

Despite the comparatively high volumes of material required for berm construction (Table (g) (vi) 1 - 2) the design-life of such berms is typically 1-2 years and they can thus be considered temporary structures.

Similar beach mining operations have previously been successfully undertaken near the Olifant’s River and along the coastline near Alexander Bay. For the current project, WCR is intending to implement this mining approach at the sandy beach target sites known as Koingnaas 68/69, Somnaas and Langklip Central. The estimated area to be disturbed at each of these sites amounts to ~118,000 m².

Michelle’s Bay (Rooiwal Bay) design

Michelles’ Bay (Rooiwal Bay) is a small protected bay located north of the Spoeg River.The mouth of the bay is some 700 m across. The bay hosts a narrow sandy beach backed by steep soil cliff and a shallow reef in the mouth. An irregular, deep, channel reaching at least 20 m depth is present in the northern part of the bay, with a second depression occurring in the southern part of the bay.

One of the proposed mining approaches implemented to access the diamond deposits on the seabed and adjacent beaches within Michelles’ Bay, involves accretion of the beach using overburden sands stripped from adjacent mine block LKB-04 on-land. Mining of the accreted area would liberate further material that can be placed into the sea to gain additional accretion. Three stages of beach accretion are being considered, with the shoreline moving seawards by 150 m during each successive stage. Sand volumes required for each stage comprised 1.3 million, 2.5 million and 5.9 million cubic metres, respectively for 150 m, 300 m and 450 m accretion. However, as the beach is accreted and the shoreline maintains equilibrium with the wave-driven currents, sand placed on the beach would be redistributed by currents and transported westwards out of the bay, where it would redeposit on the seabed and adjacent shoreline.

Closure of Michelle’s Bay with a Dynamically Stable Rock Berm

The alternative approach proposed for Michelles’ Bay is the construction of a dynamically stable rock berm across the mouth of the bay and perpendicular to the predominant wave action. To avoid erosion of the berm profile during storms, it needs to be relatively wide and therefore requires large volumes of material for construction and covers a larger footprint than a conventional rock berm.

To implement this approach in Michelles’ Bay, a berm crest of 14 m in height would be required to protect the mining area from extreme wave conditions. With a berm width of 10 m at the crest and as much as 140 m at the base, at minimum 660,000 m^3 of large cobbles/small boulders would be required. This volume does not cater for wastage through erosion of material during the construction phase or for ongoing replenishment of eroded material during the life of the structure. While considered technically feasible, this alternative has high costs associated with it and the high loss rate of material off the partly completed berm during construction may result in the structure being impossible to build. The estimated area to be disturbed using this approach would be 541,755 m^2, excluding indirect effects due to loss of construction material.

Closure of Michelle’s Bay with a statistical stable rock berm is not considered feasible due to the need for either very large armour rocks or concrete armour units on the seaward side of the berm facing the oncoming waves.

Generic design

A more generic design involving either statistically stable rock berms, or these in combination with dynamically stable berms, is being considered for other potential mining sites characterised by either a rocky shoreline or a shoreline of mixed sand and rock. The generic design is proposed for the Noup, Visbeen, Koingnaas, Langklip Central and Langklip target areas.

The generic designs assume an initial mining area of 200 x 200 m, with sequential extension into adjacent blocks as mining progresses and the resource in a block is mined out. The type of design applied is determined largely by the depth of the seabed at the seaward extreme of the shore parallel berm. Two alternative generic designs are being considered, namely:

Statically stable rock berm

In areas of seabed depth up to 2.5 m below mean sea level at the seaward edge of the mining target, a conventional, statistically stable rock berm comprising a core of finer material and an armour layer of larger rocks facing the prevailing waves would be constructed. For protection of the Stage 1 mining block, these berms would comprise a shore-parallel and shore-perpendicular component (grey shading in Figure (d) (ii) 1.1 - 7. Extension of operations into subsequent mining blocks would require the construction of a further shore-parallel berm to protect the adjacent area (lighter shading in Figure (d) (ii) 1.1 - 8).

Alternative combination berm

In areas of seabed depth up to 4 m below mean sea level at the seaward edge of the mining target, a conventional, statistically stable groyne would be built perpendicular to the shore to the required depth. Large armouring would be required at the seaward edge of this groyne to prevent erosion. To protect the Stage 1 mining block, the seaward end of the groyne would connect to a shore-parallel dynamic re-shaping berm (grey shading in Figure (d) (ii) 1.1 - 9. A further shore-parallel dynamic re-shaping berm would then be added for the protection of the Stage 2 mining block (lighter shading in Figure (d) (ii) 1.1 - 9).

For each site, the most economically and technically viable concept/s will be selected bearing in mind the temporary nature of the mining, the quantity and characteristics of available construction materials (rock, sand and clay), possible phasing of the mining to facilitate recovery of diamonds at an early stage, the need to minimise seepage into the mining area and the costs of protective measures. The potential areas to be disturbed by these proposed operations are provided instable (d) (ii)-2.

viii) The possible mitigation measures that could be applied and the level of risk

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

The mitigation measures that are proposed for the identified issues at this stage of the project are indicated in Table (g) (viii) 1 - 1.

A list of the issues that were raised by the stakeholders is provided in Table (g) (ii) -2. This table shows sections where these issues are addressed in the mitigation table. The mitigation table is included as of this report. Moreover, as summary f the issues raised by IAP's is outlined below.

The outcomes of pre-consultation meetings held with Interested and Affected parties, where most of the issues were raised, are included as Appendix h.

A comprehensive summary of the issues raised is summarised in Section (h).

The issues specifically associated with the marine environment raised by key stakeholders are summarised below and have been grouped into specific environmental aspects and mitigation measures that will be adopted are provided in Table (g) (viii) 1-1. The key issues were:

1. Interaction with other users or future use scenarios

- Overlap of proposed mining activities with proposed MPAs and with Operation Phakisa;
- Potential conflict with abalone ranching rights holders regarding water quality and habitat loss, particularly those companies that have already started seeding juveniles;
- Increased turbidity near mining site(s) may compromised water quality at the seawater intakes to land-based abalone farms.

2. Water Quality

- The impacts of suspended sediment plumes and elevated turbidity as a result of mining operations need to be assessed;

- Increased turbidity near mining site(s) may impact filter feeders;
- Requirements for discharge permits regarding discharges to the sea (particularly from diver-assisted shore units) is unclear.

3. Disturbance of Habitats

- Blasting in the marine environment should be avoided and materials used for the construction of berms re-used as much as possible;
- Concern regarding the introduction of non-native material onto the beach during berm construction;
- Concern regarding the disturbance to marine habitats and associated biota through mining in subtidal areas; and
- The impacts associated with coffer dam construction vs. accretion need to be carefully considered.

4. Impacts on Seals

- As seal colonies are unique habitats within the project area these should be mapped, and information available at DAFF.

5. Baseline Studies and Impact Monitoring

- Quantitative marine baseline studies focussing on the specific mining sites need to be undertaken;
- Provide DEA with information on the experimental design of baseline and monitoring studies prior to commencement of surveys;
- Give consideration to co-ordination of monitoring programmes with DEA and sharing of research information;
- Baseline and monitoring studies should focus both on rocky habitats (including an assessment on the impacts on reef structure) as well as sandy beach habitats;
- The recovery of these habitats following mining needs to be understood from the perspective of species recruitment and colonisation;
- Monitoring programmes should be co-ordinated to ensure an upfront understanding of sensitive habitats in the project area, with subsequent avoidance of these in the mine plans; and
- Give consideration to implementing a Strategic Environmental Assessment approach in partnership with other role players in the area so as to gain a broader understanding of the coastline rather than focusing on the project specific sites.

6. Rehabilitation, Closure and Biodiversity Offsets

- Decommissioning and closure is required of old mining sites no longer used;

- As active rehabilitation below the low water mark is not practicable, there is concerns that wave action may not be sufficient to ensure natural rehabilitation of berms; and
- The viability of creating artificial habitats to offset habitat disturbance should be considered (e.g. leaving the rock armour of the berms in place to form islands as roosting habitats for seabirds).

7. Environmental Management

- There is a need for the development of beach management plans for management of mining impacts;
- Strict house-keeping is required at beach mining sites (e.g. no refuelling on the beach, and all equipment to be removed on cessation of operations); and
- An Environmental Control Officer should be appointed to ensure compliance with the Environmental Management Plan.

Table (g) (viii) 1 - 1: Mitigation Measures for listed activities

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
5. The development of processing activities including associated structures and infrastructure e.g. construction and/or establishment of screening and processing plants, crushing plants, pans and classifiers, mobile treatment plants, • The construction and maintenance of sea water abstraction pumps and pipelines for pumping to treatment plants and the construction of slimes delivery or deposition pipelines. • Establishment of ablution facilities • Establishment of parking	f) Possibility of sterilisation of the mineral reserves/resources due to improper placement of infrastructure. g) Changes to surface topography due to placement of infrastructure and development of residue deposits h) Visual intrusion and slimes dams as permanent features of the landscape. i) Crossing over of streams and alteration of river banks j) Deterioration of water quality due to spillages	Medium	P&D, C,O	• Proper planning as supported by 50 years' worth of data • Plan and place structures with also closure in mind • Ensure that the slimes dams are deposited with the key landscape considerations of the surrounding areas. Where feasible existing voids will be utilised. The disturbed areas will be rehabilitated with due considerations of the landscape character and ecosystem dynamics • Utilise a detailed civil engineering design that was completed for each of the slime dam sites. As was done during feasibility site selections, continue for all the slimes dam positions to ensure that the bedrock profiles in each of these areas are checked to ensure that the bedrock slope dipped towards the coast and that the sites are within 1 km from the coastline. • Avoidance of seepage and slumping by continuous monitoring and routine scheduled monitoring by a professional registered engineer. Interpret results of

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
areas				bedrock elevation studies, those sites that seep into aquifers be identified. • Consider the flow characteristics and considered in the placement of the structures. • Provide mobile chemical toilets at convenient points to serve construction and operational teams • Properly dispose of septic tank contents • Adhere to licensing stipulations regarding sewage handling and disposal
6. The clearance of the area for proposed mine blocks, overburden areas, new plants at Mitchell's Bay, Koingnaas and elsewhere (mobile plant) as required and new slimes dam areas Construction of 200 tonnes per hour (tph) screening and scrubbing plant Construction of 450 tph tailings treatment facility	Soils k) Loss of soil resources due to topsoil removal and wind erosion susceptibility Vegetation l) Loss of species of conservation value m) Fragmentation and loss of habitats n) Impact on faunal migration due to fencing o) Proliferation of alien invasive	Low	C	• Limit vegetation clearing to the areas that will be used • Align all sensitive areas with the mine plan and determine which areas will need to be priorities and which areas require environmental interventions prior to mining. As such, utilise sensitivity map to ensure the identified sensitive areas are avoided • Rehabilitate disturbed areas utilising adopted appropriate strategies • Adopt soil amelioration strategies • Conduct dust monitoring and align this to health and safety dust monitoring

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	species and disturbance of fauna Land capability p) Impact on soil capability and quality, e.g. loss of seedbed ecosystems, degraded agricultural potential q) Dust generation r) Impact on health and safety such as occupational health and safety; s) Positive impacts on community well-being i.e. prosperity of the community, employment and general significant economic stimulation of the local economy through job creation; t) Impact on land use and availability i.e. restricted access due to diamond security;			• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's contracts • Consider the land capability and current land uses before placement of new structures and ensure planned rehabilitation strategies are such that the post-mining land use can still be for the benefit of the post-mining land users.
3 (continued)	b) Surface water deterioration in water quality due to suspended solids from erosion of disturbed	Low	C,O,D	• Mine infrastructure will have clean water diversions (these will be built prior to construction to minimise the impact of construction activities

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	soil Lack of storm control structures will lead to erosion of the stockpiled materials during heavy rains and run –off will thus carry suspended solids into the downstream environment, causing high silt load and affecting stream flow. Water quality might p deteriorate due to sewage effluents, surface run-off.			• The surface area of clean water areas should be maximised and the size of dirty water management areas minimised within the mine boundary area; • All storm water management measures should be designed to separate clean water from dirty water (and vice versa); • All storm water management structures such as the return water dams and catchment paddocks in the slimes dams, will be designed to require minimum maintenance, including maintenance required after floods exceeding the design capacity • For the IWWMP, haul and access roads were not included as part of the dirty water management except, where the roads are established on dirty water areas; and • Concurrent rehabilitation will be essential to reduce the recharge of rain water through the overburden dumps and to increase clean surface runoff to the clean environment. Surface water management infrastructure is designed to cater for 5 year intervals. This will require that clean and dirty water berms and trenches be placed in locations to minimise the dirty water catchment during a 5-year stage.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
7. The construction and maintenance of access roads to beach mining areas, sea-water intake pumps, land mining areas, overburden dumps, tailing dumps and slimes dams and processing plants, including road maintenance	c) Impacts on the natural landscape due to vegetation clearing d) Impact on soil capability and quality e.g. loss of seedbed ecosystems, and reduced land capability to potential soil erosion	Medium	C&O	• Implement all required safety measures when collecting road construction material and during transport thereof. • Rehabilitate or remove any access roads, gates or fences constructed, as per approved rehabilitation plan.
1 Processing activities 1.1 Slimes disposal into existing mining voids Existing mining voids in mined out areas were identified in central areas where processing plants would be placed over the life of the operation. The disposal of fine residue and waste water to: Slimes	a) The historic slimes facilities that were created on surface by De Beers have a negative impact on the environment due to windblown dust that is generated. b) Potential seepage of sea-water used in processing into freshwater resources in the area.	High	C and O	• Plan and place structures with closure in mind. • Establish a dust management plan in consultation with the environmental manager. • Place the fine fraction of the waste below natural ground level or behind existing overburden dumps to reduce windblown dust • Reduce dust generation by stabilising dust sources through covering with coarse tailings, where practically possible. • Conduct dust monitoring according to acceptable

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
dams from the processing plants, Mining voids during mining and/or overburden stripping. Return water dams.	c) Deterioration in water quality d) Potential health impact on surface water users and on the natural environment.			monitoring protocol as per prescriptions of the dust specialist investigations (Volume 4 of this EIA) Manage the slimes dams as part of the integrated water and waste management plan, which was compiled as part of the water use licence application and any impacts associated with these water uses will be managed as part of a valid licence • Align development strategies to the Estuary Management Plans that have been developed by the district municipality for these estuaries. • Utilise a detailed civil engineering design that was completed for each of the slime dam sites.
7.1 (continued)	e) Potential impact on water resources (Swartlintjies River). While the preferred site of future slimes dam is not going to impact on	High	O and D	• It is not feasible to cover slimes dams while they are in use Re-consider use of this alternative 2 and remove from the alternatives if feasible and alternatively utilise the

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	the Swartlintjies Estuary, the alternative site 9 km upstream (Alternative 2 in Figure (d) (ii) 1.1-9), is located within the Swartlinjies River Catchment. Although the prevailing wind carries some of the dry saline sediment north-east, the possibility exist that seepage of saline water gets into the Swartlinjties River. The Estuary Study Report in Section 10.42 , Volume 4, provides detailed view in this aspect.			preferred sites north of the estuary, which are situated outside of the Swartlintjies River catchment and are anticipated to drain into the sea via existing abandoned mining channels. Should alternative 2 be used (Figure (d) (ii) 1-1, this alternative site should be developed with caution to prevent accelerated salinisation of the Swartlintjies Estuarine Functional Zone and associated potential negative long-term impacts on biodiversity.
Impacts of Shore based divers and those of Beach and Offshore Channel mining				
1. Construction of coffer dam walls around excavate beach and/or offshore channel mine blocks using boulders, bedrock,	a) The changes in biophysical characteristics on open coast beaches may result in cumulative impacts as adjacent blocks are mined. b) Smothering of rocky habitats	High	O	• Berm construction and/or shoreline accretion, overburden stripping and removal and processing of target gravels are all an integral part of the mining approach and other than the ‘no-go’ option, there is no feasible mitigation for these proposed operations. Disturbance of beach habitat adjacent to the mining blocks can, however, be minimised through stringent

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
gravel, sand and other related materials. Excavation by means of bulldozers, excavators and haulage trucks. Movement of rock boulders, gravel, sand to the mine site by trucks, dredge, conveyor or slurry pump. Infilling and depositing of rock boulders, sand and clay into the seashore as rock/sand berms. Dredging or hydraulic mining of sand overburden in adjacent mining areas and pumped to the shoreline for beach accretion. Pumping of sediments due to operation of coffer dams /	by sediments and shift in communities from those characterising rocky shore to those typical of sandy beaches. c) Change in the invertebrate macro-faunal communities, Intertidal and shallow subtidal benthic communities or burial of benthic biota by sediments and localised impacts of smothering, burial. However, if the surface sediment is similar to the native beach material when operations cease, and if the final long-term beach profile has similar contours to the original profile, the addition or removal of layers of sediment does not have enduring adverse effects on the sandy beach benthos and recovery			environmental management and good house-keeping practices. • Active rehabilitation involving backfilling of mined out areas, active removal of as much of the berms above the low water mark as feasible and re-structuring of the mining area to resemble the natural beach morphology should be undertaken on completion of mining operations. • Profile and sloping of remaining tailings heaps on completion of operations. While recovery of the intertidal and sub tidal communities is rapid, physical alteration and degradation of the shoreline in ways that cannot be remediated by swell action can be more or less permanent. • Mine beach targets in blocks sequentially from the north to the along the beach, rehabilitating mined-out blocks immediately on cessation of mining in that block; • Avoid re-mining of sites in the medium to long term, as far as practically possible. • Rely on the fact that after mining activities have ceased, the sea tends to breach dams within a few

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
generation of suspended sediment plumes	following the initial disturbance can occur within a few years. In contrast, structural changes in grain size over the medium- to long-term due to repeated nourishment or seawall construction results in either permanent changes in community structure or longer recovery times.			months as a result of heavy wave action, and depending on the sitting and occurrence of storms, replenish itself to pre-mined state (visual view) over a period of months to several years • Active rehabilitation below the low water mark is not possible and recovery of habitats and communities will depend on natural processes. Sediments accreted in Mitchell's Bay would be naturally eroded over the long term.
1 (continued)	d) Development of Hypoxic sediments due to accretion • The high wave exposure in combination with the comparatively coarse nature of the beach sediments (D_{50} = ~270 µm; WSP 2015) in the project area make it highly unlikely that hypoxic conditions will develop as a	Low	O	• Consider potential sources of sand and the access requirements by heavy vehicles • Coastal and sea mining activities should be planned and spaced in such a way that it will always be a nearby, undisturbed habitat of the same type as the one that is being disturbed nearby.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
1 (continued)	e) Effects on high order consumers	Low	O	• Recovery of invertebrate macro faunal communities following disturbance of beach habitats generally occurs within 3 – 5 years after cessation of the disturbance,
	f) Sedimentation of intertidal and subtidal reefs due to redistribution of sediments.	Medium	O	• The redistribution of sediments will be monitored and controlled
1 (continued)	An increase in turbidity caused by the pumping of bottom sediments and compromised water quality and sediment inundation of areas adjacent to those being mined	Low	O and D	Turbidity offshore of the mine site(s) is thus unlikely to exceed levels attained naturally during turn-over of nearshore sediments by wave action or seasonal inputs in river discharges. As turbid water is a natural occurrence along the southern African west coast, any turbidity-related effects in the near-shore environment as a direct result of mining operations are likely to be insignificant. No mitigation measures are deemed necessary.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
2. Shore based divers related impacts	a) Disturbance of reef habitat through disposal of tailings. Devaluing of the coastal land due to visual intrusion	Medium	O	• Manage disposal of tailings above the high water mark; • Avoid re-mining of sites in the medium term; • Avoid blasting and large-scale removal of rocks from sub tidal gullies into the intertidal; • Designate and actively manage specific access, storage and operations areas; • Remove all equipment on completion of activities; and • Flatten all remaining tailings heaps on completion of operations.
2 (continued)	b) Physical damage due to trampling of intertidal biota	Low	O	
2 (continued)	c) Changes to community structure due to kelp cutting	Medium	O	Avoid kelp cutting, where unnecessary and as a value-add, collaborate with land-based abalone farmers to use

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				kelp for abalone feed, based on feasibility of this value - add option and after discussions with the NC abalone working group.
2.1 Discharge of seawater used to screen marine gravels	a) Disposal of process water resulting in disturbance of shallow marine ecosystem b) Loss of shallow marine habitat c) Disturbance of intertidal and subtidal marine areas d) Mortality of benthic organisms	Medium	O	• Reduce the negative effects of salinisation of soils from seawater by locating the outlets from the screens as close to the top of the intertidal zone as possible. • Educate personnel about the importance of benthic fauna in the marine ecosystem, and encourage them to minimise direct and indirect removal or damage through mining activity.
2.2 The establishment of the parking areas and equipment storage areas	a) Changes to ecological environment and biophysical characteristics due to placement of parking areas b) Pollution of near shore waters and beaches due to spillage of cleaning solvents, oils and other chemicals	Medium	C	• Mining the disturbed areas to the specific foot print areas that will be required • Remove all remnants of pipes and parking infrastructure when moving to the next site • Adhere to recommended waste management principles and protocols • Maintain all mining equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				• Minimize general environmental damage to habitats and to maintain ecosystem functioning and biodiversity. • Implement the use of drip trays whenever a refuelling or machine maintenance activity is being undertaken. A procedure for controlling oil spills will be compiled and used as a guide to ensure that oil spills are at a minimum. • Keep an oil spill response kit on site and ensure that the staff is trained on how he kit is used.
3. General surf zone mining related impacts	1. Potential conflicts with overlapping coastal activities such as abalone ranching right holders (1). Impact of sea -based access as an alternative to land based access Constraints for access, whether by sea or land are as follows: i. The primary constraint is sea condition – rough seas would	Medium	O and D	Co-exist with coastal users such as abalone ranchers and look for positive synergies such as the benefit WCR can contribute to the ranchers through the limited access and diamond security control on the impact poaching has historically had on the coastal activity operations Take cognisance of the draft Northern Cape Coastal Management Programme (NCCMCP) (Breetzke, 2015), which includes priority areas and tangible objectives to achieve the vision for the Northern Cape coastline over a 5 yr circle. Priority 1 in the NNCMCP, for negotiation of permanent coastal access servitudes with land owners

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	not permit either diving (from the shore) or near shore access with a boat to allow divers in the kelp zones for seeding. i. High wind stress – either from the prevailing SE (summer condition mainly) or NW (winter condition mainly). i. Delayed access through the mining lease areas by land (WCR), subsequently losing a window of opportunity to seed a designated area.			and their registration within 2 years. Finalise negotiations with SANParks, regarding management of chalets at NOUP and clearly define public access and registration therefore.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	(2) Loss of seeded abalone Abalone seeding and harvesting in mined areas will not be possible until recovery of the mined area has been achieved – conceivably this will take at least five years (as proposed by Pulfrich, 2015). At this stage the abalone ranching right will be near to or completed and the opportunity to test the feasibility of abalone ranching lost. This opportunity will not be lost in areas where mining will not occur. There would seem to be few alternatives if abalone ranching cannot be accommodated in a systematic way within a plan that incorporates both mining and abalone ranching options.	High	O	
3 (continued)	2. Limited access to the coast	Medium	C, O and D	• Discussions with San Parks to input into the conservation management plans • Biodiversity off sets and positive spin-offs in the form of relinquishing some of the mining rights, to the south

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				of the operations in to the Marine Protected Areas • WCR has committed to give up all of Sea Concession 9a and 90% of 8a and 8b to contribute to the Marine Protected Area (MPA). Section 11 application for the ceding of rights had currently been applied for with DMR. • Consider opening additional access at certain areas that are not critical in terms of diamond security.

ix) Motivation where no alternative sites were considered

Alternatives for the development were considered. The locality alternatives regarding the actual areas that are targeted to be mined were not considered because the mining sites are defined by the geological considerations and as such, the position of the mining activity is determined by where mineral resources and the reserves are embedded, and the size and depth of the deposit has been determined by means of an extensive exploration programme and there are as such no alternative sites. The delineated mining blocks shown in Appendix 4: Drawing 001, are where mining activities will be undertaken.

x) Statement motivating the alternative development location within the overall site

(Provide a statement motivation the final site layout that is proposed)

The preferred site layout on a number of factors such as geological setting prescribing the position of the diamondiferous gravels, slime dam location, design, material to be used and how it will be sourced.

The current position of the existing structures as described under Section d is pre-determined by the existing environmental management programme.

The layout of the activities that will still be undertaken is mostly determine by the site selection consideration and the design alternatives evaluated under Section d (ii) and i(vii).

Slime dams

There are no fresh water sources other than rain water in the region of the selected slime sites. Placing of the fine fraction of the waste below natural ground level or behind existing overburden dumps will reduce windblown dust. No chemicals are used in the beneficiation process. The material is mainly transported quartzite particles, with no Acid Mine Drainage (AMD) potential. A detailed civil engineering design was completed for each of the sites.

The proposed slime facilities are indicated in Figure (g) (i) 4.1 - 2 and Drawing 001. For each site, the most economically and technically viable option will be selected bearing in mind the temporary nature of the mining, the quantity and characteristics of available construction materials (rock, sand and clay), possible phasing of the mining, the need to minimise seepage into the mining area and the costs of protective measures. Specific mining methods are proposed for specific areas in e.g. Channel 68/69 (rock berms or coffer dams) and Rooiwal Bay beach (beach accretion) and Michell’s Bay (using dynamically stable rock berms).

The closure of Mitchell’s Bay using statically stable rock berm as discussed under section d(ii), is not considered preferred due to the requirement for either very large rock or concrete armour units on the seaward side of the berm facing the oncoming sea waves. It important to note that any of the preferred mining alternative mining methods for accessing diamond resources seaward of the low water mark presented in Section h(i) may be applied at any specific site depending on the outcome of a final geotechnical assessment of sea - and seafloor conditions.

The rocks would also be available in land at reasonable hauling distances. Some of the material would be sourced inland through blasting and this would be creating mixed – shore beaches. The boulders will be relocated from one mined area to the next thus avoiding removal of numerous boulders and displacing beach communities which are adapted to the Namaqua Mixed Shore habitats. The main motivation is that despite the high volumes of material required and associated impacts, these berms are considered as temporary structures since their design-life of such berms is typically 1-2 years. High wave action which are characteristics of this coastline as indicated under Section d (iv) 1.10.2 might redistribute some of the boulders.

Site Alternatives

Over the history of the Koingnaas mine slime generated by the processing plants was disposed either to slime dams constructed on surface, or was backfilled into selected mining voids in the vicinity of the plants.The slime generated by the plants in Koingnaas are classified as Sand-Silt under the USCS system. The historic slime facilities that were created on surface by De Beers have a negative impact on the environment due to windblown dust that is generated. Placement of future slime facilities should therefore take cognisance of this fact and attempt to minimize the negative impact of windblown dust and sand.

The general philosophy that WCR has adopted is that any material excavated, moved or processed as part of any new mining or plant activity should be placed in such a way that it is part of the final rehabilitation solution. This will ensure that all operations are aligned with good environmental practice and will reduce the final closure liabilities and as such planning with closure with mind is adopted in the selection criteria. Backfilling existing mining voids with slime generated from the processing plants is seen as the most effective and environmentally friendly way of disposing of slime material.

Existing mining voids in mined out areas were identified in central areas where processing plants would be placed over the life of the operation. The bedrock profiles in each of these areas were checked to ensure that the bedrock slope dipped towards the coast and that the site was within 1 km from the coastline. These attributes would ensure that any seapage of seawater associated with the slime would end up back in the ocean. There are no fresh water sources, other than rain water in the region of the selected slime sites. Placing of the fine fraction of the waste below natural ground level or behind existing overburden dumps will reduce windblown dust. No chemicals are used in the beneficiation process. The material is mainly transported quartzite, with no Acid Mine Drainage (AMD) potential. A detailed civil engineering design was completed for each of the sites. The proposed slime facilities are indicated in Figure (g) (i) 4.1 - 1.

This process culminated into the production of the final site selection. There are currently nine alternatives that are considered. The preferred slime dam sites are A, C, H, G, D and E. There are alternatives 1, 2 and 3 which are alternatives to sites H, sites A, C and G and alternatives to Sites D and E, respectively. Six sites have subsequently been chosen as the preferred sites in order to accommodate all the anticipated mine residue as the Life of Mine is approximately 11 years. The impacts that were associated with specifically the existing slime 1, and 2, were the current dust plumes and as such these sites were not preferred. The advantages and disadvantages of the sites are provided in Section h. The other key consideration in determining the preferred sites was the proximity to the plant and the available sizes of the voids to accommodate the life of mine.

The slime dams were incorporated into the integrated water and waste management plan, which was compiled as part of the water use licence application and any impacts associated with these water uses will be managed as part of a valid licence.

General Design Alternatives

There are two alternative approaches to accessing diamond resources seaward of the low water mark, namely:

- Temporary accretion of the beach in the immediate vicinity of the mining target using overburden material available on the beach or from adjacent on land mining sites; or
- The construction of a rock berm or coffer dam using non-native rocks and boulders sourced from rock stockpiles near Koingnaas. Both statistically stable and dynamically stable rock berms are being considered.

Up to six potential sites harbouring surf zone resources have been identified. However, the nature of the specific target area determines which of the alternative approaches is most suitable. For example, the exposed nature of the coastline and high long shore sediment transport rates, in combination with insufficient overburden sands available on the beach to maintain accretion under the resulting high erosion rates, negates the application of beach accretion using sand anywhere but in very sheltered bays.

Using information summarised from WSP (2015) the alternative mining approaches are detailed below.

68/69 design

Along the typically wave exposed coastline of the project area, rock berms or coffer dams are the only feasible alternative to effectively reclaiming a mining area located beyond the low water mark. The procedure for construction of a protective rock berm is described briefly below:

- On both the northern and southern side of the mining target area a rock berm is built by progressively end-tipping-rock and boulder core material from trucks perpendicular to the oncoming waves and shoreline. Dozers and excavators subsequently shape the profile and dress the slope with a suitable armour layer of larger rocks;
- The berms extend from above the storm high water mark into the surf zone until the seaward extent of the mining block is reached and a shore-parallel berm is constructed linking the two shore-perpendicular berms;
- Once the berm is in place and the mining block is enclosed overburden stripping and gravel extraction can be undertaken using conventional open-cast mining approaches;
- Once the area has been mined out, the rock berm would be progressively extended offshore to enclose the next mining block, potentially enabling mining up to 300 m seawards of the low water mark.

The material used to construct such breakwaters typically consists of an underlying core of quarried material, which gets progressively coarser towards the outside and is covered by an outer layer of large armour rock. Geotextile sandbags commonly used for coastal protection works may also be used in areas of low wave energy, as temporary emergency measures or above the high water mark on the wall itself.

The seaward extent of the berm and prevailing wave conditions determine the size/mass of the rock required for the armour layer. Berm can be extended in phases as far offshore as conditions allow. Although four phases have been assumed for this project (Figured-5 the material requirements for Stages 3 and 4 would necessitate the use of very large armour rocks that would be difficult to produce, transport and place, thereby reducing the feasibility of these structures. Possible alternatives for Stage 4 include the use of concrete armour units on the seaward face of the berm, or constructing the berm as a dynamically reshaping profile using smaller rocks (see later).

Despite the comparatively high volumes of material required for berm construction, the design-life of such berms is typically 1-2 years and they can thus be considered temporary structures.

Similar beach mining operations have previously been successfully undertaken near the Olifant's River and along the coastline near Alexander Bay. For the current project, WCR is intending to implement this mining approach at the sandy beach target sites known as Koingnaas 68/69, Somnaas and Langklip Central. The estimated area to be disturbed at each of these sites amounts to ~118,000 m² (Illustration 8 and Illustration 9)

Mitchell's Bay (Rooiwal Bay) design

Mitchell's Bay (Rooiwal Bay) is a small protected bay located north of the Spoeg River. The mouth of the bay is some 700 m across. The bay hosts a narrow sandy beach backed by steep soil cliff and a shallow reef in the mouth. An irregular, deep, channel reaching at least 20 m depth is present in the northern part of the bay, with a second depression occurring in the southern part of the bay.

One of the proposed mining approaches implemented to access the diamond deposits on the seabed and adjacent beaches within Mitchell's Bay, involves accretion of the beach using overburden sands stripped from adjacent mine block LKB-04 on-land. Mining of the accreted area would liberate further material that can be placed into the sea to gain additional accretion. Three stages of beach accretion are being considered, with the shoreline moving seawards by 150 m during each successive stage. Sand volumes required for each stage comprised 1.3 million, 2.5 million and 5.9 million cubic metres, respectively for 150 m, 300 m and 450 m accretion. However, as the beach is accreted and the shoreline maintains equilibrium with the wave-driven currents, sand placed on the beach would be redistributed by currents and transported westwards out of the bay, where it would redeposit on the seabed and adjacent shoreline.

Closure of Mitchell's Bay with a Dynamically Stable Rock Berm

The alternative approach proposed for Mitchell's Bay is the construction of a dynamically stable rock berm across the mouth of the bay and perpendicular to the predominant wave action. To avoid erosion of the berm profile during storms, it needs to be relatively wide and therefore requires large volumes of material for construction and covers a larger footprint than a conventional rock berm.

To implement this approach in Mitchell's Bay, a berm crest of 14 m in height would be required to protect the mining area from extreme wave conditions. With a berm width of 10 m at the crest and as much as 140 m at the base, at minimum 660,000 m³ of large cobbles/small boulders would be required. This volume does not cater for wastage through erosion of material during the construction phase, or for ongoing replenishment of eroded material during the life of the structure.

While considered technically feasible, this alternative has high costs associated with it and the high loss rate of material off the partly completed berm during construction may result in the structure being impossible to build. The estimated area to be disturbed using this approach would be 541,755 m², excluding indirect effects due to loss of construction material.

Closure of Mitchell’s Bay with a statistical stable rock berm is not considered feasible due to the need for either very large armour rocks or concrete armour units on the seaward side of the berm facing the oncoming waves.

Generic design

A more generic design involving either statistically stable rock berms, or these in combination with dynamically stable berms, is being considered for other potential mining sites characterised by either a rocky shoreline or a shoreline of mixed sand and rock. The generic design is proposed for the Noup, Visbeen, Koingnaas, Langklip Central and Langklip target areas.

The generic designs assume an initial mining area of 200 x 200 m, with sequential extension into adjacent blocks as mining progresses and the resource in a block is mined out. The type of design applied is determined largely by the depth of the seabed at the seaward extreme of the shore parallel berm. Two alternative generic designs are being considered, namely:

Statically stable rock berm

In areas of seabed depth up to 2.5 m below mean sea level at the seaward edge of the mining target, a conventional, statistically stable rock berm comprising a core of finer material and an armour layer of larger rocks facing the prevailing waves would be constructed. For protection of the Stage 1 mining block, these berms would comprise a shore-parallel and shore-perpendicular component (grey shading in Figure (d) (ii) 1.1 - 8). Extension of operations into subsequent mining blocks would require the construction of a further shore-parallel berm to protect the adjacent area (lighter shading in).

Alternative combination berm

In areas of seabed depth up to 4 m below mean sea level at the seaward edge of the mining target, a conventional, statistically stable groyne would be built perpendicular to the shore to the required depth. Large armouring would be required at the seaward edge of this groyne to prevent erosion. To protect the Stage 1 mining block, the seaward end of the groyne would connect to a shore-parallel dynamic re-shaping berm (grey shading Figure (d) (ii) 1.1 -9). A further shore-parallel dynamic re-shaping berm would then be added for the protection of the Stage 2 mining block) (lighter shading in Figure (d) (ii) 1.1 -9).

For each site, the most economically and technically viable concept/s will be selected bearing in mind the temporary nature of the mining, the quantity and characteristics of available construction materials (rock, sand and clay), possible phasing of the mining to facilitate recovery of diamonds at an early stage, the need to minimise seepage into the mining area and the costs of protective measures. The potential areas to be disturbed by these proposed operations are provided.

The concerns of stakeholders regarding matters pertaining to these types of mining activities as outlined below were considered and the key though process and input into planning of such considerations are indicated below.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the site layout plan).

The Terms of Reference (ToR) were developed and as part of compiling the ToR, various methods were used to obtain an overview of the project context from an environmental, legal, policy and administrative, as well as institutional context. Therefore, the assessment of environmental aspects formed part of the specialist's investigations whereby these studies assessed the environment likely to be affected by the proposed mining development. Impacts were identified through use of modelling of collected data, and professional expertise. Once the impacts have been identified, they were assessed for significance, using the criteria provided in Section vi. The first stage of impact assessment was identification of environmental activities, aspects and impacts. This was supported by the identification of receptors and resources, which allowed for an understanding of the impact pathway and an assessment of the sensitivity to change. The significance of the impact was then assessed by rating each variable according to defined criteria. The purpose of the rating was to develop a clear understanding of influences and processes associated with each impact.

Impact management objectives were then determined from previous knowledge of the EAP whilst undertaking similar studies, input from project team specialist studies, IAPs and stakeholders, existing documents and reports. The significance of the impact also determined the impact management objectives to be utilised e.g. whether the impact will require on-going monitoring or if mitigation measures could be implemented to reduce the impact within a specific period of time. Existing regulations, guidelines and standards with regards to the different activities/impacts to be undertaken was also utilised to determine impact management objectives such as Norms and Standards for Storage of Waste, 2013 will be used to guide on waste management strategies.

Potential issues of concerns, gathered during meetings and scoping report review stage were assessed further by specialists, to identify the key aspects and the impacts resulting from those aspects. Interested and affected parties were identified and informed about the project. They were given an opportunity to raise any concerns they might have about the project as well as suggested solutions. The scoped issues will then be used to ascertain the aspects and associated impacts.

The identification, description, evaluation and comparison of alternatives are important for ensuring the objectivity of the assessment process.

The assessment of alternatives was, where possible, done in a way that feeds back into the planning or design of the activity, thereby optimizing the positive aspects and minimizing the negative aspects that were highlighted during the assessment process. The assessment process was also iterative where necessary to reflect the optimal formulation of alternatives. In instances where it was clear that such an interactive and iterative process had been followed in the development of a preferred alternative, it was then appropriate to terminate the assessment of other alternatives, excluding the no-go alternative that have been considered and assessed in such a process during the course of the assessment.

The assessment of alternatives as a minimum, included the following:

- The consideration of the no-go alternative as a baseline scenario (even in cases where the no-go alternative is not a realistic alternative);
- A comparison of the selected alternatives; and
- The providing of reasons for the elimination of an alternative.

Where alternative locations or sites were identified as alternatives such as is the case with the slime dam positions, the features of each location or site was assessed. The comparative assessment considered the following aspects:

- Capital and operating costs;
- Direct, indirect and cumulative impacts;
- Degree to which the impacts could be reversed by application of mitigation measures;
- Physical, legal or institutional constraints; and
- A no go option should remain the default option and will always be included to provide the baseline for assessment of the impacts of other alternatives and also to illustrate the implications of not authorizing the activity.

1. The proposed method of assessing duration significance

The method of assessing the significance is provided under (Section g) (iv).

2. EIA Process

The EIA was being undertaken in a phased approach. The adopted approach is included in the presentation below.

	August 2015 –February 2016	**Pre-application meetings, social Scan , application form and scoping report compilation** To find IAPs and understand social, economic and geographic context of the site	
PHASE 1	March 2016-April 2016	**Scoping** Involve stakeholders and IAPs in EIA process through adverts, site notices and emails	Preliminary information sharing session
	March-April 2016	Review of Scoping Report by IAPs	Engaging stakeholders to solicit comments
	End of April 2016	Submission of Scoping Report to DMR	
	April 2016-June 2016	**Commission specialists** Investigate the issues to determine the impacts	Provide IDP, LED strategy, environmental management framework, environmental related municipal by laws
PHASE 2	June - September 2016	EIAr Compilation	
	September - October 2016	**Feedback IAPs** Give an opportunity to IAPS to review the EIAr	Review the EIAR and/or engage stakeholders to solicit comments
PHASE 3	November 2016	**Submit EIAr to DMR** Review of EIAr by DMR	
		Incorporate comments from DMR (IF APPLICABLE)	Issuing of environmental authorisation
	May 2017	Inform IAPs about the environmental authorisation and appeal	

Key:
🟦 : Timeframes
🟨 : Process to be undertaken
🟫 : IAP and authority involvement

MYEZO ENVIRONMENTAL MANAGEMENT SERVICES
Environmental Stewardship

Presentation 1: Process of EIA and stages at which various stakeholders will be consulted

The competent authority was consulted as follows:

- During the Scoping phase:The Draft Scoping Report was made available for public review to stakehoders and IAP's for review and comment for a period of 30 days.At this stage of public review, the competent authority was also be given the Draft Scoping Report for review. Once the 30 day public review period had lapsed all issues and concerns raised were incorporated into the Final Scoping Report which was then submitted to the competent authority.
- During the Environmental Impact Reporting Phase: After the Scoping Report was accepted, the project proceeded into the Environmental Impact Reporting Phase, the competent authority was consulted during the public review of the Draft Environmental Impact Assessment Report (EIAr). The Draft EIAr was made available for public review for a period of 30 days. Once the 30 day public review period has lapsed all issues and concerns raised will be incorporated into the Final EIAr which will also be submitted to the competent authority.

3. Particulars of the public participation process with regard to the Impact Assessment process that was conducted.

3.1 Steps to be taken to notify interested and affected parties

The collected information during stakeholder profiling was used to determine the best engagement strategies. The literacy levels and circumstances that could hinder effective participation were noted during these stages. As such it was determined that the language barrier could be a risk at grass root level. As a control it was decided to have an Afrikaans facilitator and the key engagements at EIAR stage were summarised in Afrikaans. The site notices were also presented in Afrikaans. Telephonic engagement to solicit data was also done in Afrikaans, where necessary, by the dedicated facilitator. There were no mobility aspects that were noted that could hinder stakeholders from participating during the EIA report process. The needs and values of IAPs were sought to be understood and various participation approaches in line with these needs were applied during scoping phase and still continued to be implemented through to the EIA stage. An environmental awareness component was always a part of the consultation to ensure that the stakeholders were informed about their environmental rights to participate in decisions that might affect them and the relevance of the environmental studies for the project and how they should participate.

A register of the stakeholders was kept and updated to ensure that they are informed timeously of project developments. (Appendix H).

3.2 Details of the engagement process to be followed

The following process was observed for the EIA stage:

- IAPs were given an opportunity to review the EIAr.
- Letters of invitation discuss the EIAr were sent to interested and affected parties. The reply slips were included to facilitate the participation of IAPs and to assist them in capturing any more impacts they would require clarity on.

The letters of invitations to participate in the environmental process will be categorized as follows:

- English letters of invitation – mostly distributed to regulatory and local authorities and specialist interest groups:
    - ➢ Afrikaans email mostly issued to adjacent landowners or other parties who have displayed the need for such summarized.
    - ➢ All registered stakeholders were notified via e-mails and those that do not have emails would be notified via post about the availability of the EIA report. The emails also worked effectively in this region. Other mode of communication such as faxes was also used.

Site notices will also be placed as follows:

- ➢ Koingnaas security access point which is also open to the public.
- ➢ Neighbouring towns of Komaggas and Hondeklip Bay (Activity centres - community hall/centre or beach access point.

A copy of the report will be made accessible and will be available at:

- ➢ Koingnaas site office.
- ➢ Trans Hex Operations (head office) for the specialist interest groups who might be based in Cape Town.
- ➢ Springbok Library .

One-one meetings were held with Department of Environment: Oceans and Coast and DAFF so that the terms of references for the marine and coastal activities could be collaboratively finalized.

DCA was also met to discuss Aquaculture terms of reference.

3.3 Description of the information provided to Interested and Affected Parties

- The stakeholders were provided with the initial site plan;
- Details of the intended activity;
- Locality plans;
- Environmental impact assessment report;
- Mitigation measures and;
- Monitoring plans.

3.3 Description of the information to be provided to Interested and Affected Parties

(Information to be provided must include the initial site plan and sufficient detail of the intended operation and the typical impacts of each activity, to enable them to assess what impact the activities will have on them or on the use of their land).

- The stakeholders were provided with the initial site plan .
- Details of the intended activity.
- Locality plans.
- Environmental impact assessment report.
- Mitigation measures and Monitoring plans.

3.4 Description of the tasks that will be undertaken during the environmental impact assessment process

The subsequent studies after the scoping phase entailed:

- Undertaking specialist studies and environmental impact assessment;
- Development of Environmental Management Programme Report (EMPr).
- Suggested mitigation measures to eliminate, reduce and compensate for the consequences of the project on the environment;
- An estimate of the costs linked to the implementation of the measures;
- Where applicable, a quantification of the expected results in terms of rate of pollution and the minimal threshold of disturbances and comparison with legal standard and general practices in similar cases.

The various stages that formed part of the EIAr production and what was undertaken are outlined below.

3.5 Compilation of EIAR, EMPR and Closure Plan

Undertaking Specialist investigations

The technical report on Coastal Protection for Beach Mining in the Koingnaas Area was compiled by WSP Group on behalf of WCR and provided support regarding the selection of alternatives for the coastal and beach mining activities.

The terms of reference for specialists were compiled. The specialists were engaged and commissioned and the summary of their findings is included in section J.

The issues raised by stakeholders will be investigated further to determine the impacts. An EIAR will be compiled.

The EIAr included the key tasks outlined below:

- An assessment of the environment likely to be affected by the proposed mining operation, including cumulative environmental impacts.
- An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed mining operation, including the cumulative impacts.
- A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts.
- A determination of the appropriate mitigatory measures for each significant impact.
- An identification of knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information.
- A description of the arrangements for monitoring and management of environmental impacts.

Compilation of Environmental Management Programme (EMPR)

The EMPR has been compiled and includes the aspects outlined below:

- A description of the environmental objectives and specific goals for- mine closure, the management of identified environmental impacts emanating from the proposed mining operation, the socio-economic conditions as identified in the social and labour plan and historical and cultural aspects;

- A description of the appropriate technical and management options chosen for each environmental impact, socio-economic condition and historical and cultural aspects for each phase of the mining operation;

- Action plans to achieve the objectives and specific goals contemplated in paragraph (a) which must include a time schedule of actions to be undertaken to implement mitigatory measures for the prevention, management and remediation of each environmental impact, socio-economic condition and historical and cultural aspects for each phase of the mining operation.

- Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Compilation of Monitoring and Performance Assessment Report

The Performance Assessment Report included the following:

- Information regarding the period applicable to the performance assessment;
- Scope of assessment and the procedure to be sued as well as evaluation criteria.

Emergency Plan

The emergency plan was developed and it included the procedures to be undertaken for environmental related emergencies and remediation.

Environmental Awareness Plan

The Plan explained how WCR intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment; and describe the manner in which he or she intends to:

(i) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;

(ii) Contain or remedy the cause of pollution or degradation and migration of pollutants; and

(iii) Comply with any prescribed waste standard or management standards or practices.

Closure Plan

The Closure Plan included the following:

- A description of the closure objectives and how these relate to the prospecting or mine operation and its environmental and social setting;
- A summary of the regulatory requirements and conditions for closure;
- A summary of the results of the environmental risk report and details of identified residual and latent impacts;
- A summary of the results of progressive rehabilitation undertaken;
- A description of the methods to decommission each prospecting or mining component and the mitigation or management strategy proposed to avoid, minimize and manage residual or latent impacts;
- Details of any long-term management and maintenance expected;

- Details of a proposed closure cost and financial provision for monitoring, maintenance and post closure management;
- A sketch plan drawn on an appropriate scale describing the final and future land use proposal and arrangements for the site;
- A record of interested and affected persons consulted.

Financial provision

The financial provision stage included the following:

- The determination of the quantum of the financial provision;
- Details of the method providing for financial provision.

Rehabilitation objectives

The influence on the environment has been one of the most important considerations when designing the WCR mine and this will be continued through the and operational and decommissioning phases. Not only the visual impact of overburden and tailings dumps is considered, but also excavations and their visual, botanical and safety repercussions was taken into account.

Rehabilitation strategies to ensure that the visual character and environmental (status) of the area is not compromised and that the post mining land use is beneficial to the land owners, was considered. There are various strategies under consideration such as stripping of topsoil and hauling of overburden into already backfilled area, where practical, as defined by the availability of such pits and hauling distances. Alternatives related to stockpiled of overburden /mine residues on surface for later use should there be no immediate available backfilled area are considered. Non-assisted natural colonization is also amongst the strategies that are being evaluated as part of the closure plan.

Environmental issues and risks

The list of issues is provided in Table (g) (ii) 1 - 2. The issues that were identified are listed below.

An assessment of the issues and risks is provided as Table (g) (iv) 1 - 1, as well as in specialist reports (Raised Issues Volume 4).

Interaction with other users or future use scenarios

- Overlap of proposed mining activities with proposed MPAs and with Operation Phakisa;
- Potential conflict with abalone ranching rights holders regarding water quality and habitat loss, particularly those companies that have already started seeding juveniles;
- Increased turbidity near mining site(s) may compromised water quality at the seawater intakes to land-based abalone farms.

Water Quality

- The impacts of suspended sediment plumes and elevated turbidity as a result of mining operations need to be assessed;
- Increased turbidity near mining site(s) may impact filter feeders;
- Requirements for discharge permits regarding discharges to the sea (particularly from diver-assisted shore units) is unclear.

Disturbance of Habitats

- Blasting in the marine environment should be avoided and materials used for the construction of berms re-used as much as possible;
- Concern regarding the introduction of non-native material onto the beach during berm construction;
- Concern regarding the disturbance to marine habitats and associated biota through mining in subtidal areas; and
- The impacts associated with coffer dam construction vs. accretion need to be carefully considered.

Impacts on Seals

- As seal colonies are unique habitats within the project area these should be mapped, and information available at DAFF.

Baseline Studies and Impact Monitoring

- Quantitative marine baseline studies focussing on the specific mining sites need to be undertaken;
- Provide DEA with information on the experimental design of baseline and monitoring studies prior to commencement of surveys;
- Give consideration to co-ordination of monitoring programmes with DEA and sharing of research information;
- Baseline and monitoring studies should focus both on rocky habitats (including an assessment on the impacts on reef structure) as well as sandy beach habitats;
- The recovery of these habitats following mining needs to be understood from the perspective of species recruitment and colonisation;
- Monitoring programmes should be co-ordinated to ensure an upfront understanding of sensitive habitats in the project area, with subsequent avoidance of these in the mine plans; and

- Give consideration to implementing a Strategic Environmental Assessment approach in partnership with other role players in the area so as to gain a broader understanding of the coastline rather than focusing on the project specific sites.

Rehabilitation, Closure and Biodiversity Offsets

- Decommissioning and closure is required of old mining sites no longer used;
- As active rehabilitation below the low water mark is not practicable, there is concerns that wave action may not be sufficient to ensure natural rehabilitation of berms; and
- The viability of creating artificial habitats to offset habitat disturbance should be considered (e.g. leaving the rock armour of the berms in place to form islands as roosting habitats for seabirds).

Environmental Management

- There is a need for the development of beach management plans for management of mining impacts;
- Strict house-keeping is required at beach mining sites (e.g. no refuelling on the beach, and all equipment to be removed on cessation of operations); and
- An Environmental Control Officer should be appointed to ensure compliance with the Environmental Management Plan.

i. **Assessment of each identified potentially significant impact and risk** (This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Table (i) 1 - 1: Impact Assessment Table

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
Land based operations				

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>8. Drilling and prospecting
• SONIC drilling
• Large diameter LDA auger drilling
• Tunnelling
• Bulk sample extraction from drill holes and tunnels
• Bulk sample excavation, from trenches, pits and tunnels including transport and treatment
• Bulk sample extraction by means of directional drilling.</td>
<td>a) Positive benefits of sharing research data through research and development for development and design of effective alternatives and modifications in the mining technologies for optimal resource extraction and utilisation.
b) Dust generation impacts
c) Impact on vegetation species</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Fully reversible</td><td></td></tr>
<tr><td>Loss of resource</td><td>Low</td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>High</td><td></td></tr>
</table>
</td>
<td>P&D</td>
<td>• Share information with research institutions and position the company as a contributor in research and development in the West Coast and innovators in seeking new technologies for optimal and sustainable extraction of resources.
• Limit disturbance to vegetation, use existing tracks, where available. Limit making ne vehicle track in the veld.
• Rigs will be equipped with dust extraction equipment.</td>
</tr>
<tr>
<td>9. The development of processing activities</td>
<td>k) Possibility of sterilisation of the</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
</table>
</td>
<td>P&D, C,O</td>
<td>• Proper planning as supported by 50 years' worth of data</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>including associated structures and infrastructure e.g. construction and/or establishment of screening and processing plants, crushing plants, pans and classifiers, mobile treatment plants,
• The construction and maintenance of sea water abstraction pumps and pipelines for pumping to treatment plants and the construction of slimes delivery or deposition pipelines.</td>
<td>mineral reserves/resources due to improper placement of infrastructure.
l) Changes to surface topography due to placement of infrastructure and development of residue deposits
m) Visual intrusion and slimes dams as permanent features of the landscape.
n) Crossing over of streams and alteration of river banks
o) Deterioration of water quality due to spillages</td>
<td>
<table>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Fully reversible</td></tr>
<tr><td>Loss of resource</td><td colspan="2">Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">High</td></tr>
</table>
</td>
<td></td>
<td>• Plan and place structures with also closure in mind
• Ensure that the slimes dams are deposited with the key landscape considerations of the surrounding areas. Where feasible existing voids will be utilised. The disturbed areas will be rehabilitated with due considerations of the landscape character and ecosystem dynamics
• Utilise a detailed civil engineering design that was completed for each of the slime dam sites. As was done during feasibility site selections, continue for all the slimes dam positions to ensure that the bedrock profiles in each of these areas are checked to ensure that the bedrock slope dipped towards the coast and that the sites are within 1 km from the coastline.
• Avoidance of seepage and slumping by continuous monitoring and routine scheduled monitoring by a professional registered</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td>• Establishment of ablution facilities
• Establishment of parking areas</td><td></td><td></td><td></td><td>engineer. Interpret results of bedrock elevation studies, those sites that seep into aquifers be identified.
• Consider the flow characteristics and considered in the placement of the structures.
• Provide mobile chemical toilets at convenient points to serve construction and operational teams
• Properly dispose of septic tank contents
• Adhere to licensing stipulations regarding sewage handling and disposal</td></tr>
<tr><td>10. The clearance of the area for proposed mine blocks, overburden areas, new plants at Mitchell’s Bay, Koingnaas and</td><td>Soils
u) Loss of soil resources due to topsoil removal and wind erosion susceptibility</td><td><table><tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr><tr><td>Severity</td><td>Low</td><td>Low</td></tr><tr><td>Duration</td><td>Low</td><td>Low</td></tr><tr><td>Extent</td><td>Local</td><td>Local</td></tr></table></td><td>C</td><td>• Limit vegetation clearing to the areas that will be used
• Align all sensitive areas with the mine plan and determine which areas will need to be priorities and which areas require environmental interventions prior to mining.</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>elsewhere (mobile plant) as required and
new slimes dam areas
Construction of 200 tonnes per hour (tph) screening and scrubbing plant
Construction of 450 tph tailings treatment facility</td>
<td>Vegetation
v) Loss of species of conservation value
w) Fragmentation and loss of habitats
x) Impact on faunal migration due to fencing
y) Proliferation of alien invasive species and disturbance of fauna
Land capability
z) Impact on soil capability and quality, e.g. loss of seedbed ecosystems, degraded agricultural potential
aa) Dust generation
bb) Impact on health and safety such as occupational health and safety;</td>
<td>
<table>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Partially reversible</td></tr>
<tr><td>Loss of resource</td><td>Low</td><td>Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td></td>
<td>As such, utilise sensitivity map to ensure the identified sensitive areas are avoided
• Rehabilitate disturbed areas utilising adopted appropriate strategies
• Adopt soil amelioration strategies
• Conduct dust monitoring and align this to health and safety dust monitoring
• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor’s contracts
• Consider the land capability and current land uses before placement of new structures and ensure planned rehabilitation strategies are such that the post-mining land use can still be for the benefit of the post-mining land users.</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>cc) Positive impacts on community well-being i.e. prosperity of the community, employment and general significant economic stimulation of the local economy through job creation;
dd) Impact on land use and availability i.e. restricted access due to diamond security;</td><td></td><td></td><td></td></tr>
<tr><td>3 (continued)</td><td>c) Surface water deterioration in water quality due to suspended solids from erosion of disturbed soil
Lack of storm control structures will lead to erosion of the stockpiled materials during heavy rains and run – off will thus carry suspended</td><td><table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
</table></td><td>C,O,D</td><td>• Mine infrastructure will have clean water diversions (these will be built prior to construction to minimise the impact of construction activities
• The surface area of clean water areas should be maximised and the size of dirty water management areas minimised within the mine boundary area;
• All storm water management measures should be designed to separate clean</td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	solids into the downstream environment, causing high silt load and affecting stream flow. Water quality might p deteriorate due to sewage effluents, surface run-off.	<table><tr><td>**Status**</td><td>Negative</td><td>Negative</td></tr><tr><td>**Confidence**</td><td>High</td><td>High</td></tr><tr><td>**Reversibility**</td><td colspan="2">Partially reversible</td></tr><tr><td>**Loss of resource**</td><td>Low</td><td>Low</td></tr><tr><td>**Degree to which the impact can be mitigated**</td><td>Medium</td><td>Medium</td></tr></table>		water from dirty water (and vice versa); • All storm water management structures such as the return water dams and catchment paddocks in the slimes dams, will be designed to require minimum maintenance, including maintenance required after floods exceeding the design capacity • For the IWWMP, haul and access roads were not included as part of the dirty water management except, where the roads are established on dirty water areas; and • Concurrent rehabilitation will be essential to reduce the recharge of rain water through the overburden dumps and to increase clean surface runoff to the clean environment. Surface water management infrastructure is designed to cater for 5 year intervals. This will require that clean and dirty water berms and trenches be placed in locations to minimise the dirty water catchment during a 5-year stage.

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>11. The construction and maintenance of access roads to beach mining areas, sea-water intake pumps, land mining areas, overburden dumps, tailing dumps and slimes dams and processing plants, including road maintenance</td>
<td>e) Impacts on the natural landscape due to vegetation clearing
f) Impact on soil capability and quality e.g. loss of seedbed ecosystems, and reduced land capability to potential soil erosion</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td></td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td></td><td></td></tr>
</table>
</td>
<td>C&O</td>
<td>• Implement all required safety measures when collecting road construction material and during transport thereof.
• Rehabilitate or remove any access roads, gates or fences constructed, as per approved rehabilitation plan.</td>
</tr>
<tr>
<td>12. Overburden stripping and mechanical extraction of ore and mine block</td>
<td>l) Noise
m) Damage to archaeological and</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td>C,O,D</td>
<td>• Compile a rehabilitation plan that is safe and non –polluting.
• Notify stakeholders of blasting times when blasting will be done in areas of public</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>development, including blasting activities
Establishment of temporary stockpiles and/or residue deposits during mining operations;
Re-mining of residue stockpiles or residue deposits;
Certain mine residue deposits (CRD’s) at the existing Koingnaas and Michell’s Bay plant sites that will be re-mined and reclaimed.
Some overburden dumps will be used in continuous rehabilitation.
Mobile treatment plant stockpiles and residue dumps that will be processed and rehabilitated</td>
<td>heritage sites.
n) Dust generation
o) Deterioration in water quality due to elevated nitrate levels associated with blasting
p) Noise generation
q) Topsoil removal
r) Loss of soil resources due to wind erosion susceptibility
s) Surface water deterioration due to suspended solids from erosion of disturbed soils
t) Vegetation clearing
v. Loss of species of conservation value</td>
<td>
<table>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td></td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td></td><td></td></tr>
</table>
</td>
<td></td>
<td>access.
• Adhere to Mine health and safety noise regulations
• Avoid disturbance of archaeological sites and notify SAHRA, through the appointed archaeologist, should there be archaeological finds.
• Strip and store topsoil prior to placement of infrastructure as far practical as possible and avoid sterilization of such soil stockpiles by ensuring for adequate windrows and heights (generally not more than 2 m where possible to avoid loss of seedbank)
• Adopt soil amelioration strategies
• Conduct dust monitoring and align this to Health and Safety dust monitoring.
• The requirement that any removal of surface vegetation be restricted to as small a footprint as possible.
• Regular monitoring (approximately every 6</td>
</tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
on an ongoing basis.	i. Fragmentation and loss of habitats i. Impact on faunal migration due to fencing i. Proliferation of alien invasive species and disturbance of fauna u) Removal and loss of Namaqualand Seashore Vegetation and Namaqualand Coastal Duneveld.			months) should be carried out across all areas of mining activity. This can be done visually, but any signs of soil loss by wind or water, should be reported in order that preventative measures can be taken before any problem becomes worse. • Within the broader study area, there are no specific sensitive areas that need to be avoided, in terms of the soils or agricultural potential.
5 (continued)				• Limit vegetation clearing to the areas that will be used • Utilise and continuously update sensitivity map to ensure the identified sensitive areas are avoided • Rehabilitate disturbed areas utilising adopted appropriate strategies

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				• An important objective should be to reduce negative edge effects by ensuring that all regularly used informal roads have acceptable surfaces, are free from erosion, and have effective drainage. • New and existing mining pits will be backfilled, where appropriate, with existing spoil and any new spoil generated according to a systematic plan. • New soil dumps will not be positioned within areas of intact habitat adjacent to mining pits, but will be used to backfill or rehabilitate existing disturbed areas. • Material for coffer dams will be sourced from existing disturbed sites, as far as possible. Existing roads will be used wherever possible and they will be constructed so as to avoid undisturbed habitat. • An ECO will be appointed who will be involved with planning of roads and other infrastructure and who will monitor and

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				audit impacts on the undisturbed natural environment. • A long-term monitoring program will be developed for the site that monitors and should aim to quantify changes in habitat. • ECO to keep a log of activities which must be inspected and signed off once monthly by the relevant manager. • The mine should appoint a suitably qualified restoration specialist to compile a vegetation rehabilitation plan for areas deemed necessary. The restoration specialist must submit the vegetation rehabilitation plan to the ECO and mine management for approval.
5 (continued)	v) Impact on Land capability /. Impact on soil capability and quality, e.g. loss of seedbed ecosystems and loss of agricultural			• Restricted footprint, as little surface disturbance, as possible so that there is minimum disturbance • Removal and storage of cover soil (>0.5 m, if possible). Soil should be stored for the shortest possible time (<2-3 yrs, if possible)

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	potential; v. Loss of agricultural land due to low prevailing agricultural potential i. Whenever any excavation or other surface disturbance is involved, the possibility of increased erosion exists. In the case of the West Coast Resources mining project, due to the sandy nature of the topsoils, coupled with the dry climate, the erosion hazard will be in the form of increased susceptibility to wind erosion, whereby any activity that removes the vegetation cover (no matter how sparse) will expose the topsoil to the			and stored to a height of less than 2-3 metres, if possible before being replaced for rehabilitation. • Effective re-establishment of natural vegetation (in consultation with vegetation specialists), with appropriate soil conservation n measures during this phase. • Regular monitoring (at least every 6 months) to check on progress of rehabilitation.

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>possibility of removal and re-deposition at a distance, by wind action.</td><td></td><td></td><td></td></tr>
<tr><td>13. General mining related activities</td><td>a) General mining related activities
Potential noise, dust and safety impacts associated with mining related activities
Mining related activities have the potential to impact negatively on adjacent landowners and communities. The typical impacts include dust, noise and safety. The movement of heavy construction vehicles along local public roads in the area may also pose potential safety risks to other road users.</td><td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>High</td><td>Medium (slime into existing voids)</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Partial</td><td>Partial</td></tr>
<tr><td>Loss of</td><td>Low</td><td>Low</td></tr>
</table>
</td><td>C, O and D</td><td>• Noise complaints will be recorded and address as soon as possible</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>Most the mining and associated activities will take place within the mining area which is not open to the public.
The transport of heavy mining and plant equipment to the site may however pose potential risks to motorists.</td><td><table>
<tr><td>resource</td><td></td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Medium</td><td>Medium</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>1.2 Vehicular movements within the site and associated transport routes. Loading, hauling and transport activities</td><td>b) Impacts on air quality due to vehicle entrainment emissions and potential accidents due to uncontrolled vehicle movements (Traffic safety)
c) Noise</td><td><table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
</table></td><td>P&D, C,O,D</td><td>• Use existing roads in as far as applicable
• Ensure that all regularly used informal roads have acceptable surfaces, are free from erosion, and have effective drainage.
• Remove foreign road-construction materials which may hamper vegetation re-growth and dispose of in an approved manner prior to rehabilitation.
• Monitor the emissions of dust by conducting dust suppression methods like sprinkling, where adequate.
• Avoid abnormal loads along N7 on</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Reversibility</td><td colspan="2">Partially reversible</td></tr>
<tr><td>Loss of resource</td><td>Low</td><td>Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>High</td><td>High</td></tr>
</table>
</td><td></td><td>weekends and public holidays;
• All vehicles will be road-worthy and drivers will be qualified, made aware of the potential road safety issues, and need for strict speed limits.
• Equipment and vehicles will be maintained in good operating condition. Any worn or faulty exhaust- and/or intake silencers will be replaced immediately.</td></tr>
<tr><td>1.3 Re-fuelling of machinery (drill rigs, vehicles), and spillage of cleaning solvent, oils and other chemicals</td><td>d) Deterioration in water quality due to spillages during re-fuelling of machinery (drill rigs, vehicles), and spillage of cleaning solvent, oils and other chemicals</td><td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium (positive)</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>C,O,D</td><td>• Educate contractors and all other personnel about the importance of environmental management and encourage them to minimise direct and indirect removal or damage through mining activity.
• Investigate means to reduce consumption of fossil fuels like installation of fuel efficient equipment, and servicing and repairing all equipment regularly.
• Implement the use of drip trays, whenever a refuelling or machine maintenance</td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Confidence	High	High		activity is being undertaken. • Compile a procedure for controlling oil spills and use the same as a guide to ensure that oil spills are at a minimum.
		Reversibility	Partially reversible			
		Loss of resource	Low	Low		
		Degree to which the impact can be mitigated	Low	Low		
1.4 Storage and disposal of waste 1.5 Fuel and lubricant management, including storage and field management as well as temporary storage of diesel and associated contaminated utensils and rags 1.6 Oil spills and recycling	e) Pollution of surrounding environment including contamination of soils due to spillages		**Pre-mitigation**	**Post-mitigation**	O Waste generating activities	• Carry-out regular waste and energy management assessments for all operations • Understanding of waste generating activities, mapping these and design collection, storage and disposal strategies. • Recycling equipment and materials where possible. • Design a recording system to ensure that fuel consumption and levels are monitored. • Retain wastes in leak-proof containers on-board and dispose at the port side to designated port disposal collection facilities.
		Severity	Low	Low		
		Duration	Short	Short-Medium term		
		Extent	Site specific	Site specific		
		Consequence	Low	Low		
		Probability	Seldom	Low		
		Significance	Low	Low		
		Status	Negative	Negative		
		Confidence	High	High		
		Reversibility	Partially reversible			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		<table><tr><td>**Loss of resource**</td><td>Low</td><td>Low</td></tr><tr><td>**Degree to which the impact can be mitigated**</td><td>High</td><td>High</td></tr></table>		• Regularly collect all plastic wastes generated during off shore based mining daily and store in suitable waste container for disposal at the nearest licensed landfill site. • Collect discarded pipes etc. on a regular basis from the mine, for disposal at the landfill site. • Maintain accurate records of all solid waste generated from mining and related activities. • Store non-biodegradable refuse (e.g. glass bottles, plastic bags, metal scrap etc.) in a container at collection points for collection on a regular basis for disposal at the designated mine site waste disposal facility. • Collect and store biodegradable refuse in a suitable covered container for regular disposal at the designated mine site waste disposal facility. • Recycle waste as far as practicable in

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				accordance with the national strategy for waste management. • Prevent and avoid littering • Keep a record of the quantities and types of waste disposed of, and the locations and methods used • Re-useable tyres sent to designated holding facility prior to being sent to authorised tyre dealer or supplier. • Conveyor belts to be stored in designated area, subject to the provisions of the GN R.718 and any latest waste regulations, before being removed for recycling or disposal.
6.5 (continued)				• Operators to be properly trained in refuelling and avoidance of diesel spills. • Operators to be provided with and trained in the use of oil decontaminants • Provide wash bay with concrete floors which drain to oil catch pits (Para. 6.1).

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				• Clean oil catch pits to waste oil drums regularly. • Construct supply tanks and used oil storage areas • Ensure all oils are drained from scrap engines, etc. before storage. • Engines, etc. which are to be reconditioned and required to be kept lubricated to stand on suitable floor equipped for a possible leak or spill. • Used oil storage area to be constructed with used oil disposal contractor or WCR providing suitable drums in these areas at each workshop.
1.7 Workshops Electrical, mechanical, earth moving boiler making and workshops 1.8 Administration and other buildings: Office	f) Surface water Deterioration in surface water quality Oil spillages during maintenance may be in contact with storm water.	L	O	• Adhere to procedures developed for the management of ancillary activities • Observe methods to reduce utilisation of resources such as electricity efficient mechanism and water management strategies and develop means of optimising

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
buildings, training centre, emergency services and cafeteria 1.9 Housing and recreational facilities; 1.10 Powerlines; and access to electricity 1.11 Electricity substation and network 1.12 Railways; 1.13 Sewage plant; 1.14 Pollution control dams, paddocks, and evaporation dams. 1.15 Pipelines 1.16 Process water pumps and storage tanks 1.17 Portable water supply and storage tanks	During operation, contamination could occur from oil, diesel and chemical leaks or spills,			fuel consumption on vehicles.

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1.18 Use of natural resources</td><td>g) Loss of natural resources</td><td><table>
<tr><th></th><th>Pre-mitigation</th><th>Post-mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Short</td><td>Short-Medium term</td></tr>
<tr><td>Extent</td><td>Site specific</td><td>Site specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Partially reversible</td></tr>
<tr><td>Loss of resource</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>High</td><td>High</td></tr>
</table></td><td>O</td><td></td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>2 Processing activities
2.1 Slimes disposal into existing mining voids
Existing mining voids in mined out areas were identified in central areas where processing plants would be placed over the life of the operation.
The disposal of fine residue and waste water to: Slimes dams from the processing plants, Mining voids during mining and/or overburden stripping.
Return water dams.</td>
<td>f) The historic slimes facilities that were created on surface by De Beers have a negative impact on the environment due to windblown dust that is generated.
g) Potential seepage of sea-water used in processing into freshwater resources in the area.
h) Deterioration in water quality
i) Potential health impact on surface water users and on the natural environment.</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Low</td></tr>
<tr><td>Duration</td><td>High</td><td>Medium (slime into existing voids)</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Low</td></tr>
<tr><td>Probability</td><td>High</td><td>High</td></tr>
<tr><td>Significance</td><td>High</td><td>Medium</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Partially reversible</td><td></td></tr>
<tr><td>Loss of resource</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Low</td><td>Medium</td></tr>
</table>
</td>
<td>C and O</td>
<td>• Plan and place structures with closure in mind.
• Establish a dust management plan in consultation with the environmental manager.
• Place the fine fraction of the waste below natural ground level or behind existing overburden dumps to reduce windblown dust
• Reduce dust generation by stabilising dust sources through covering with coarse tailings, where practically possible.
• Conduct dust monitoring according to acceptable monitoring protocol as per prescriptions of the dust specialist investigations (Volume 4 of this EIA) Manage the slimes dams as part of the integrated water and waste management plan, which was compiled as part of the water use licence application and any impacts associated with these water uses will be managed as part of a valid licence
• Align development strategies to the Estuary Management Plans that have been developed by the district municipality for these estuaries.</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>7.1 (continued)</td>
<td>j) Potential impact on water resources (Swartlintjies River).
While the preferred site of future slimes dam is not going to impact on the Swartlintjies Estuary, the alternative site 9 km upstream (Alternative 2 in Figure (d) (ii) 1.1-9), is located within the Swartlinjies River Catchment. Although the prevailing wind carries some of the dry saline sediment north-east, the possibility exist that seepage of saline water gets into the Swartlinjties River. The Estuary Study Report in Section 10.42 , Volume 4, provides detailed view in this aspect.</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th></th></tr>
<tr><td>Severity</td><td>High</td><td>N/A</td></tr>
<tr><td>Duration</td><td>High</td><td>N/A</td></tr>
<tr><td>Extent</td><td>Medium: The river is situated outside the concession area and would be impacted too.</td><td>N/A</td></tr>
<tr><td>Consequence</td><td>High</td><td>N/A</td></tr>
<tr><td>Probability</td><td>Medium</td><td>N/A</td></tr>
<tr><td>Significance</td><td>High</td><td>N/A</td></tr>
<tr><td>Status</td><td>Negative</td><td>N/A</td></tr>
<tr><td>Confidence</td><td>Medium</td><td></td></tr>
<tr><td>Reversibility</td><td colspan="2">Partially reversible</td></tr>
<tr><td>Nature of cumulative impact</td><td colspan="2">High</td></tr>
<tr><td>Degree of which impact may cause irreplaceable loss of resources</td><td colspan="2">Medium</td></tr>
</table>
</td>
<td>O and D</td>
<td>• It is not feasible to cover slimes dams while they are in use
Re-consider use of this alternative 2 and remove from the alternatives if feasible and alternatively utilise the preferred sites north of the estuary, which are situated outside of the Swartlintjies River catchment and are anticipated to drain into the sea via existing abandoned mining channels.
Should alternative 2 be used (Figure (d) (ii) 1-1, this alternative site should be developed with caution to prevent accelerated salinisation of the Swartlintjies Estuarine Functional Zone and associated potential negative long-term impacts on biodiversity.</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td colspan="5">Impacts of Shore based divers and those of Beach and Offshore Channel mining</td></tr>
<tr>
<td>4. Construction of coffer dam walls around excavate beach and/or offshore channel mine blocks using boulders, bedrock, gravel, sand and other related materials.
Excavation by means of bulldozers, excavators and haulage trucks.
Movement of rock boulders, gravel, sand to the mine site by trucks, dredge, conveyor or slurry pump.
Infilling and depositing of rock boulders, sand and clay into the seashore as</td>
<td>d) The changes in biophysical characteristics on open coast beaches may result in cumulative impacts as adjacent blocks are mined.
e) Smothering of rocky habitats by sediments and shift in communities from those characterising rocky shore to those typical of sandy beaches.
If the surface sediment is similar to the native beach material when operations cease, and if the final long-term beach profile has similar</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Duration</td><td>Short Term</td><td>Low</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Possible/Frequent</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Reversibility</td><td colspan="2">Fully reversible as natural recovery of communities will occur on cessation of operation and redistribution of tailings and boulders by wave action.</td></tr>
<tr><td>Loss of resource</td><td>Low</td><td>Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td>O</td>
<td>• Berm construction and/or shoreline accretion, overburden stripping and removal and processing of target gravels are all an integral part of the mining approach and other than the ‘no-go’ option, there is no feasible mitigation for these proposed operations. Disturbance of beach habitat adjacent to the mining blocks can, however, be minimised through stringent environmental management and good house-keeping practices.
• Active rehabilitation involving backfilling of mined out areas, active removal of as much of the berms above the low water mark as feasible and re-structuring of the mining area to resemble the natural beach morphology should be undertaken on completion of mining operations.
• Profile and sloping of remaining tailings heaps on completion of operations. While</td>
</tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
rock/sand berms. Dredging or hydraulic mining of sand overburden in adjacent mining areas and pumped to the shoreline for beach accretion. Pumping of sediments due to operation of coffer dams / generation of suspended sediment plumes	contours to the original profile, the addition or removal of layers of sediment does not have enduring adverse effects on the sandy beach benthos and recovery following the initial disturbance can occur within a few years. In contrast, structural changes in grain size over the medium- to long-term due to repeated nourishment or seawall construction results in either permanent changes in community structure or longer recovery times.			recovery of the intertidal and sub tidal communities is rapid, physical alteration and degradation of the shoreline in ways that cannot be remediated by swell action can be more or less permanent. • Mine beach targets in blocks sequentially from the north to the along the beach, rehabilitating mined-out blocks immediately on cessation of mining in that block; • Avoid re-mining of sites in the medium to long term, as far as practically possible. • Rely on the fact that after mining activities have ceased, the sea tends to breach dams within a few months as a result of heavy wave action, and depending on the sitting and occurrence of storms, replenish itself to pre-mined state (visual view) over a period of months to several years • Active rehabilitation below the low water mark is not possible and recovery of habitats and communities will depend on natural processes. Sediments accreted in

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
				Mitchell's Bay would be naturally eroded over the long term.

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
	f) Change in the invertebrate macro-faunal communities, Intertidal and shallow subtidal benthic communities or burial of benthic biota by sediments and localised impacts of smothering, burial.	<table><tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr><tr><td>**Severity**</td><td>Medium</td><td>Medium</td></tr><tr><td>**Duration**</td><td>Medium</td><td>Medium</td></tr><tr><td>**Extent**</td><td>Local</td><td>Site specific</td></tr><tr><td>**Consequence**</td><td>Medium</td><td>Medium</td></tr><tr><td>**Probability**</td><td>Definite</td><td>Definite</td></tr><tr><td>**Significance**</td><td>High</td><td>Medium to high</td></tr><tr><td>**Status**</td><td>Negative</td><td>Negative</td></tr><tr><td>**Confidence**</td><td>High</td><td>High</td></tr><tr><td>**Reversibility**</td><td colspan="2">Partially Reversible as active rehabilitation below the low water mark is not possible and recovery of habitats and communities will depend on natural erosion of accreted sediments and recovery of biota are likely to be reversible over long term.</td></tr><tr><td>**Nature of cumulative**</td><td colspan="2">The highly localised loss of intertidal and shallow subtidal benthic communities may result in cumulative impacts in threatened or endangered habitats.</td></tr><tr><td>**Loss of resource**</td><td colspan="2">Medium</td></tr></table>		•

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td><table><tr><td>Degree to which the impact can be mitigated</td><td>Very Low</td></tr></table></td><td></td><td></td></tr>
<tr><td>1 (continued)</td><td>g) Development of Hypoxic sediments due to accretion
• The high wave exposure in combination with the comparatively coarse nature of the beach sediments (D_{50} = ~270 µm; WSP 2015) in the project area make it highly unlikely that hypoxic conditions will develop as a</td><td>Low
<table>
<tr><th></th><th>With mitigation</th><th>Without mitigatio</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Short</td><td>Short – Medium term</td></tr>
<tr><td>Extent</td><td>Site specific</td><td>Site specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Seldom</td><td>Seldom</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Nature of Cumulative Impact</td><td colspan="2">Cumulative impacts are unlikely as being highly mobile, affected species can move to adjacent available feedin ground.</td></tr>
<tr><td>Reversibility</td><td colspan="2">Fully reversible</td></tr>
</table></td><td>O</td><td>• Consider potential sources of sand and the access requirements by heavy vehicles
• Coastal and sea mining activities should be planned and spaced in such a way that it will always be a nearby, undisturbed habitat of the same type as the one that is being disturbed nearby.</td></tr>
</table>

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Loss of resource	Low			
		Degree to which the impact can be mitigated	None			
1 (continued)	h) Effects on high order consumers		**With mitigation**	**Without mitigation**	O	• Recovery of invertebrate macro faunal communities following disturbance of beach habitats generally occurs within 3 – 5 years after cessation of the disturbance,
		Severity	Low	Low		
		Duration	Short	Short – Medium term		
		Extent	Site specific	Site specific		
		Consequence	Low	Low		
		Probability	Seldom	Seldom		
		Significance	Low	Low		
		Status	Negative	Negative		
		Confidence	High	High		
		Nature of Cumulative Impact	Cumulative impacts are unlikely as being highly mobile, affected species can move to adjacent available feeding ground.			
		Reversibility	Fully reversible			
		Loss of	Low			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		resource				
		Degree to which the impact can be mitigated	None			
	i) Sedimentation of intertidal and subtidal reefs due to redistribution of sediments.		**With mitigation**	**Without mitigation**	O	- The redistribution of sediments will be monitored and controlled
		Severity	High	High		
		Duration	Short term to medium although sediments in the near-shore will be continuously suspended by wave action, natural erosion following accretion is likely to only occur over many years.	Short term to medium		
		Extent	Local	Local		
		Consequence	Medium	Medium		
		Probability	Continuous for the duration of mining	Continuous		
		Significance	Medium	Medium		
		Status	Negative	Negative		
		Nature of	Highly likely cumulative impacts during			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		cumulative impact	the life of mine			
		Confidence	High	High		
		Reversibility	Partially reversible			
		Loss of resource	Medium			
		Degree to which the impact can be mitigated	None			

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>1 (continued)</td>
<td>An increase in turbidity caused by the pumping of bottom sediments and compromised water quality and sediment inundation of areas adjacent to those being mined</td>
<td>
<table>
<tr><th></th><th>Pre-mitigation</th><th>Post-mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Short</td><td>Short</td></tr>
<tr><td>Extent</td><td>Site specific</td><td>Site specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Seldom</td><td>Seldom</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Neutral</td><td>Neutral</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Partially irreversible</td><td></td></tr>
<tr><td>Loss of resource</td><td colspan="2">Medium</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Medium</td></tr>
</table>
</td>
<td>O and D</td>
<td>Turbidity offshore of the mine site(s) is thus unlikely to exceed levels attained naturally during turn-over of nearshore sediments by wave action or seasonal inputs in river discharges. As turbid water is a natural occurrence along the southern African west coast, any turbidity-related effects in the near-shore environment as a direct result of mining operations are likely to be insignificant.
No mitigation measures are deemed necessary.</td>
</tr>
<tr>
<td>5. Shore based divers related impacts</td>
<td>d) Disturbance of reef habitat through disposal of tailings.
Devaluing of the coastal land</td>
<td>
<table>
<tr><th></th><th>With mitigation</th><th>Without mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Short term</td><td>Short term</td></tr>
</table>
</td>
<td>O</td>
<td>• Manage disposal of tailings above the high water mark;
• Avoid re-mining of sites in the medium term;</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>due to visual intrusion</td><td><table>
<tr><td>Extent</td><td>Site specific: limited to mining</td><td>Site specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Possible</td><td>Unlikely</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Fully reversible as natural recovery of communities will occur on cessation of operations and redistribution of tailings by wave action.</td></tr>
<tr><td>Loss of resource</td><td colspan="2">Low</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Medium</td></tr>
</table></td><td></td><td>Avoid blasting and large-scale removal of rocks from sub tidal gullies into the intertidal;
Designate and actively manage specific access, storage and operations areas;
Remove all equipment on completion of activities; and
Flatten all remaining tailings heaps on completion of operations.</td></tr>
<tr><td>2 (continued)</td><td>e) Physical damage due to trampling of intertidal biota</td><td>Low</td><td>O</td><td></td></tr>
<tr><td>2 (continued)</td><td>f) Changes to community structure due to kelp</td><td><table>
<tr><td></td><td>With mitigation</td><td>Without mitigation</td></tr>
</table></td><td>O</td><td>Avoid kelp cutting, where unnecessary and as a value-add, collaborate with land-based abalone farmers to use kelp for abalone feed, based on</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>cutting</td><td>
<table>
<tr><td>Severity</td><td>Low</td><td>Low</td><td></td></tr>
<tr><td>Duration</td><td>Short term</td><td>Short term</td><td></td></tr>
<tr><td>Extent</td><td>Site specific: limited to mining</td><td>Site specific</td><td></td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td><td></td></tr>
<tr><td>Probability</td><td>Possible</td><td>Unlikely</td><td></td></tr>
<tr><td>Significance</td><td>Medium</td><td>Low</td><td></td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td><td></td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td><td></td></tr>
<tr><td>Reversibility</td><td colspan="3">The impact is fully reversible as natural recovery of communities will occur during and on cessation of operations.</td></tr>
<tr><td>Nature of cumulative impact</td><td colspan="2">The highly localised removal of kelp is not expected to result in cumulative impacts.</td><td></td></tr>
<tr><td>Loss of resource</td><td colspan="2">Low</td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Medium</td><td></td></tr>
</table>
</td><td></td><td>feasibility of this value -add option and after discussions with the NC abalone working group.</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>2.3 Discharge of seawater used to screen marine gravels</td>
<td>a. Disposal of process water resulting in disturbance of shallow marine ecosystem
b. Loss of shallow marine habitat
c. Disturbance of intertidal and subtidal marine areas
d. Mortality of benthic organisms</td>
<td>
<table>
<tr><th></th><th>Pre-mitigation</th><th>Post-mitigation</th></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Short</td><td>Short – medium term</td></tr>
<tr><td>Extent</td><td>Site specific</td><td>Site specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Definite</td><td>Low</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td colspan="2">Irreversible</td></tr>
<tr><td>Loss of resource</td><td colspan="2">Medium</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Medium</td></tr>
</table>
</td>
<td>O</td>
<td>• Reduce the negative effects of salinisation of soils from seawater by locating the outlets from the screens as close to the top of the intertidal zone as possible.
• Educate personnel about the importance of benthic fauna in the marine ecosystem, and encourage them to minimise direct and indirect removal or damage through mining activity.</td>
</tr>
<tr>
<td>2.4 The establishment of the parking areas and equipment storage</td>
<td>c) Changes to ecological environment and biophysical characteristics</td>
<td>
<table>
<tr><th></th><th>Pre-mitigation</th><th>Post mitigation</th></tr>
<tr><td>Severity</td><td>Medium</td><td>Medium</td></tr>
</table>
</td>
<td>C</td>
<td>• Mining the disturbed areas to the specific foot print areas that will be required
• Remove all remnants of pipes and parking</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>areas</td>
<td>due to placement of parking areas
d) Pollution of near shore waters and beaches due to spillage of cleaning solvents, oils and other chemicals</td>
<td>
<table>
<tr><td>Duration</td><td>Short</td><td>Short</td><td></td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td><td></td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td><td></td></tr>
<tr><td>Probability</td><td>Definite</td><td>Low</td><td></td></tr>
<tr><td>Significance</td><td>Medium</td><td>Definite</td><td></td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td><td></td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td><td></td></tr>
<tr><td>Reversibility</td><td>Partially irreversible</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td colspan="2">Medium</td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Low</td><td></td></tr>
</table>
</td>
<td></td>
<td>infrastructure when moving to the next site
• Adhere to recommended waste management principles and protocols
• Maintain all mining equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled.
• Minimize general environmental damage to habitats and to maintain ecosystem functioning and biodiversity.
• Implement the use of drip trays whenever a refuelling or machine maintenance activity is being undertaken. A procedure for controlling oil spills will be compiled and used as a guide to ensure that oil spills are at a minimum.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Keep an oil spill response kit on site and ensure that the staff is trained on how he kit is used.</td>
</tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>6. General surf zone mining related impacts</td>
<td>3. Potential conflicts with overlapping coastal activities such as abalone ranching right holders
(1). Impact of sea -based access as an alternative to land based access
Constraints for access, whether by sea or land are as follows:
The primary constraint is sea condition – rough seas would not permit either diving (from the shore) or near shore access with a boat to allow divers in the kelp zones for seeding.
High wind stress – either from the prevailing SE (summer condition</td>
<td>
<table>
<tr><th></th><th>Without Mitigation</th><th>Assuming Mitigation</th></tr>
<tr><td>Severity</td><td>High</td><td>Low</td></tr>
<tr><td>Duration</td><td>Medium-term</td><td>Low</td></tr>
<tr><td>Extent/Spatial Scale</td><td>Medium (beyond the site boundary)</td><td>Medium (beyond the site boundary)</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Low</td></tr>
<tr><td>Probability</td><td>High</td><td>Low</td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium</td></tr>
<tr><td>Status</td><td>Negative</td><td>Neutral</td></tr>
<tr><td>Confidence</td><td>High</td><td>Medium</td></tr>
<tr><td>Nature of Cumulative impact</td><td colspan="2">For abalone to be seeded in the selected sites access to the specific locations needs to be expedited within a short time frame (24 hours) in order to allow windows of opportunity to be utilised (relates to sea and weather conditions). Boat-based seeding is not considered a viable option by the abalone seeding rights holder although this could be</td></tr>
</table>
</td>
<td>O and D</td>
<td>Co-exist with coastal users such as abalone ranchers and look for positive synergies such as the benefit WCR can contribute to the ranchers through the limited access and diamond security control on the impact poaching has historically had on the coastal activity operations
Take cognisance of the draft Northern Cape Coastal Management Programme (NCCMCP) (Breetzke, 2015), which includes priority areas and tangible objectives to achieve the vision for the Northern Cape coastline over a 5 yr circle. Priority 1 in the NNCMCP, for negotiation of permanent coastal access servitudes with land owners and their registration within 2 years. Finalise negotiations with SANParks, regarding management of chalets at NOUP and clearly define public access and registration therefore.</td>
</tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING		PHASE	TYPICAL MITIGATION MEASURES
	mainly) or NW (winter condition mainly). i. Delayed access through the mining lease areas by land (WCR), subsequently losing a window of opportunity to seed a designated area.		explored further between conflicting parties. This would include exploring security alternatives which are the primary concern of the mining operators.		
		Degree to which impact can be reversed	Fully reversible		
		Degree to which impact may cause irreplaceable loss of resources	Low		
		Degree to which impact can be mitigated	Medium		

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>(2) Loss of seeded abalone
Abalone seeding and harvesting in mined areas will not be possible until recovery of the mined area has been achieved – conceivably this will take at least five years (as proposed by Pulfrich, 2015). At this stage the abalone ranching right will be near to or completed and the opportunity to test the feasibility of abalone ranching lost. This opportunity will not be lost in areas where mining will not occur. There would seem to be few alternatives if abalone ranching cannot be accommodated in a systematic way within a plan that incorporates both mining and abalone ranching options.</td><td>
<table>
<tr><th></th><th>Without Mitigation</th><th>Assuming Mitigation</th></tr>
<tr><td>Severity</td><td>High</td><td>Low</td></tr>
<tr><td>Duration</td><td>Medium-term (for the duration of the project)</td><td>Medium-term (for the duration of the project)</td></tr>
<tr><td>Extent/Spatial Scale</td><td>Medium (local) to High (regional)</td><td>Medium (local) to High (regional)</td></tr>
<tr><td>Consequence</td><td>High</td><td>High</td></tr>
<tr><td>Probability</td><td>High</td><td>High</td></tr>
<tr><td>Significance</td><td>High</td><td>High</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Nature of Cumulative impact</td><td colspan="2">Increased abalone overall mortality and economic loss due to restrictions on access and use of optimal windows for both seeding and harvesting abalone.</td></tr>
<tr><td>Degree to which impact can be reversed</td><td colspan="2">Irreversible</td></tr>
</table>
</td><td>O</td><td></td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td><table>
<tr><td>Degree to which impact may cause irreplaceable loss of resources</td><td>High</td><td></td></tr>
<tr><td>Degree to which impact can be mitigated</td><td>High</td><td></td></tr>
</table></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3 (continued)</td><td>4. Limited access to the coast</td><td><table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th><th></th></tr>
<tr><td>Severity</td><td>Medium</td><td>Low</td><td></td></tr>
<tr><td>Duration</td><td>Low</td><td>Low</td><td></td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td><td></td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Medium</td><td></td></tr>
<tr><td>Probability</td><td>Definite</td><td>Medium</td><td></td></tr>
<tr><td>Significance</td><td>Medium</td><td>Medium</td><td></td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td><td></td></tr>
</table></td><td>C, O and D</td><td>• Discussions with San Parks to input into the conservation management plans
• Biodiversity off sets and positive spin-offs in the form of relinquishing some of the mining rights, to the south of the operations in to the Marine Protected Areas
• WCR has committed to give up all of Sea Concession 9a and 90% of 8a and 8b to contribute to the Marine Protected Area (MPA). Section 11 application for the ceding of rights had currently been applied for with</td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Confidence	High	High		DMR. • Consider opening additional access at certain areas that are not critical in terms of diamond security.
		Reversibility	Irreversible			
		Loss of resource	Medium			
		Degree to which the impact can be mitigated	Medium			
ACTIVITIES	IMPACTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
7. Slimes disposal into the ocean, as an alternative to land based slimes disposal	• Disposal of slimes into the • sea/ocean through a process of discharge as an alternative to surface disposal and natural seepage into the sea, in certain instances) • Even though the discharge of the slimes into the sea would avoid contamination of land /surface with sea		**Without mitigation**	**With mitigation**	0	• Should there be a need for a discharge, apply for relevant licences to DEA to ensure such discharge in conducted in a controlled manner.
		Severity	Medium	Medium		
		Duration	High	High		
		Extent	Regional	Regional		
		Consequence	Medium	Medium		
		Probability	Definite	Medium		
		Significance	Medium	Medium		
		Status	Negative	Negative		

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td>water, the discharge of slimes into the sea will cause tailings plumes and high sedimentation with fine slimes remaining in suspension for longer periods than the coarse and is as such currently not a favoured option.
Since this is an existing operation, there are already existing slimes, which are already contaminated with sea water and which are targeted to be used continual slimes discharge.</td><td><table>
<tr><td>Confidence</td><td>High</td><td>High</td><td></td></tr>
<tr><td>Reversibility</td><td>Irreversible</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td colspan="2">Medium</td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td colspan="2">Medium</td><td></td></tr>
</table></td><td></td><td></td></tr>
<tr><td>On-going operations</td><td>• Lack of implementation of environmental management requirements</td><td><table>
<tr><td></td><td>Pre-mitigation</td><td>Post-mitigation</td><td></td></tr>
<tr><td>Severity</td><td>High</td><td>Low</td><td></td></tr>
<tr><td>Duration</td><td>Long term</td><td>Short – medium term</td><td></td></tr>
</table></td><td>C,O,D</td><td>• Specify the job description and responsibilities of persons involved in environmental management.
• Incorporate environmental factors into contracts, job descriptions and performance</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Extent</td><td>Local</td><td>Site specific</td><td></td></tr>
<tr><td>Consequence</td><td>High</td><td>Low</td><td></td></tr>
<tr><td>Probability</td><td>Probably</td><td>Low</td><td></td></tr>
<tr><td>Significance</td><td><i>High</i></td><td>Low</td><td></td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td><td></td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td><td></td></tr>
<tr><td>Reversibility</td><td>Partially reversible</td><td></td><td></td></tr>
<tr><td>Loss of resource</td><td>Medium</td><td></td><td></td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Medium</td><td></td><td></td></tr>
</table>
</td><td></td><td>appraisals to improve environmental awareness and performance.</td></tr>
<tr><td></td><td>a) Potential positive impacts
• Creation of employment opportunities;
• Creation of skills development and training opportunities;
• Creation of business opportunities;</td><td>
<table>
<tr><td colspan="3">Creation of employment opportunities</td></tr>
<tr><td></td><td>Without Mitigation</td><td>Assuming Enhancement</td></tr>
<tr><td>Severity/Intensity</td><td>Low</td><td>High</td></tr>
<tr><td>Duration</td><td>Medium term</td><td>Medium-term</td></tr>
</table>
</td><td>C,O,D</td><td>Requirements as set out in the SLP will be implemented.</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td></td>
<td>• Creation of opportunities to revitalise Koingnaas and Kleinzee;
• Support for local community initiatives and developments.
b) Potential negative impacts
• Risk to abalone and crayfish operations;
• Noise, dust and safety impacts associated with mining related activities and the movement of heavy vehicles.
c) Creation of Employment Opportunities</td>
<td>
<table>
<tr><td>Extent</td><td>Local-Regional</td><td>Local-Regional</td><td></td></tr>
<tr><td>Consequence</td><td>Medium</td><td>High</td><td></td></tr>
<tr><td>Probability</td><td>Likely</td><td>Likely</td><td></td></tr>
<tr><td>Significance</td><td>Medium</td><td>High</td><td></td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td><td></td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td><td></td></tr>
<tr><td>Nature of Cumulative impact</td><td colspan="2">Opportunity to improve economic mobility and skills levels in the area</td><td></td></tr>
<tr><td>Degree to which impact can be reversed</td><td colspan="2">N/A</td><td></td></tr>
<tr><td>Degree to which impact may cause irreplaceable loss of resources</td><td colspan="2">N/A</td><td></td></tr>
<tr><td>Degree to which impact can be</td><td colspan="2">Low</td><td></td></tr>
</table>
</td>
<td></td>
<td></td>
</tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		enhanced		

Creation of training and skills development opportunities		
	Without Mitigation	**Assuming Enhancement**
Severity / Intensity	Low	High
Duration	Medium term	Medium-term
Extent	Local-Regional	Local-Regional
Consequence	Medium	High
Probability	Likely	Likely
Significance	Medium	High
Status	Positive	Positive

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

Confidence	High	High
Nature of Cumulative impact	Improved pool of skills and experience in the local area	
Degree to which impact can be reversed	N/A	
Degree to which impact may cause irreplaceable loss of resources	N/A	

Creation of business opportunities

	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	Low	High
Duration	Medium term	Medium-term

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Extent	Local-Regional	Local-Regional		
		Consequence	Medium	High		
		Probability	Likely	Likely		
		Significance	Medium	High		
		Status	Positive	Positive		
		Confidence	High	High		
		Nature of Cumulative impact		Opportunity to create opportunities for local business to expand and for new businesses to become established.		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Degree to which impact can be reversed	N/A			
		Degree to which impact may cause irreplaceable loss of resources	N/A			
		Degree to which impact can be enhanced	Low			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		Revitalise Koingnaas and Kleinzee		

	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	High	High
Duration	Medium term	Medium-term
Extent	Local-Regional	Local-Regional
Consequence	High	High
Probability	Likely	Likely
Significance	High	High
Status	Negative	Positive
Confidence	High	High
Nature of Cumulative impact		Negative cumulative impact linked to deterioration of

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING		PHASE	TYPICAL MITIGATION MEASURES
			towns resulting in dysfunctional, run-down towns. Positive cumulative impact linked to functional, operating towns that generate income or local authorities.		
		Degree to which impact can be reversed	N/A		
		Degree to which impact may cause irreplaceable loss of resources	N/A		
		Degree to which impact can be enhanced	High		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		1. Support for community initiatives		

Support for community initiatives

	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	Low	High
Duration	Medium term	Medium-term
Extent	Local	Local-Regional
Consequence	Medium	High
Probability	Likely	Likely
Significance	Medium	High
Status	Positive	Positive
Confidence	High	High
Nature of Cumulative impact	Positive cumulative impact linked to up-liftment of local	

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

	communities and improvement in social welfare.
Degree to which impact can be reversed	N/A
Degree to which impact may cause irreplaceable loss of resources	N/A
Degree to which impact can be enhanced	Low

2. Risk posed by workers to local community closure and decommissioning impacts.

Impact of workers on family structures and social networks

	Without Mitigation	**Assuming Mitigation**
Severity	Low	Low
Duration	Medium-	Medium-term

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
			term			
		Extent	Local	Local		
		Consequence	Low	Low		
		Probability	Unlikely	Unlikely		
		Significance	Low	Low		
		Status	Negative	Negative		
		Confidence	High	High		
		Nature of Cumulative impact		Impact on well-being and future opportunities for individuals and their families affected by unplanned pregnancy, and STDs, specifically HIV and or AIDS. Overall cumulative impact on		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		(see below)		

	community as a whole would be negligible.
Degree to which impact can be reversed	Irreversible in case of HIV and or AIDS.
Degree to which impact may cause irreplaceable loss of resources	Low for community as a whole
Degree to which impact can be mitigated	Low

3. Decommissioning Impact

Impact of closure and decommissioning

	Without Mitigation	**Assuming Mitigation**
Severity	Moderate	Low
Duration	Medium-term	Medium-term
Extent	Local-Regional	Local-Regional

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING				PHASE	TYPICAL MITIGATION MEASURES
		Consequence	Moderate	Moderate			
		Probability	Likely	Unlikely			
		Significance	High	Low			
		Status	Negative	Negative			
		Confidence	High	High			
		Nature of Cumulative impact	Impact on local and regional economy associated with job losses and impact on local suppliers				
		Degree to which impact can be reversed	N/A				
		Degree to which impact may cause irreplaceable loss of resources	N/A				

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td><table><tr><td>Degree to which impact can be mitigated</td><td>High</td></tr></table></td><td></td><td></td></tr>
<tr><td>1) Decommissioning of marine operations:
1.1 Decommissioning of surf zone, beach and off shore channel mining activities, including decommissioning of coffer dams rock source quarries, and earthworks associated with the marine operations e.g. tailings dumps, slimes dams, slimes pipelines Access and service roads
1.2 Decommissioning of land mining and prospecting activities,</td><td>a) Decommissioning impact
Closure or decommissioning marks the end of a project. As in the planning stage, the social effects of closure begin when the intent to close is announced or romours start to circulate. The social impacts area typically linked to loss of jobs. In terms of South Africa, the Mineral and Petroleum Resources Development Act, 2002, (Act No 28 of 2002) (MPRDA), the potential impacts associated with</td><td><table>
<tr><td colspan="3">Potential noise, dust and safety impacts associated with mining related activities</td></tr>
<tr><td></td><td>Without Mitigation</td><td>Assuming Mitigation</td></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Medium-term</td><td>Medium-term</td></tr>
<tr><td>Extent</td><td>Local-Site Specific</td><td>Local-Site Specific</td></tr>
<tr><td>Consequence</td><td>Low</td><td>Low</td></tr>
<tr><td>Probability</td><td>Unlikely</td><td>Unlikely</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
</table></td><td></td><td>The impacts and risks associated with closure are presented under Section m subsection 2 of the EMPr (Table R-RI). Appendix 1 of this EMPr provides rehabilitation strategies that will be adopted.</td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
including: Mine excavations Overburden dumps, tailings dumps, slimes dams Sea-water pumps and pipe lines, slimes pumps and pipelines Buildings and associated structures and electrical works no longer required Treatment plants and associated structures and electrical works that are no longer required as well as Access and service roads.	downscaling and retrenchments must be addressed in the SLP. In this regard one of the objectives of the SLP is to provide mine workers with additional skills, save jobs and manage downscaling and/or closure.	**Confidence**	High	High		
		Nature of Cumulative impact	No significant cumulative impacts			
		Degree to which impact can be reversed	N/A			
		Degree to which impact may cause irreplaceable loss of resources	N/A			
		Degree to which impact can be mitigated	Low			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
Removal of scrap	• Disturbance of topsoil • Removal of scrap allows rehabilitation of areas, but can also result in negative environmental impacts.	(see significance rating table below)	D	Ensure that adequate soil management measures are put in place for removal of scrap.

	Without mitigation	**With mitigation**
Severity	high	High
Duration	High	Medium
Extent	Local	Local
Consequence	Medium	Low
Probability	Low	Low
Significance	Low	Low
Status	Negative	Negative
Confidence	High	High
Reversibility	Irreversible	
Loss of resource	High	High
Degree to which the impact can be mitigated	Low	Low

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr>
<td>Concurrent
back- filling into
mined out
areas</td>
<td>- Soil contamination through mixing of different soil horizons.</td>
<td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>high</td><td>High</td></tr>
<tr><td>Duration</td><td>High</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Irreversible</td><td></td></tr>
<tr><td>Loss of resource</td><td>High</td><td>High</td></tr>
<tr><td>Degree to which the impact can be mitigated</td><td>Low</td><td>Low</td></tr>
</table>
</td>
<td>D</td>
<td>As presented in Appendix 1.</td>
</tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
Sloping steep sided slopes, overburden dumps and dangerous benches.	- Change in the original landscape.		**Without mitigation**	**With mitigation**	D	Slope un-contaminated mounds or heaps of other material, other than topsoil and subsoil, to reduce visual impacts.
		Severity	high	High		
		Duration	High	Medium		
		Extent	Local	Local		
		Consequence	Medium	Low		
		Probability	Low	Low		
		Significance	Low	Low		
		Status	Negative	Negative		
		Confidence	High	High		
		Reversibility	Irreversible			
		Loss of resource	High	High		
		Degree to which the impact can be mitigated	Low	Low		

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td>Handling of topsoil</td><td>• Soil mixing leading to soil contamination due to mixture of soil content from different soil horizons.</td><td></td><td></td><td>Ensure that topsoil used to cover up has minimal to no contamination that might have a negative impact on soil content.</td></tr>
<tr><td>General rehabilitation aspects such as waste management
• Solid waste management (domestic and industrial)
• Asbestos handling
• Hydrocarbon fuel and lubricant management
• Alien vegetation control
• Demolition of buildings and burial of building rubble</td><td></td><td>
<table>
<tr><th></th><th>Without mitigation</th><th>With mitigation</th></tr>
<tr><td>Severity</td><td>high</td><td>High</td></tr>
<tr><td>Duration</td><td>High</td><td>Medium</td></tr>
<tr><td>Extent</td><td>Local</td><td>Local</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Low</td></tr>
<tr><td>Probability</td><td>Low</td><td>Low</td></tr>
<tr><td>Significance</td><td>Low</td><td>Low</td></tr>
<tr><td>Status</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td><td>High</td></tr>
<tr><td>Reversibility</td><td>Irreversible</td><td></td></tr>
<tr><td>Loss of resource</td><td>High</td><td>High</td></tr>
</table>
</td><td>D</td><td>• The rehabilitat-ion of the site will involve the following:
• Overburden Dumps.
• Backfill where appropriate.
• Adopt closure objectives and refer to Appendix 1 of this EMPr.</td></tr>
</table>

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td><table><tr><td>Degree to which the impact can be mitigated</td><td>Low</td><td>Low</td></tr></table></td><td></td><td></td></tr>
<tr><td>Ceasing of mining activities</td><td>Employment
Loss of jobs and income.</td><td><table>
<tr><th colspan="3">Creation of employment opportunities</th></tr>
<tr><th></th><th>Without Mitigation</th><th>Assuming Enhancement</th></tr>
<tr><td>Severity/Intensity</td><td>Low</td><td>High</td></tr>
<tr><td>Duration</td><td>Medium term</td><td>Medium-term</td></tr>
<tr><td>Extent</td><td>Local-Regional</td><td>Local-Regional</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>High</td></tr>
<tr><td>Probability</td><td>Likely</td><td>Likely</td></tr>
<tr><td>Significance</td><td>Medium</td><td>High</td></tr>
<tr><td>Status</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>Closure</td><td>Manage as per SLP requirements</td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

Confidence	High	High
Nature of Cumulative impact	Opportunity to improve economic mobility and skills levels in the area	
Degree to which impact can be reversed	N/A	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be enhanced	Low	

Creation of training and skills development opportunities

	Without Mitigation	**Assuming Enhancement**
Severity / Intensity	Low	High
Duration	Medium term	Medium-term

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

Extent	Local-Regional	Local-Regional	
Consequence	Medium	High	
Probability	Likely	Likely	
Significance	Medium	High	
Status	Positive	Positive	
Confidence	High	High	
Nature of Cumulative impact	Improved pool of skills and experience in the local area		
Degree to which impact can be reversed	N/A		
Degree to which impact may cause irreplaceable loss of resources	N/A		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

Creation of business opportunities

	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	Low	High
Duration	Medium term	Medium-term
Extent	Local-Regional	Local-Regional
Consequence	Medium	High
Probability	Likely	Likely
Significance	Medium	High
Status	Positive	Positive
Confidence	High	High
Nature of Cumulative impact		Opportunity to create opportunities for local business to

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
				expand and for new businesses to become established.		
			Degree to which impact can be reversed	N/A		
			Degree to which impact may cause irreplaceable loss of resources	N/A		
			Degree to which impact can be enhanced	Low		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		See nested table below		

Revitalise Koingnaas and Kleinzee

	Without Mitigation	Assuming Enhancement
Severity/Intensity	High	High
Duration	Medium term	Medium-term
Extent	Local-Regional	Local-Regional
Consequence	High	High
Probability	Likely	Likely
Significance	High	High
Status	Negative	Positive
Confidence	High	High
Nature of Cumulative impact		Negative cumulative impact linked to deterioration of

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td>

	towns resulting in dysfunctional, run-down towns. Positive cumulative impact linked to functional, operating towns that generate income or local authorities.
Degree to which impact can be reversed	N/A
Degree to which impact may cause irreplaceable loss of resources	N/A
Degree to which impact can be enhanced	High

</td><td></td><td></td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		4. Support for community initiatives		

Support for community initiatives

	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	Low	High
Duration	Medium term	Medium-term
Extent	Local	Local-Regional
Consequence	Medium	High
Probability	Likely	Likely
Significance	Medium	High
Status	Positive	Positive
Confidence	High	High
Nature of Cumulative impact	Positive cumulative impact linked to up-liftment of local	

<table>
<tr><th>ACTIVITIES</th><th>IMPACTS AND ASPECTS</th><th>SIGNIFICANCE RATING</th><th>PHASE</th><th>TYPICAL MITIGATION MEASURES</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td>communities and improvement in social welfare.</td><td></td></tr>
<tr><td>Degree to which impact can be reversed</td><td>N/A</td><td></td></tr>
<tr><td>Degree to which impact may cause irreplaceable loss of resources</td><td>N/A</td><td></td></tr>
<tr><td>Degree to which impact can be enhanced</td><td>Low</td><td></td></tr>
</table>
5. Risk posed by workers to local community closure and decommissioning impacts.
<table>
<tr><td colspan="3">Impact of workers on family structures and social networks</td></tr>
<tr><td></td><td>Without Mitigation</td><td>Assuming Mitigation</td></tr>
<tr><td>Severity</td><td>Low</td><td>Low</td></tr>
<tr><td>Duration</td><td>Medium-</td><td>Medium-term</td></tr>
</table>
</td><td></td><td></td></tr>
</table>

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES
		<table><tr><td></td><td>term</td><td></td></tr><tr><td>**Extent**</td><td>Local</td><td>Local</td></tr><tr><td>**Consequence**</td><td>Low</td><td>Low</td></tr><tr><td>**Probability**</td><td>Unlikely</td><td>Unlikely</td></tr><tr><td>**Significance**</td><td>Low</td><td>Low</td></tr><tr><td>**Status**</td><td>Negative</td><td>Negative</td></tr><tr><td>**Confidence**</td><td>High</td><td>High</td></tr><tr><td colspan="2">**Nature of Cumulative impact**</td><td>Impact on well-being and future opportunities for individuals and their families affected by unplanned pregnancy, and STDs, specifically HIV and or AIDS. Overall cumulative impact on</td></tr></table>		

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING	PHASE	TYPICAL MITIGATION MEASURES

	community as a whole would be negligible.
Degree to which impact can be reversed	Irreversible in case of HIV and or AIDS.
Degree to which impact may cause irreplaceable loss of resources	Low for community as a whole
Degree to which impact can be mitigated	Low

6. Decommissioning Impact

Impact of closure and decommissioning		
	Without Mitigation	**Assuming Mitigation**
Severity	Moderate	Low
Duration	Medium-term	Medium-term
Extent	Local-Regional	Local-Regional

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING			PHASE	TYPICAL MITIGATION MEASURES
		Consequence	Moderate	Moderate		
		Probability	Likely	Unlikely		
		Significance	High	Low		
		Status	Negative	Negative		
		Confidence	High	High		
		Nature of Cumulative impact	Impact on local and regional economy associated with job losses and impact on local suppliers			
		Degree to which impact can be reversed	N/A			
		Degree to which impact may cause irreplaceable loss of resources	N/A			

ACTIVITIES	IMPACTS AND ASPECTS	SIGNIFICANCE RATING		PHASE	TYPICAL MITIGATION MEASURES
		Degree to which impact can be mitigated	High		

j) SUMMARY OF SPECIALIST REPORTS

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

The specialist recommendations are provided in Table (j) 1-1.

Table (j) 1-1: Specialist recommendations

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Soil Study	Mitigation measures will involve:		
	• Restricted footprint as little surface disturbance as possible so that there is minimum disturbance	X	Table (g) (v) 1 - 2: Impact Assessment Table, Activity 7; Table (g) (viii) 1 - 2: Mitigation Measures; EIAr Part K (i), Soils; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 7.
	• Removal and storage of cover soil (>0.5 m, if possible). Soil should be stored for the shortest possible time (<2-3 yrs, if possible) and stored to a height of less than 2-3 metres, if possible before being replaced for rehabilitation.	X	Table (g) (v) 1 - 3: Impact Assessment Table, Activity 7; Table (g) (viii) 1 - 3: Mitigation Measures; EIAr Part K (i), Soils; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 7;
	• Effective re-establishment of natural vegetation (in consultation with vegetation specialists), with appropriate soil conservation n measures during this phase.	X	Table (g) (v) 1 - 4: Impact Assessment Table, Activity 7; Table (g) (viii) 1 - 4: Mitigation Measures; EIAr Part K (i), Soils; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 7.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	• Regular monitoring (at least every 6 months) to check on progress of rehabilitation. • The requirement that any removal of surface vegetation be restricted to as small a footprint as possible.	X X	Table (g) (v) 1 - 5: Impact Assessment Table, Activity 7; Table (g) (viii) 1 - 5: Mitigation Measures; EIAr Part K (i), Soils; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 7; Table (g) 1 - 1: Monitoring plan
	• In addition, due to the wind erosion hazard in this area (sandy topsoils) wind protection measures should be taken wherever possible. Such measures will potentially include windbreaks (either natural vegetation or constructed fencing, netting etc.) perpendicular to the direction of the prevailing wind, and may need to be undertaken with the cooperation of an engineering specialist.	X	Table (g) (v) 1 - 6: Impact Assessment Table, Activity 5; Table (g) (viii) 1 - 6: Mitigation Measures, Surf Zone related Mining Activities, Activity 5. EIAr Part K (i), Biodiversity; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 5.
	• Regular monitoring (approximately every 6 months) should be carried out across all areas of mining activity. This can be done visually, but any signs of soil loss by wind or water, should be reported in order that preventative measures can be taken before any problem becomes worse.	X	Table (g) (v) 1 - 7: Impact Assessment Table, Activity 5; Table (g) (viii) 1 - 7: Mitigation Measures, Surf Zone related Mining Activities, Activity 5. EIAr Part K (i), Biodiversity; EIAr Part K (i), Biodiversity; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 5. Table

LIST OF STUDIES UNDERTAKEN	**RECOMMENDATIONS OF SPECIALIST REPORTS**	**SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT** **(Mark with an X where applicable)**	**REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.**
			(g) 1 - 2: Monitoring plan
	• Within the broader study area, there are ***no specific sensitive areas*** that need to be avoided, in terms of the soils or agricultural potential.	X	Table (g) (v) 1 - 8: Impact Assessment Table, Activity 5; Table (g) (viii) 1 - 8: Mitigation Measures, Surf Zone related Mining Activities, Activity 5. EIAr Part K (i), Biodiversity; EIAr Part K (i), Biodiversity; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Activity 5. Table (g) 1 - 3: Monitoring plan
Hydrology Study	• Maintenance of vehicles should conducted on a clearly demarcated area at the workshop.	X	Table (i) 1 - 2: Impact Assessment Table, Construction phase, Activity 24; EMPr Part B, Section 1.2, Roads; Part K (i), Biodiversity; EIAr Part K (i), Biodiversity; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Mining related activities.
	• Maintenance should be conducted on a concrete slab. Any spillages of oil and grease will be recovered through the oil collector.	X	Table (i) 1 - 3: Impact Assessment Table, Construction phase, Activity 24; EMPr Part B, Section 1.2, Roads; Part K (i), Biodiversity; EIAr Part K (i), Biodiversity; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Mining related activities.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	• Waste should separate on site and disposed of at a registered landfill site. • Chemical Toilets should utilised at remote locations.	X	Table (i) 1 - 4: Impact Assessment Table, Combined Impacts (Land and Shore Based Impacts), Activity 8, Construction phase, Activity 23; EMPr Part B, Section 1.2, Roads; Section 8.1; Table (g) 1 - 4: Monitoring plan;
	• Only Environmentally Friendly material must be used for construction purposes.	X	EIAr Part K (i), Biodiversity.
	• Slime should disposed of in existing voids from historic mining activities.	X	EIAr Part K (i), Biodiversity.
	• Vegetation clearance for establishment of required infrastructure must be managed as minimum as possible.	X	Table (i) 1 - 5: Impact Assessment Table, Combined Impacts (Land and Shore Based Impacts) Activities 4 and 6, Fine Tailings Disposal (Slime) Activity 6, Construction Phase Activities 3 and 4; Table (d) (ix) 1-1: Measure s to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities Activity 6.
	• Clean water from the clean water catchment area should be allowed to freely flow back to the receiving environment. Ocean	X	Table (i) 1 - 6: Impact Assessment Table,

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	water will be abstracted for re-use at the plant.		Construction Phase Activities 30 and 31.
	Sediment Transport		
	• The side slopes of the Tailings Dams must not exceed 1:3 (vertical: horizontal) in order to reduce flow velocity on the side slopes.	X	Table (i) 1 - 7: Impact Assessment Table, Construction Phase Activity 32; EMPr Section1,2 Overburden Dumps; EIAr Part P (ii),Fine Residue (Tailings) Dams (FRD’s).
	• A maintenance schedule must be produced for maintenance of roads in order to prevent and manage sediment transport.	X	Table (i) 1 - 8: Impact Assessment Table, Construction Phase Activity 32; EMPr Section1,2 Overburden Dumps; EIAr Part P (ii),Fine Residue (Tailings) Dams (FRD’s).
Geohydrology Study	• The investigation provided a preliminary understanding of the groundwater situation at the site. The recommendations seek to ensure the mine complies with the relevant government legislation, particularly the National Water Act of 1998. To this end, the following recommendations are made:		
	• Site and drill at least five exploratory boreholes in the strip of land along the coast, extending 500 metres inland	X	EIAr Part K (iii), Impact on groundwater quality, Part P (i) Water Resources, Table (g) 1 - 5: Monitoring plan, Source Activity Return water dams and slimes dams and water abstraction
	• Siting of the boreholes should employ geophysical survey		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	techniques to increase the chances of locating geological structures that influence groundwater flow such as faults, fracture zones and dykes. Electromagnetic (EM), magnetic, and electro-seismic techniques are recommended in this regards. Table 11.1 of the gehydrological report, provides guidance on approximate positionjs of the geophysical survey lines.		points.
	• Place some of the boreholes down-stream of the slime dams so that they can also function as monitoring boreholes, should potable groundwater be found.	X	EIAr Part K (iii), Impact on groundwater quality, Part P (i) Water Resources, Table (g) 1 - 6: Monitoring plan, Source Activity Return water dams and slimes dams and water abstraction points.
	• Electrical conductivity of all water strikes should closely be monitored to identify possible pockets of fresh water.	X	EIAr Part K (iii), Impact on groundwater quality, Part P (ii) Impact on Groundwater Quality; Figure (g) (iv) (a) 6 - 10; Figure (g) (iv) (a) 6 - 12; Table (i) 1 - 9: Impact Assessment Table, Operational Phase, Land Based Impacts.
	• Water quality parameters to be analysed for should include but not limited to the following: pH, EC, TDS, Ca, Mg, Na, K, Fe, Mn, Cu, Pb, Zn, Cd, Cr, CL, SO4, F, NO3, PO4, CO3, and HCO3.	X	EMPr Section 10, Groundwater; Table (g) 1 - 7: Monitoring plan, Source Activity Return water dams and slimes dams and water abstraction points.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	Sampling should be carried out quarterly. • All waste containment facilities must be lined with impermeable or low permeability material. Common lining materials include clay, concrete and HDPE liners; the latter two being expensive.	X	Table (i) 1 - 10: Impact Assessment Table, Rehabilitation Phase, Land Based Impacts Activity 55; EMPr Section10, Groundwater.
	Location of infrastructure General Notice 704 (GN704) of 1999, regulations on use of water for mining and related activities aimed at the protection of water resources. Specifically related to this proposed project the following restrictions are applicable in terms of GN704 Activity 4: No person in control of mine or activity may: • 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 meters from watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or	X	EIAr Part P (ii) Location of infrastructure;

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	on waterlogged ground, or on ground likely to become water-logged, undermined, unstable or cracked;	X	EIAr Part P (ii) Location of infrastructure;
	• Except in relation to a matter contemplated in regulation 10, carry on any underground or opencast mining, prospecting or any other operation or activity under or within 1:50 year flood line or within a horizontal distance of 100 meters from any watercourse or estuary, whichever is the greatest;	X	EIAr Part P (ii) Location of infrastructure;
	• Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; or	X	EIAr Part P (ii) Location of infrastructure;
	• Use any area or locate any sanitary convenience, fuel 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 or estuary.		
	Surface water quality monitoring • The surface water quality monitoring plan must include the	X	EIAr Part P (ii) Surface water quality monitoring;

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	proposed water monitoring points. This plan can be used as a management tool to ensure that potential impacts on surface water resources are managed according to the hierarchy of water and impact management. This tool will ensure that negative impacts are identified at the early stages and that the appropriate action is implemented for the protection of water resources.		EMPr Part G Reporting on Water Quality; EMPr Section 10 Ground Water.
	• Water Management System must be implemented for proper record keeping. This system must be populated with Water Quality Objectives (like RWQO published by the DWS) as well as monthly water quality results.	X	EIAr Part P (ii) Surface water quality monitoring; EMPr Part G Reporting on Water Quality; EMPr Section 10 Ground Water.
	• Water quality monitoring points are recommended on the two surface water resources for the study area. However, it must be noted that due to the dry nature of the study area, it may not be possible to collect water samples unless after significant storm events.	X	EIAr Part P (ii) Surface water quality monitoring; EMPr Part G Reporting on Water Quality; EMPr Section 10 Ground Water.
	• Additional monitoring points are recommended as follows:	X	EIAr Part P (ii) Surface water quality monitoring; EMPr Part G Reporting on Water Quality; EMPr Section 10 Ground Water.
	• Sea water abstraction points;		EIAr Part P (ii) Surface water quality monitoring; EMPr Part G Reporting on Water Quality; EMPr

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	• Release of sea water for shore bashed activities	X	Section 10 Ground Water.
	• These additional monitoring points will be used as a management tool to identify and manage potential impact on Sea Water Quality from the mining activities. Should there be any significant impact from the mining processes, reasonable measures will be in place.	X	EIAr Part P (ii) Surface water quality monitoring; EMPr Part G Reporting on Water Quality; EMPr Section 10 Ground Water.
WCR dust study	WCR dust plume study The following management conditions/ attenuation measures should apply to limit the generation and impact of wind-blown dust in the considerations of: • General mining activity fall-out dust; and • Sand drift plumes	X	Table (k) 1 - 1: Summary of social impacts during construction phase; EIAr Part K (i), Air Quality and Dust Plumes; EIAr Part P (ii),Fine Residue (Tailings) Dams (FRD's); Table (g) (v) 1 - 9: Impact Assessment Table, Fine Tailings Disposal (Slime), Surf Zone Related Mining Activities, Activities 5 and 8. Surf Zone Related Impacts, Activity 2, Mining related activities. EMPr Section 11 Visual, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Fine Tailings

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	General mining activity fall-out dust Attenuating fall-out dust relates to all mining and site development activities and relies on pre-establishment consideration of dust risk in terms of location relative to downwind uses, planned disturbance of vegetation exposing the surface to wind generated dust, trafficking of roads and manoeuvring areas where soils are pulverised to significantly increase dust generation potential and to processing activities which may be related to the specific project and present as high dust generating sources. Implementation of the following dust attenuation methods are to be considered. a) Minimising disturbed areas. b) Avoidance of dumping with exposed surfaces as opposed to alternative dumping in existing nearby excavations. c) Planned dust attenuation:	X	Disposal (Slimes), Surf Zone Related Mining Activities Activity 8, Mining Related Activities, EMPr Part F (i) Financial Provision. Table (g) 1-8: Monitoring plan, Source Activity, Natural revegetated areas; EMPr Part R, Closure related risks.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	i. Watercart or sprinkler wetting of heavily trafficked roads and manoeuvring areas. ii. Considering dust generation by especially in-fiend screening plants in the choice of wet or dry screening. iii. For dry screening plants planning the dust control systems of sprays, covering of conveyors and transfer points etc. iv. Planning rounding, top soiling and revegetation of unavoidable dumps. v. Planning/ scheduling top soiling and revegetation of all areas to be disturbed Planned new slime dam fall-out dust plume attenuation Apply the following dust attenuation considerations in planning of new slime dams. • Limiting the surface area of the dams (within the considerations of slime dam design) and plan them as deep as possible to reduce their surface area and especially any area (such as	X	Table (k) 1 - 2: Summary of social impacts during construction phase; EIAr Part K (i), Air Quality and Dust Plumes; EIAr Part P (ii),Fine Residue (Tailings) Dams (FRD's); Table (g) (v) 1 - 10: Impact Assessment Table, Fine Tailings Disposal

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	shallows) which, during operation will periodically or seasonally dry presenting as a major dust source. • Giving preference to locating in existing excavations or deep valleys between dumps to avoid or minimise walls which can present as dust sources and to also restrict the lateral extent of the dams. Such location will also ensure proximity of overburden cover material in the post drying rehabilitation of the surface. • Ensuring that if walls are required, material with the highest possible clay content is used in such walls to limit dust generation by the walls during and after operation. • Ensuring that, under no circumstances, natural, low depressions nor deflation pans be used as slime dams (as has occurred elsewhere) as their shallow perimeters, broad lateral extents and exposure to high winds result in significant plume generation both during low water levels in operation and following drying on abandonment. • Slime dams should never be located upwind of sensitive built or		(Slime),EMPr Section 11 Visual, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Fine Tailings Disposal (Slimes); EIAr Part K (iii) Impact on groundwater quality, Sand Movement, Table (k) 1 - 3: Risk of Infrastructure; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Fine Tailings Disposal (Slimes); EMPr Section 1.2 Fine residue dams;

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	natural receiving environments, given the high dust risks associated with them. Attenuation of existing slime dam dust generation (Koingnaas and Mitchell's Bay slime dams). Apply the 3-pronged holistic approach to dust plume attenuation to consist of: *" · stabilization of sources* *· cut-off system for dust removal from the mobile dust columns; and* *· stabilization of dust impacted areas to facilitate recuperation of remnant vegetation"* or Introduction of pioneer seeding. In practise: i. Slope and then armour the walls in coarse tailings. ii. Armour the high level dust plume areas (dune-seas), which	X	Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Fine Tailings Disposal (Slimes)

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	now serve as dust sources in the plume. iii. Apply a system of netting dust traps as per the generic method in Diagram 5. iv. Armour the slime dam surface once dried sufficiently to permit equipment movement on it, without the risk of liquification by equipment vibration. v. Apply seeding programmes to the moderate plume areas, both where armoured and where natural vegetation requires assistance. vi. Allow the treated areas to accumulate in-blown seed and revegetate naturally in the long-term.		
	Attenuation of dust plumes generated by littoral zone Beach and Coffer Dam mining The risk of plume development by beach/ coffer dam mining relates primarily to either on-shore coastal orientations or half-heart bays. In most cases such plume development will not be new since the proposed areas of beach and coffer dam mining already support	X	Table R-RI Summary: Identified Risks Summary, Risk Source, Risks emanating from the natural semi-desert ambient environment WCR.

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	natural and mining generated plumes. It is expected that there would be an increased littoral drift sand caused by beach and coffer dam littoral zone disturbances, which migrates to on-shore beaches and half-heart bays is potential for adding to the existing system and therefore requires focussing on attenuation of existing plumes to accommodate the increase which is likely given future mining. Fortunately, the plume sources are fairly well defined by coast-line form and allow the following intervention to reduce risk of increased plume generation: a) When scheduling a planned beach and coffer dam mining operation: Assess the coastal form in terms of littoral drift towards on-shore orientated beaches and half-heart bays and use existing plume development on the coastline to indicate where increased plume feed can result from the proposed littoral zone mining project. b) Within the model described in Diagram 5, consider the wind-path		

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	in relation to the coastal characteristic and define: • The source areas. • The plume root zone for cut-off netting intervention. • A suitable traverse for plume toe intersection as a planned toe cut-off netting system. Based on such understanding of the expected plume, design a comprehensive plume management project for the site and schedule equipment availability for removal of accumulated sand from the netting traps. Monitoring of fall-out dust will be required.		
Aquaculture Study	Develop the mine plan to ensure that mining proceeds systematically and efficiently from one end of the target area to the next, and that the target area is mined to completion in as short a time as possible (Pulfrich, 2015);	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.
	Abalone ranching: Coordinate this systematic mining plan to facilitate abalone ranching operations, aiming to minimise areas of operation to	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment

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	allow seed to harvest grow out and rotation of areas. This is not ideal but by synergising between mining and ranching operations, appropriate compromise is possible;		affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.
	2. To allow impacted communities to recover to a condition where they are functionally equivalent to the original condition, the beaches should not be re-mined for at least five years, if at all. Efficient, high intensity mining methods are thus preferable to repeated operations (Pulfrich, 2015); Abalone seeding and harvesting in mined areas will not be possible until recovery of the mined area has been achieved – conceivably this will take at least five years (as proposed by Pulfrich, 2015). At this stage the abalone ranching right will be near to or completed and the opportunity to test the feasibility of abalone ranching lost. This opportunity will not be lost in areas where mining will not occur but under the current scenario, the mining operator would need access to all proposed mining areas. Further, the abalone ranching right in Zone 4 was premised on the basis that the whole area would be available for the selection of abalone seeding and trial grow-out for the	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.

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	duration of the abalone harvesting right. There would seem few alternatives if abalone ranching cannot be accommodated in a systematic way within a plan that incorporates both mining and abalone ranching options.		
	3. Initiate restoration and rehabilitation as soon as mining is complete in an area. This should involve removal (and re-use) of as much of the rock armour off the berms as possible, levelling of seawalls above the low water mark to facilitate more rapid natural erosion by the sea, back-filling excavations using seawall material, tailings and discards and restoring the beach profile to that resembling the pre-mining situation (Pulfrich, 2015) Abalone ranching: This will have no material benefits or mitigate impacts on abalone ranching except if abalone ranching were delayed until the mining has been completed and impacted areas rehabilitated.	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.
	4. Berms should be designed in such a way that they will erode naturally as rapidly as possible as soon as active maintenance ceases. Once mining has been completed in an area, as much of the	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment

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	berms as possible should be actively removed, leaving only those portions below the low water mark to be eroded naturally. Abalone ranching: This will have no material benefits or mitigate impacts on abalone ranching except if abalone ranching were delayed until the mining has been completed and impacted areas rehabilitated.		affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.
	5. Abalone Ranching: Develop a comprehensive security and access plan to facilitate abalone ranching for land-based access to potential seeding and abalone harvesting areas. This plan should be pro-active and responsive to environmental conditions and windows of opportunity to facilitate optimal operational needs of the abalone ranching whether it be land or sea-based.	X	EIAr, Part K (iii), Aquaculture study; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities, Activity 3.
Biodiversity studies	• Minimise the development footprint, especially with regards to roads which should be planned in a more systematic manner.	X	EIAr, Part K (i), Biodiversity; Table (g) 1 - 9: Monitoring plan, Source Activity, Biodiversity monitoring should be undertaken.
	• An integrated monitoring plan should be developed for the site	X	EIAr, Part K (i), Biodiversity; Table (g) 1 - 10: Monitoring plan, Source Activity, Biodiversity

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	which includes key faunal and ecological indicators.	X	monitoring should be undertaken. EIAr, Part K (i), Biodiversity; Table (g) 1 - 11: Monitoring plan, Source Activity, Biodiversity monitoring should be undertaken.
Noise study	- Noise monitoring	X	Table (g) (v) 1 - 11: Impact Assessment Table, Surf Zone Related Impacts, Activity 8, Mining related activities, Construction Phase, Activity 8; EIAr, Part K (i), Noise Study. Table R - RI Summary: Identified Risks Summary, Risk Source, Mining disturbance earthworks; Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Impacts, Activity 8.
Marine study	- Develop the mine plan to ensure that mining proceeds systematically and efficiently from one end of the target area to the next, and that the target area is mined to completion in as short a	X	Table (g) (v) 1 - 12: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix)

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	time as possible.		1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities
	• To allow impacted communities to recover to a condition where they are functionally equivalent to the original condition, the beaches should not be re-mined for at least five years, if at all. Efficient, high intensity mining methods are thus preferable to repeated operations.	X	Table (g) (v) 1 - 13: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities
	• To prevent degradation of the sensitive high-shore beach areas, all activities must be managed according to a strictly enforced Environmental Management Plan. High safety standards and good house-keeping must form an integral part of any operations on the shore from start-up, including, but not limited to: – drip trays and bunding under all vehicles and equipment on the shore where losses are likely to occur; – no vehicle maintenance or refuelling on shore; – accidental diesel and hydrocarbon spills to be cleaned up accordingly; and	X	Table (g) (v) 1 - 14: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities

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	– Collect and dispose polluted soil at appropriate bio-remediation sites.		
	• To avoid unnecessary disturbance of communities and destruction of habitats, heavy vehicle traffic in the high- and mid-shore must be limited to the minimum required, and must be restricted to clearly demarcated access routes and operational areas only. The operational footprint of the mining site should be minimised as far as practicable.	X	Table (g) (v) 1 - 15: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities
	• Initiate rehabilitation as soon as mining is complete in an area. This should involve removal (and re-use) of as much of the rock armour off the berms as possible, levelling of seawalls above the low water mark to facilitate more rapid natural erosion by the sea, back-filling excavations using seawall material, tailings and discards and restoring the beach profile to that resembling the pre-mining situation. No accumulations of tailings should be left above the high water mark.	X	Table (g) (v) 1 - 16: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities

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	• Berms should be designed in such a way that they will erode naturally as rapidly as possible as soon as active maintenance ceases. Once mining has been completed in an area, as much of the berms as possible should be actively removed, leaving only those portions below the low water mark to be eroded naturally.	X	Table (g) (v) 1 - 17: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities; EIAr, Part G (vii) General Design Alternatives and The 68/69 design.
	• On cessation of operations, all mining equipment, artificial constructions or beach modifications created during mining must be removed from above and within the intertidal zone.	X	Table (g) (v) 1 - 18: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities;
	• To quantify the full impact of the mining using berms on the beaches in the mining and prospecting licence areas, it is recommended that a structured Before-After/Control-Impact (BACI) monitoring programme be implemented. The experimental design and details of this programme should be compiled in collaboration with the DEA: Oceans & Coasts.	X	Table (g) (v) 1 - 19: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity,

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			Surf Zone Related Mining Activities;
	• Monitoring should commence before mining starts, be undertaken for at least as long as mining remains in operation, and thereafter to determine the rate of recovery. Monitoring should continue until communities in the impacted areas show evidence of having recovered to within 80% of levels at suitable ‘reference’ sites (bioequivalence tests) over a minimum of at least three successive years. However, following each survey the status of the beach should be re-assessed and the sampling programme revised to reflect both changes in the impacted communities as well as changes to the mining plan(s). The requirements for a monitoring programme and the proposed methodology are presented in Appendix I.	X	Table (g) (v) 1 - 20: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity, Surf Zone Related Mining Activities;
	• In the case of diver-assisted shore-based mining operations, the following mitigation measures should be implemented: – No disposal of tailings above the high water mark; – Avoid re-mining of sites in the medium term; – Prohibit blasting and large-scale removal of rocks from	X	Table (g) (v) 1 - 21: Impact Assessment Table, Surf Zone Related Mining Activities, Table (d) (ix) 1-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity,

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	subtidal gullies into the intertidal; – Designate and actively manage specific access, storage and operations areas; – Remove all equipment on completion of activities; and – Flatten all remaining tailings heaps on completion of operations.		Surf Zone Related Mining Activities;

Attach copies of Specialist Reports as appendices

k. Environmental impact statement

i. Summary of the key findings of the environmental impact assessment

Marine

The biota of nearshore marine habitats on the West Coast is relatively robust, being naturally adapted to an extremely dynamic environment where biophysical disturbances are commonplace. The benthic communities within this region are largely ubiquitous, particular only to substrate type (i.e. hard vs. soft bottom), exposure to wave action, or water depth. Habitats specific to the study area include:

- Sandy intertidal and subtidal substrates,
- Intertidal rocky shores and subtidal reefs, and
- The water body.

The biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability - even at small scales. No rare or endangered species have been recorded.

‘No-take’ MPAs offering protection of the Namaqua biozones are currently absent northwards from Cape Columbine. Rocky shore and sandy beach habitats are generally not particularly sensitive to disturbance and natural recovery occurs within 2-5 years. However, much of the Namaqualand coastline has been subjected to decades of disturbance by shore-based diamond mining operations. These cumulative impacts and the lack of biodiversity protection have resulted in most of the coastal habitat types in Namaqualand being assigned a threat status of ‘critically endangered’. Of those, ‘critically endangered’ Namaqua Sandy Inshore and Namaqua Sandy Rocky Coast occur in the concession but not the mining target areas, and ‘endangered’ Namaqua Mixed Shore occurs within the mining target areas.

Sediment mobilisation and redistribution

The overburden sands placed on the shoreline to achieve accretion are understood that it will be reworked into the near shore zone by wave action until the long-term equilibrium profile of the new beach is reached. The addition of sediments will result in the steepening of the beach profile, which in turn will lead to increased erosion of sediments by wave action. Some sediments will be carried offshore by undertow and rip currents and deposited beyond the surf-zone, to be returned shoreward again in calm conditions. However, it has been considered that this impact will be ameliorated by the fact that eroded sediments would be rapidly redistributed alongshore by wave-driven currents, initially leaking southwards out of Mitchell’s Bay and ultimately extending seawards on the seabed beyond the mouth of the bay (WSP 2015).

Impact on high order consumers

The movement of sediments results to inundation of reefs by sand, and corresponding responses by the benthic faunal and floral communities presented in Section d (iv) 1.12. Due to recovery over the short-term of the invertebrate communities that serve as a food source for higher-order consumers, the potential impacts are considered to be of low intensity and are thus considered to be of low significance both without and with mitigation. It is however borne at the forefront of planning that although recovery of invertebrate macro faunal communities following disturbance of beach habitats generally occurs within 3 – 5 years after cessation of the disturbance, the species inhabiting beaches are all important components of the sandy-beach food chain.

The Beach accretion will potentially cause impacts associated with loss of oxygen in the sediments.

The high wave exposure in combination with the comparatively coarse nature of the beach sediments (D50 = ~270 µm; WSP 2015) in the project area make it highly unlikely that hypoxic conditions will develop as a consequence of the shoreline accretion. Furthermore, the dune sands to be used for shoreline accretion will likely have a low organic content and this low rate of oxygen depletion.

The impact of hypoxic conditions on site where berm construction is envisaged is reduced by the coarse sediment which will ensure penetrability and this high flushing rates.

The effect of creating mixed shore beaches due to movement of material inland into the beaches is a considered fact and off-sets are under consideration and commitment are made to relinquish parts of sea concession 8a and sea concession 9a held under the current mining rights held by WCR. These portions of right would be included in the Marine Protected Areas Section d (iv) 1.20. Should there be any potential to support the endangered status of the Namaqua Mixed Shore habitat though the mining process, such strategies will be considered in the mining process and as such WCR is forming strategic alliances through various engagement with key stakeholders. The main intention is to also contribute towards research and in the management of the disturbed habitats and hence the contribution through relinquishment of some the 8a and 9a mining rights.

Biodiversity

Although large parts of the current mining activities are within previously disturbed areas, significant impact on fauna and ecological processes is still likely to occur if the appropriate mitigation and avoidance measures are not implemented. Historic mining activities at the site took place in a very haphazard manner and the footprint of mining activities can be significantly reduced through better planning and coordination. There are many soil dumps at the site which should have been used to fill existing mining voids rather than impact on additional intact areas. There are a variety of listed and local endemic fauna species present in the area and the extensive mining-related disturbance in the area threatens habitat availability and connectivity for such species. A monitoring plan including key faunal and ecosystem indicators should be developed for the site, especially to monitor the potential impacts of the beach mining and related activities at Mitchell's Bay which may affect sand movement in the area and change input levels from the marine into the terrestrial environment.

Soils

The general agricultural potential rating is low, which agrees with the land capability rating of Class vii.

The overall impacts on the soils of the area are expected to be moderate to low due to the current land use as well as the fact that the survey area does not constitute an area of high agricultural potential. The impacts of previous mining activities on the soil will, however, require that adequate mitigation and management measures to be put in place.

There is as such no reason why the proposed activity should not be authorized, in terms of the soils occurring or their associated agricultural potential.

Socio-economic

The key social issues associated with the operational phase include:

Potential positive impacts

- Creation of employment opportunities;
- Creation of skills development and training opportunities;
- Creation of business opportunities;
- Creation of opportunities to revitalise Koingnaas and Kleinzee;
- Support for local community initiatives and developments.

Employment

The current operations employ ~ 100 permanent staff, of which 93 (93%) are historically disadvantaged individuals (HDIs). In terms of employees from the local area, 93 (93%) of the total workforce comes from local towns in the area. All of these workers are HDIs.

At full production the total workforce will number 250-300. As in the case of the current breakdown, more than 90% of this workforce will be HDIs. The proposed mining development will therefore create significant employment opportunities for HDIs. Although the employment opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the local economy in the KLM and NKLM.

The total annual wage bill associated with the current operations which employs ~ 100 staff is R 31 million (2016 rand values). The annual total wage bill associated with a workforce of between 250 and 300 will be in the region of R 90 million (2016 rand values). The total wage bill (excluding annual increases) over the 10 to 15 life of mine would therefore be in the region of R 900 million to R 1.35 billion (2016 rand values).

As indicated above, 93% of the current employees are HDIs and live in local towns in the study area. These figures are also likely to apply to the full production workforce of 250-300. A significant portion of the annual wage bill is and will be earned by HD members from the area and will be spent in local towns in the area. The injection of wage income over the 10 and 15 year life of mine (R 900 million to R 1.35 billion) will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

Training and skills development

86 out of the current total of 100 current employees have undergone some form of training and skills development within the first 12 months of being employed. All of the recipients are HDIs. Similar on-going training and skills development opportunities will be provided for the additional workers employed when full production is achieved (250-300). As is currently the case, the majority of the beneficiaries will be HDIs from local communities in the NKLM and KLM. The proposed mining development will therefore create significant training and skills development opportunities for HDIs. Although these opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the workers and will increase their chances of finding alternative employment when the mining operations stop.

Creation of business opportunities

The creation of business opportunities will be linked to capital expenditure and procurement expenditure by WRC and wage spend by employees in the local economy.

WRCs capital expenditure associated with start-up activities amounts to ~ R 26 million (2016 rand values) for the first year of operations. The capital expenditure for the remaining 10 -15 years life of mine is estimated to be region of R 128 million (2016 rand values). This expenditure creates business opportunities for local companies involved in the mining sector.

In addition to capital expenditure WCR outsource a number of their operations to mining, service and security contractors etc. The total expenditure by WCR for period 2015/16 was therefore in the region of R 55 million (2016 rand values). This, like the annual wage bill, will increase when mining operations move into full production and will create opportunities for local businesses in the NKLM and KLM. WCRs are committed to the implementation of a preferential procurement plan as per the requirements set out in the Social Labour Plan (April 2015).

In addition to the business opportunities associated with the mining related expenditure a percentage of the annual wage bill (R90 million at full employment) will be spent in the towns where the workers live. As indicated above the total wage bill over the 10-15 life of mine will be in the region of R 900 million to R 1.34 billion. The local spend of a percentage of this wage income will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

Creation of opportunities to revitalise Koingnaas and Kleinzee

Given the limited economic opportunities in the area the mining operations proposed by WRCs provide an opportunity to act as catalyst to revitalise the towns of Koingnaas and Kleinzee. In this regard the presence of WCRs employees in these towns will create demand for services, such as doctors, pharmacists, etc. and facilities, such as supermarkets, sports facilities and restaurants. Friends and family members of WCR employees will also visit the towns, thereby increasing the demand for services and facilities and also increasing the exposure of these towns to the public.

In the absence of the potential opportunities created by the proposed mining there is a very real risk that the towns of Koingnaas and Kleinzee would deteriorate and become dysfunctional, run-down towns. If this happens it will pose a financial burden on the NKLM and KLM.

Support for community initiatives

In discussions with representatives from the NKLM and KLM WCRs have identified a number of community initiatives to support, including up-grading school facilities and covering salaries for school teachers and the establishment of play parks and internet cafes. A budget of ~ R 10 million has been allocated to supporting community initiatives over the next five years.

However, based on the feedback from the local community one of the key challenges facing the communities in Hondeklip Bay and Soebatsfontein was access to affordable public transport. There is no bus service that services the local small towns in the area and transport costs associated with travelling to towns such as Springbok, Garies and Kamieskroon are high. One the key costs that local parents are faced is the cost of transporting children to the high school in Garies. Due to the high transport costs a number of families cannot afford to send their children to high school. As a result they do not complete school and this places them at a disadvantage in later life. The other issue identified by representatives from Hondeklip Bay was the lack of sports facilities for the youth. The only sport facility is the rugby field, which has not ablution facilities or change rooms. The cost associated with hiring transport for away games was also raised as an issue.

Potential negative impacts

- Risks to local communities posed by workers;
- Risk to abalone and crayfish operations;
- Noise, dust and safety impacts associated with mining related activities and the movement of heavy vehicles.

The significance of the potential negative impacts with mitigation was assessed to be of Low Negative significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

Table (k) 1 – 1 summarises the significance of the impacts associated with the mine activities.

Table (k) 1 - 4: Summary of social impacts during construction phase

Impact	**Significance** **No Mitigation**	**Significance** **With Enhancement/Mitigation**
Creation of employment opportunities	Medium (Positive impact)	High (Positive impact)
Creation of training and skills development opportunities	Medium (Positive impact)	High (Positive impact)
Creation of business opportunities	Medium (Positive impact)	High (Positive impact)
Revitalisation of Koingnaas and Kleinzee	High[1] (Negative impact)	High (Positive impact)
Support for community initiatives	High	High
Risk to local communities posed by workers	Low (Negative impact)	Low (Negative impact)
Dust, noise and safety impacts associated with mining related activities	Low (Negative impact)	Low (Negative impact)

The findings of the SIA indicate that the Koingnaas-Samsons Bak mining project will create a number of positive social and economic opportunities for the local community and the area as a whole. The majority of the employment opportunities are likely to benefit HD members from the community. The findings of the SIA also indicate that all of the potential negative impacts can be effectively mitigated. It is therefore recommended that the proposed Koingnaas-Samsons Bak be supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the SIA report.

Air quality and Dust plumes

The sand plumes were mapped from Google Earth™ imagery of 2014 (most consistent image by comparison to 2016) captured at between 1:2000 and 1:5000 scale and the site visit of 6 - 7 July 2016 verified the sand plume levels (intensity) within the respective categories of high, medium and low (as generally shown under Air quality section in Section g), Figure g (iv) 7-1 and indicated in detail in Figures (k) 1-1, (k) 1-2 and (k) 1-3. The dust mapping categorisation is included under Table (k) 1 - 2.

Figure (k) 1-1: WCR Dust study 2016 - Michells Bay

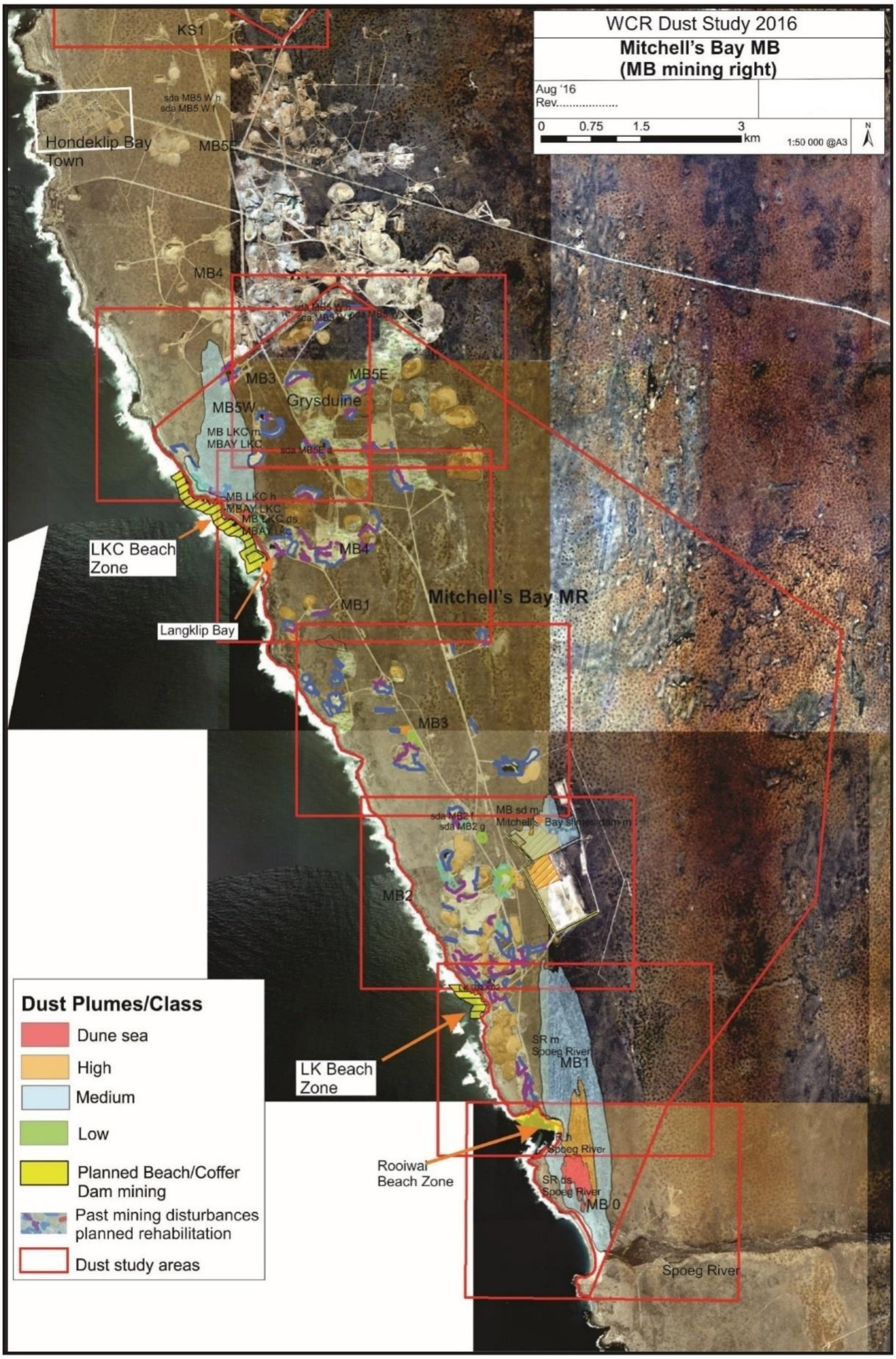

Figure (k) 1-2: WCR Dust study 2016 - Koingnaas

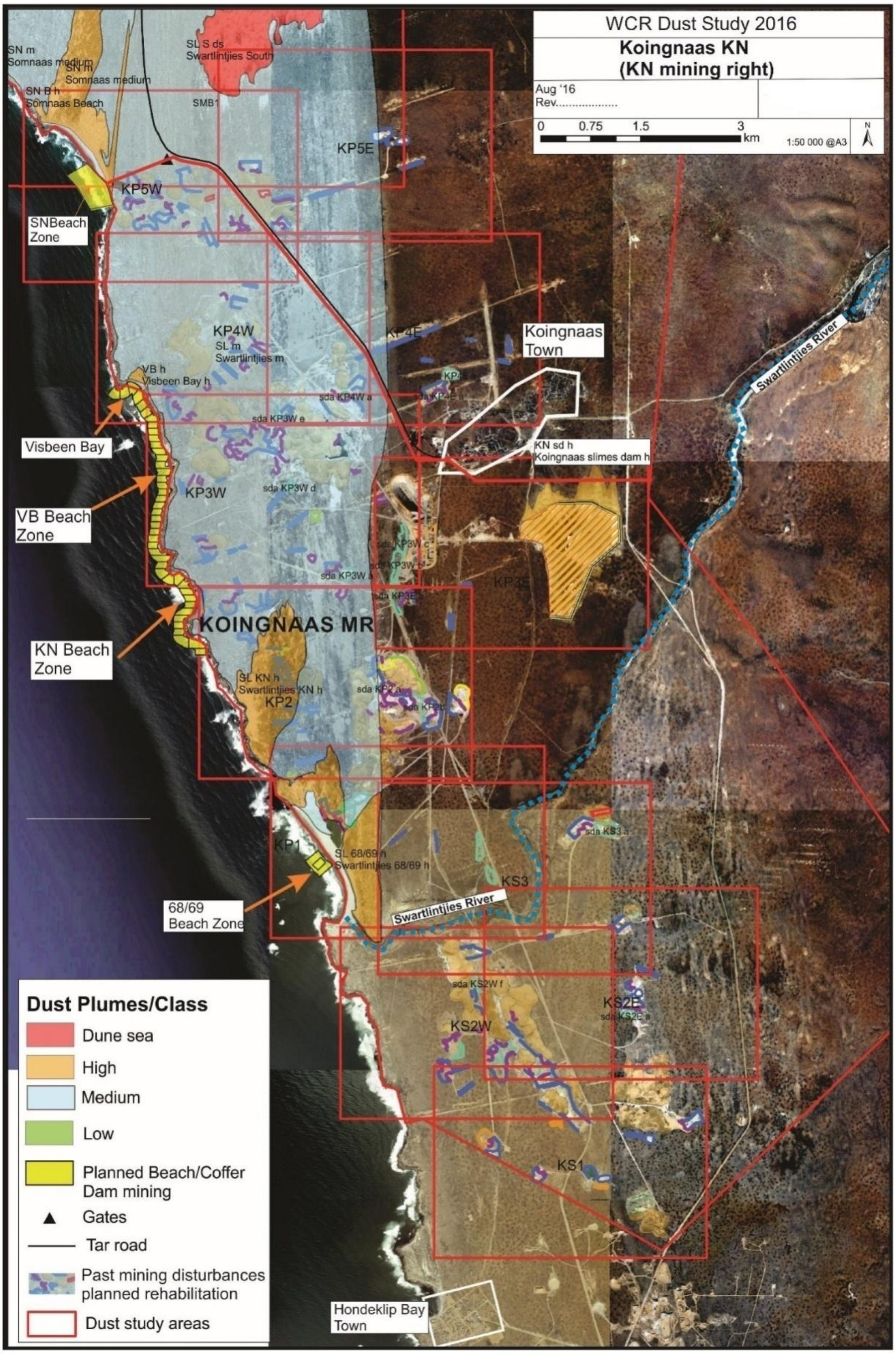

Figure (k) 1-3: WCR Dust study 2016 - Samsonsbak

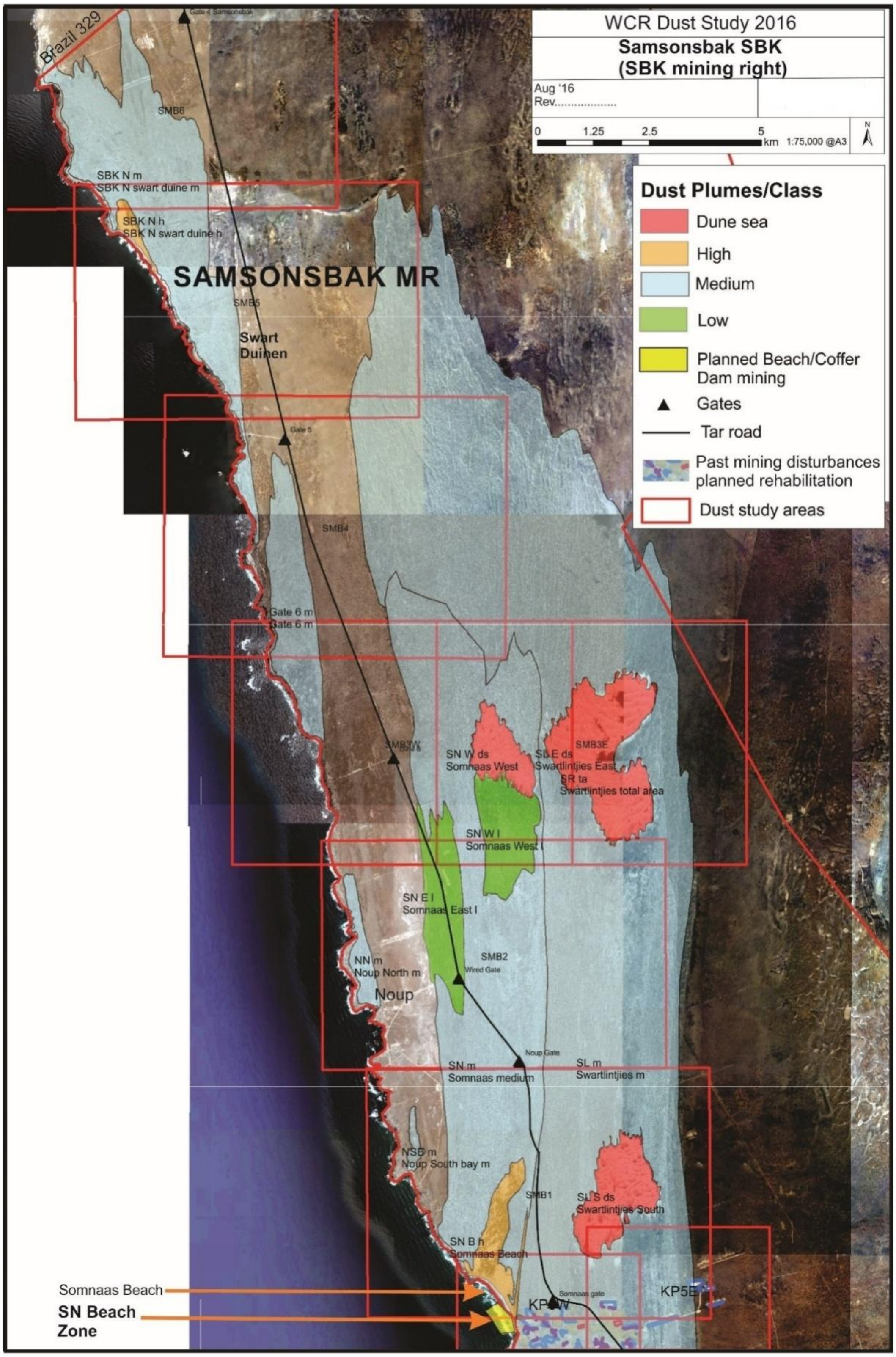

Table (k) 1 - 5: 2016 Plume Mapping and Categorisation

Fid	Shape*	Class	Type	Origin	Plume_Numb	Name	Area
0	Polygon	Total Plume	N/A	N/A	SR ta	Spoeg River total area	288.4
1	Polygon	High	River mouth	Natural	SR h	Spoeg River	39.1
2	Polygon	Dune sea	River mouth	Natural	SR ds	Spoeg River	21.9
3	Polygon	Medium	River mouth	Natural	SR m	Spoeg River	227.4
4	Polygon	Medium	Half heart bay	Mine/natural	LK 02	LK02	0.6
5	Polygon	Dune sea	Onshore coast	Mine/natural	MB LKC ds	MBAY LKC	1.6
6	Polygon	High	Onshore coast	Mine/natural	MB LKC h	MBAY LKC	7.8
7	Polygon	Medium	Onshore coast	Mine/natural	MB LKC m	MBAY LKC	146.1
8	Polygon	Dune sea	N/A	Mine/natural	SL S ds	Swartlintjies South	300.0
9	Polygon	Dune sea	N/A	Mine/natural	SL E ds	Swartlintjies East	571.0
10	Polygon	High	Half heart bay	Mine/natural	SN B h	Somnaas Beach	176.9
11	Polygon	Dune sea	Half heart bay	Mine/natural	SN W ds	Somnaas West	169.0
12	Polygon	Low	Half heart bay	Mine/natural	SN W l	Somnaas West l	284.7
13	Polygon	Medium	Half heart bay	Mine/natural	SN m	Somnaas medium	2767.7
14	Polygon	Low	Half heart bay	Mine/natural	SN E l	Somnaas East l	324.0
15	Polygon	High	Half heart bay	Mine/natural	VB h	Visbeen Bay h	4.6
16	Polygon	High	Onshore coast	Mine/natural	SL 68/69 h	Swartlintjies 68/69 h	141.1

Fid	Shape*	Class	Type	Origin	Plume_Numb	Name	Area
			and river mouth				
17	Polygon	High	Onshore coast and river mouth	Mine/natural	SL KN h	Swartlintjies KN h	147.5
18	Polygon		N/A	N/A	SR ta	Swartlintjies total area	11972.1
19	Polygon	Medium	Onshore coast and river mouth	Mine/natural	SL m	Swartlintjies m	10809.4
20	Polygon	Medium	Half heart bay	Mine/natural	NN m	Noup North m	102.2
21	Polygon	Medium	Half heart bay and onshore coast	Natural	Gate 6 m		

Ground water

Koingnaas is an existing mining area with most infrastructure requirements already in place. Infrastructure at each mine site and processing operation comprising electric power supply, roads, potable, fresh and seawater supplies, fuel supply and storage and workshops, have been established and maintained.

There are no fresh water sources, other than rain water in the region of the selected slime sites.

Due to the mining methods applied on site, No chemicals are used in the beneficiation process as physical processes are implemented.

Existing mining voids in mined out areas were identified in central areas where processing plants would be placed over the life of the operation. The bedrock profiles in each of these areas were checked to ensure that the bedrock slope dipped towards the coast and that the site was within 1 km from the coastline. These attributes ensure that any seepage of seawater associated with the slime would end up back in the ocean.

The identified potential impacts were rated low.

Groundwater characterisation was based on the evaluation of existing boreholes mainly from the National Groundwater Archive (NGA) of the Department of Water and Sanitation (DWS). A total of 27 boreholes were identified in the study area. The two boreholes that supply domestic water to Koingnaas (BH 12 and BH 14) plot at the same positions as boreholes 3017AA00003 and 3017AA00001 in the NGA respectively. The location of the boreholes is Figure (g) (iv)(d)1-3.

ii. Final site map

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attached as Appendix 4.3, please verify)

A final layout plan for the slime dams is shown in Appendix 4.2, 4.2.1, 4.2.2. The original slime layout is also included as Figure (g) (i) 4.1 - 1 to demonstrate the sites that were originally selected and were subsequently eliminated due to the environmentally sensitivity.

An overall site layout plan with all key development sites and activities is provided as Drawing 001 (Appendix 4.3).

iii. Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Impact on groundwater Levels

Of all the mining operations, land mining has the biggest potential to impact on groundwater levels. Theoretically, as soon as mining excavation breaches the water-table, groundwater will flow into the pit thereby necessitating dewatering of the pit to facilitate mining. This in turn will have potential to deplete groundwater resources in the area, as well as trigger seawater intrusion into aquifers adjacent to the mining operations.

The risk of this happening is, however, considered negligible due to the fact that mining operations will be taking place at relatively shallow depth, generally less than 20 metres below surface; thus above the water-table. To date, no potable groundwater has been encountered within the proposed mining area. At the time of the site visit on 22 June 2016, one of the excavations was about 17 metres deep and only seawater was seeping into the pit, Plate 9.1.

Impact on groundwater quality

Potential negative impact on groundwater quality emanating from the mining operations relate to possible contamination of groundwater through leakage from waste containment facilities such as slime dams and rock dumps; and from petroleum products at the workshops. The slime dams contain seawater used during diamond processing.

Available water quality data indicate that the entire area proposed for mining is characterised by highly saline groundwater with electrical conductivity of above 1000 mS/m. This is supported by the fact that there are no water supply boreholes around, and south of Koingnaas. Potable groundwater is currently sourced from the Somnaas Noupaquifer located about 20 kilometres north of Koingnaas.

The natural groundwater quality in the proposed mining area is very poor and is not suitable for basic human needs (BHN). There is no evidence that groundwater contributes to land-based ecological systems in the proposed mining area; in the form of springs, wetlands or river base flow in dry seasons. Contamination from the slime dams, which contain sea-quality type water, will further degrade groundwater quality that is already very poor. Groundwater ultimately discharges into the sea.

Diamond processing relies on the physical properties (mainly density and hardness) of the mineral for extraction, no chemically active substances are added, which may potentially introduce toxins. This means that the process water emerging from the process plant will have been little altered in chemical composition from its original state. The impact of such water discharging back into the sea on the marine ecology is a subject of debate, but logically, should be negligible.

The main conclusion derived from the assessment is that the proposed diamond mining activities will very small negative impact on groundwater resources for reasons listed below:

- Mining excavations will be limited to shallow depths of less than 20 metres below surface, by most probability above the water-table.
- The natural or ambient groundwater quality in the proposed mining area is of very poor quality; hence further degradation through contamination by sea-quality water will not make a big difference.
- Diamond processing relies on the physical properties of the mineral, no active chemicals with potential to introduce toxins are added. This means that the process water emerging from the plant will have been little altered in chemical composition from its original state. The impact of contaminated groundwater discharging into the sea on the marine ecology is currently a subject of debate, but logically, should be negligible.

The study was not exhaustive and definitive as it was based entirely on existing data. No primary data were generated in this study. The presence or absence of potable groundwater in the proposed mining area needs further investigation by way of siting and drilling exploratory boreholes in the 500 metre wide coastal strip of the mining area.

The conclusion is based entirely on the evaluation of existing data coupled with a hydrocensus. No new boreholes were drilled in this investigation.

Aquaculture Study

Mining and abalone ranching are in direct conflict in terms of geographic space usage. Embayments in areas such as Noup, Visbeen, Koingnaas, Somnaas Langklip and Langklip Central, which are target areas for intertidal mining, are also pristine seeding sites proposed for abalone ranching. Furthermore, the ripple effects that mining will have on reducing or eliminating local habitats will further limit options for abalone seeding. The impact on kelp, the availability of which plays a key role in the expansion of the abalone sector also cannot be ignored.

The main marine impacts to the abalone ranching industry associated with the proposed mining activities are related to disturbance and loss of rocky habitats in the mining footprint. From the results of past studies, it is now well established that mining in the intertidal zone of sandy beaches using seawall/coffer dam technology and active beach accretion severely influences the benthic biota of adjacent rocky intertidal and shallow subtidal habitats (Pulfrich, 2016). However, as shoreline accretion and berm construction are an unavoidable consequence of the proposed mining, there can be no direct mitigation for their impacts on the habitat of abalone seeding sites.

Whereas abalone production and spin-off industries present numerous and plentiful opportunities for sustainable income creation, using local human and ecological asset bases, mining is an extractive industry and therefore has a lifespan. Regardless of employment opportunities that mining may afford, cognisance must be taken of the negative impacts the closing down of this sector will have on local economies.

Finalising, the minutes of the meeting between WCR and DCA (Myezo, 2016) refers:

A need for coexistence of economically productive industries is paramount and any connotations that suggest sector superiority, should be avoided. For example, mining might provide more jobs but as resources deplete the sector will reach the end of its life span. Abalone might provide fewer jobs but is a sustainable sector in the long term and should provide long-term, sustainable livelihoods. A steering committee is being set up and its term of reference are being finalised. The DMR and DAFF have to be involved in the harmonisation and streamlining of co-existence of the two sectors. A bilateral agreement is needed and Operation Phakisa already provides for that.

Further, the mining right states that the right holder has a "*liability for payment of compensation to any person/s using or entitled to use the surface of the mining area from any possible damage or injury associated with any activities on the mining area. Should holder fail to take reasonable steps referred to above, and to the extent that there is legal liability, the holder shall compensate such person or persons for any damage or losses, including but not limited to damage to the surface, to any crops or improvements, which such person or persons may suffer as a result of, arising from or in connection with the exercise of his/her rights under this mining right or any act or omission in connection therewith".*

Further, in consideration of the granting of the right to ranch abalone in Zone 4, it is clear the conflict of interest between mining and abalone ranching was not foreseen – pending the outcome of a legal opinion from DAFF, there is clearly a need for DAFF to provide guidance on the options for abalone ranching in areas where impacts from alternate activities might occur (such as mining).

There is only one major operational impact considered – that of access to sites for seeding and harvesting operations. A significant portion of the concession area awarded to DCA is within the proposed WCR diamond mining areas. Access to several seeding sites is controlled by WCR and DCA is required to submit a written request for permission to access these sites several weeks prior to the expected date that access is required. To mitigate this impact the alternative is to seed only from boats so that land-based access would not be required. Both boat and land-based seeding options however have similar constraints, primarily limited weather and sea-condition windows for access (either for seeding or harvesting in the future). Land-based seeding is the preferred option for DCA (Le Roux pers. comm.) primarily because of the logistics of using boats as well as the capital and running costs thereof. Further, land-based seeding is more easily controlled with respect to handling of seed both from a transport perspective and transporting (with divers) to selected settlement areas. Seeding by hand (as done by divers) is the preferred method of seeding as it facilitates site selection for seed on a site by site basis. This method enables careful selection of settlement positions of seed (such as natural crevices and shelters as used by wild-caught populations). Access via boat is technically more challenging as divers must operate from outside the kelp and surf zones to access the selected seed areas. In our discussions with DCA several alternative seeding methods were discussed, such as for example use of enclosed pipes or artificial structures that provide temporary shelter for abalone seed and juveniles – this theoretically allows for a measure of "early stage" protection and migration from these artificial structures over time. DCA (Le Roux pers comm.) stated that these options had been investigated but that no advantage to these methods over the hand seeding of divers was apparent.

Assuming attrition associated with natural mortality, the expected survival of seed from seeding stage to harvesting is expected to be about 20.9% (Le Roux pers comm.) Any increase in factors such as mining-induced sediment plumes, silting and loss of habitat will certainly alter the expected mortality of artificially seeded abalone.

Opportunities and risks posed on local economy

The economy of the Namaqua coast communities depends primarily on employment in mining and on artisanal fishing. Both of these sectors are however declining, with detrimental impacts on local livelihoods (Anchor Environmental, 2012; Pulfrich, 2016). Local government recognises the need for alternative livelihood opportunities in these areas (Republic of South Africa, 2015). Particularly important is the sustainability of such livelihoods and the integration of opportunities with local human and ecological asset bases.

Aquaculture presents a prime opportunity for employment creation along the west coast, as it has the potential to support more jobs than (wild-capture) fisheries do (Britz *et al*., 2000). The natural environment in the area is pristine, and presents ideal conditions for aquaculture. Furthermore, the type of skills required for the development of this sector, such as diving and boatmanship, are already present, as is the availability of labour (Britz *et al*., 2000). The abalone sector presents not only the opportunity for direct employment, but creates opportunities for the development of an entire sector, including other industries such as seaweed and post-harvest value adding (Troell *et al*., 2006).

Abalone farms employ an average of 60 people, at roughly 0.46 – 1.62 employees per ton. The total employment in the industry for 2004 being 1390, with labourers earning an average of $270 per month (Troell *et al*., 2006). Abalone is labour intensive, employing primarily those without high levels of formal education.

Men are primarily employed in ranching operations, but hatcheries and spin-off industries such as seaweed employ more women. The major advantage of aquaculture industries such as abalone over extractive industries such as mining is the sustainability of the sector, both in terms of longevity as well as its negligible ecological impact (Troell *et al*., 2006).

Abalone ranching has the potential to provide 3680 jobs directly, generating R154 million disposable income in the target towns (Britz *et al*., 2000) and is a sector with the potential for long-term sustainability (note this applies to all ranching and not just ranching within Zone 4).

Biodiversity

The area of the Namaqualand coast between Mitchell's Bay in the south and Kleinsee in the north has been poorly explored and documented botanically due to restricted access over many years. However, a limited number of botanical studies have shown that apart from some localized 'special' plant communities, large areas are covered by one or a few types of vegetation. This is true in the study area where the vegetation is mainly Namaqualand Strandveld with limited areas of Namaqualand Coastal Duneveld and Namaqualand Seashore Vegetation. It is contended that there are no botanical fatal flaws for the area investigated but that there are 'red flags'. Certain plant communities and plant species within the general vegetation matrix are sensitive. These plant communities and species are described in the report and it is essential that these are noted and that the recommended mitigation measures are implemented as per the management plan. If this happens satisfactorily the impacts on the vegetation and flora can be reduced from potentially high negative to medium negative and the proposed future mining becomes more acceptable within the described botanical context.

The most striking impression from investigation of the botanical aspects of the study area between Mitchell's Bay and Koingnaas is the dramatic negative impact of mining on the natural environment. Past mining activities were driven by production and paid little heed to the environment. Very little restoration was undertaken, apart from a few areas where netting was implemented to minimize wind-blown sand and to attempt to restore the vegetation. The open-cast diamond mining has left a fragmented landscape in its wake. Lessons must be learnt from the former lack of restoration and the *modus operandi* employed in the past should not be repeated. In addition, areas requiring rehabilitation should still be attended to within the context of the renewed mining activities.

The area north of Koingnaas and particularly at Samson's Bak that is earmarked for future mining, is less disturbed than in the southern areas from Somnaas southwards. Opportunity therefore exists in the areas where future mining is proposed, e.g. at Samson's Bak, to ensure that best environmental practice is observed. Spoil should not be randomly dumped but should only be deposited in approved spoil areas, preferably where there is already disturbance. Loss of undisturbed vegetation and habitat should be avoided wherever possible. Also, wherever possible existing roads should be used and new roads should only be constructed with discretion.

It is important that an environmental officer (ECO) should be appointed to be involved with planning from the outset. Such a person should advise on the alignment of new roads, placement of spoil and general environmental best practice. The ECO should also be responsible for monitoring the status of the habitat in the mining rights area, determination of sensitive habitats, overseeing translocation of important plant species where necessary and should be in charge of rehabilitation / restoration activities.

The cumulative impact of all the existing and planned disturbance is however, likely to be high for some species at least. The major opportunity to reduce this impact would be to improve the condition of habitat within the site, through rehabilitation of disturbed areas. There are many unnecessary roads and unfilled mining voids present at the site and some connectivity within the site can be restored through remedial measures and rehabilitation of these areas.

Risk of failure of infrastructure

Table (k) 1 - 6: Risk of Infrastructure

Infrastructure at risk of failure	Potential cause of failure
Tailings dumps	Steep slope gradients are the most probable cause of failure but this can be exacerbated by excess erosion causing weaknesses in the structure.
Slimes dams	Failure of slime dams can be induced by a combination of one or more of the following mechanisms: • Adverse layering in the tailings material close to the outer wall; • Overtopping of the dam wall.
Return water dams and PCDs	Extreme storm events and a lack of maintenance could cause failure of the walls of return water dams. Any erosion of the walls should be identified during routine inspections.
Process water holding facilities	These structures will be constructed of concrete or other manmade products. They will therefore be less susceptible to erosion but still require maintenance. Failure could be caused by equipment (pump) failure.
Water supply dam	Failure could occur during extreme storm events or due to lack of maintenance. Inclusion of spillways will reduce possible risk of failure.

l. Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPR as well as for inclusion as conditions of authorisation.

Soils

- Restricted footprint: as little surface disturbance as possible so that there is minimum disturbance.
- Removal and storage of cover soil (>0.5 m, if possible). Soil should be stored for the shortest possible time (<2-3 yrs, if possible) and stored to a height of less than 2-3 metres, if possible before being replaced for rehabilitation.
- Effective re-establishment of natural vegetation (in consultation with vegetation specialists), with appropriate soil conservation n measures during this phase.
- Regular monitoring (at least every 6 months) to check on progress of rehabilitation.

Biodiversity

- The requirement that any removal of surface vegetation be restricted to as small a footprint as possible.
- In addition, due to the wind erosion hazard in this area, wind protection measures should be taken wherever possible. Such measures will potentially include windbreaks (either natural vegetation or constructed (fencing, netting etc.) perpendicular to the direction of the prevailing wind, and may need to be undertaken with the cooperation of an engineering specialist.
- Regular monitoring (approximately every 6 months) should be carried out across all areas of mining activity. This can be done visually, but any signs of soil loss by wind or water, should be reported in order that preventative measures can be taken before any problem becomes worse.

Within the broader study area, there are *no specific sensitive areas* that need to be avoided, in terms of the soils or agricultural potential.

Reasonable measures as recommended in the EMPr report must be implemented in order to reduce the impact on surface water resources. In view of the above conclusions, the following recommendations are made:

- Only environmentally friendly materials must be used during the construction phase to minimize pollution;
- Vegetation stripping must be limited to the minimum width required;
- The topography of all disturbed areas must be rehabilitated, in such a manner that it blends with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation;

- Storage of Contaminated Water is deemed a water use and the Department of Water and Sanitation must be consulted for an authorisation prior to the construction phase. Concurrent rehabilitation must be implemented in order to reduce desertification. The general philosophy that WCR has adopted is that any material excavated, moved or processed as part of any new mining or plant activity should be placed in such a way that it is part of the final rehabilitation solution. This will ensure that all operations are aligned with good environmental practice and will reduce the final closure liabilities. Backfilling existing mining voids with slime generated from the processing plants is seen as the most effective and environmentally friendly way of disposing of slime material.
- The final landform of the rehabilitated pits must be sustainable, free draining, minimize erosion and avoid ponding. Where final voids are maintained, these must be properly sloped to ensure a safe landscape.
- The disturbed area and footprint of the mine's operations must be kept as small as possible by mining strips.
- During the operational phase, uncontaminated surface water from the site must be allowed to freely flow to the environment.

Surface water

Monitoring

No flow was observed during field investigations. No water quality samples could be collected. However, as part of the monitoring program, the upstream and downstream monitoring points are recommended. Chemical analysis is the only way to obtain indicative data for potential water quality deterioration. Volume 4 surface water specialist report provides and indication of the suggested monitoring points.

Re-use of water

Water that collects at the RWD can be used at the plant. During significant storm events that result in surplus water, excess water must be pumped to the pollution control dams.

Water balance

The ongoing management and update of water balance is critical. It is important that a review and management programme be developed and implemented in order to actively manage the water systems on the basis of the information provided by the balances.

Socio-economc

- WCRs should seek to increase the number of workers employed from the communities that are in close proximity to the mining area. Likewise, training and skills development opportunities should also be provided for members from these communities to enable them to apply for jobs on the mine;
- The proposed mining operations proposed by WCRs would represent an enhancement measure. However, the potential issues identified by the SIA and other studies undertaken as part of the EIA should be addressed.
- The development approaches as indicated in the social and labour should be applied.
- A meeting should be held with Hondeklip Bay community prior to the commencement of the mining operations and on receipt of the environmental authorisation and discuss matters pertaining to the applicable operational plans. There should be continuous engagement on the envisaged post mining land uses.

Aquaculture

Mining and abalone ranching are in direct conflict in terms of geographic space usage. Embayments in areas such as Noup, Visbeen, Koingnaas, Somnaas Langklip and Langklip Central, which are target areas for intertidal mining, are also pristine seeding sites proposed for abalone ranching. Furthermore, the ripple effects that mining will have on reducing or eliminating local habitats will further limit options for abalone seeding. The impact on kelp, the availability of which plays a key role in the expansion of the abalone sector also cannot be ignored.

The main marine impacts to the abalone ranching industry associated with the proposed mining activities are related to disturbance and loss of rocky habitats in the mining footprint. From the results of past studies, it is now well established that mining in the intertidal zone of sandy beaches using seawall/coffer dam technology and active beach accretion severely influences the benthic biota of adjacent rocky intertidal and shallow subtidal habitats (Pulfrich, 2016). However, as shoreline accretion and berm construction are an unavoidable consequence of the proposed mining, there can be no direct mitigation for their impacts on the habitat of abalone seeding sites.

Whereas abalone production and spin-off industries present numerous and plentiful opportunities for sustainable income creation, using local human and ecological asset bases, mining is an extractive industry and therefore has a lifespan. Regardless of employment opportunities that mining may afford, cognisance must be taken of the negative impacts the closing down of this sector will have on local economies.

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Further, the mining right states that the right holder has a "*liability for payment of compensation to any person/s using or entitled to use the surface of the mining area from any possible damage or injury associated with any activities on the mining area. Should holder fail to take reasonable steps referred to above, and to the extent that there is legal liability, the holder shall compensate such person or persons for any damage or losses, including but not limited to damage to the surface, to any crops or improvements, which such person or persons may suffer as a result of, arising from or in connection with the exercise of his/her rights under this mining right or any act or omission in connection therewith".*

Further, in consideration of the granting of the right to ranch abalone in Zone 4, it is clear the conflict of interest between mining and abalone ranching was not foreseen – pending the outcome of a legal opinion from DAFF, there is clearly a need for DAFF to provide guidance on the options for abalone ranching in areas where impacts from alternate activities might occur (such as mining).

Biodiversity

The key biodiversity objective is the minimization of impacts on natural vegetation namely due to mining on the coastline and immediately inland.

- Only carefully demarcated areas are accessed i.e. areas not directly involved with a mine operation should be avoided.

An environmental officer (ECO) should be appointed to be involved with planning from the outset. Such a person should advise on the alignment of new roads, placement of spoil and general environmental best practice. The ECO should also be responsible for monitoring the status of the habitat in the mining rights area, determination of sensitive habitats, overseeing translocation of important plant species where necessary and should be in charge of rehabilitation.

An on-site environmental control officer should be consulted at each step of the operation i.e. from planning to operation.

- An important objective should be to reduce negative edge effects e.g. no unnecessary tracks or roads should be permitted.
- There should be no random traversing of the natural vegetation off designated mining areas and roads.

- Material for coffer dams should be sourced from existing disturbed sites. No new sites for rock material should be opened.
- Where possible access roads should follow existing roads. If new roads are required they should be planned to take the least damaging routes.
- Stockpile areas should be carefully sited on existing disturbed areas so as not to further damage.
- Any areas that can be utilised after mining must be identified and actively rehabilitated under the direction of a qualified ecologist.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment).

Background to alternatives

Two coastal protection options were previously proposed for the mining at Rooiwal Bay beach accretion with sand; and closure of the bay using a rock berm.

For the first option, the potential fate of the sand is an environmental concern that the coastline adjacent to Rooiwal Bay is rocky and sand that may move out of the bay could negatively affect these rocky habitats. Full closure of the bay with a rock berm is expensive.

West Coast Resources requested WSP to develop an additional coastal protection option involving a Combination of a reduced rock berm, in order to reduce the wave energy inside the bay, and beach accretion with sand. The option/s should reduce the potential “leakage” of sand out of the bay. Any rock berms required should be feasible to construct. High maintenance, or replenishment of rock eroded from the berms, would be acceptable.

Rock Groyne

It is an option to construct a rock groyne from the southern shore of the bay see layout in Figure (m) 1 - 1. This groyne (or breakwater / berm) would extend in a north-westerly direction to the reef that is located in the centre of the bay. Its length is 275 m, with the water depth at the tip approximately 4 m.

This groyne cuts across the gully located in the southern part of the bay. The gully is a pathway for sand to be transported out of the bay. The groyne thus cuts-off this gully and closes the gap between the reef in the centre of the bay and the headland on the south shore. It also reduces the wave heights to the east, inside the bay. Its effectiveness was investigated with a numerical model.

The groyne is positioned over the natural underwater ridge occurring in the south of the bay. This reduces the volume of rock needed (estimated volume = 90 000 m^3).

The reef causes large waves to break and lose energy, prior to impacting the groyne. However, the groyne will still be exposed to large waves due to the focussing effect of the reef (implication: large rock and frequent maintenance will be needed).

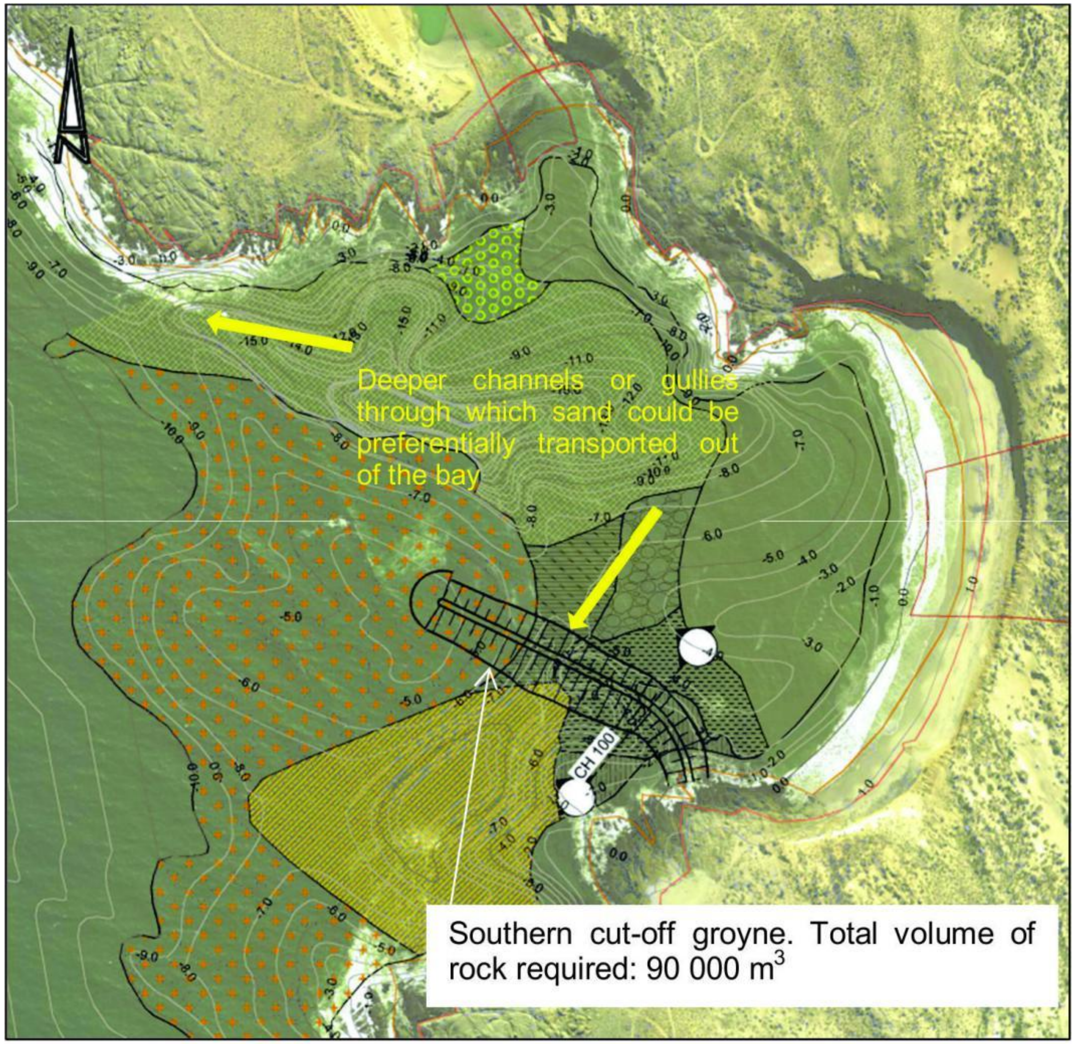

Figure (m) 1 - 1: Southern cut-off groyne

Numerical Modelling of Currents

The Delft-3D FLOW model was setup to simulate the wave-driven currents at Rooiwal Bay for selected wave conditions. The model setup (bathymetry, grids, model parameters, etc.) were based on those used previously for the wave modelling at the site. A limited number (three) of discrete wave conditions were simulated, as the scope of the study was limited. No measurements of currents are available at the site, therefore the simulated current fields and velocities should be considered indicative only. Winds were not included in the model, as the large magnitude currents at Rooiwal are expected to be wave-dominated. The currents were simulated with coastal protection options included, and without – i.e. natural conditions.

The currents resulting from two typical wave conditions are shown in Figure (m) 1 - 2for the natural bay condition. In the plot, the warmer colours indicate higher current speeds. The white arrows show the current direction and the length of the arrows indicates the relative current speed.

The following is noted about the resulting currents:

- A strong northward flowing current is generated at the headland at the south of the bay (Reason: heavy wave breaking). The current flows northward across the mouth of the bay. It would inhibit sand in the bay from moving southward to the rocky shore;
- The wave focussing and breaking on the central reef reinforces the northward current;
- The current reduces in strength as the water moves into the deep depression in the north of the bay;
- The current diverts anti-clockwise, turning seaward, and exits the bay close to the northern rocky;
- Shore. It dissipates as it flows seaward into deeper water. The current speeds, which are in the order of 1 m/s, are high enough to carry suspended sand out of the bay;
- A clockwise circulation pattern is set up in the eastern part of the bay;
- Current speeds near the beach are low;
- On the coast north of Rooiwal Bay, the current speeds are mild with a net seaward flow;
- Currents are very similar for the two wave conditions, with a greater northward bias for the sea condition (right hand pane). This is due to the more southerly direction of this wave condition.

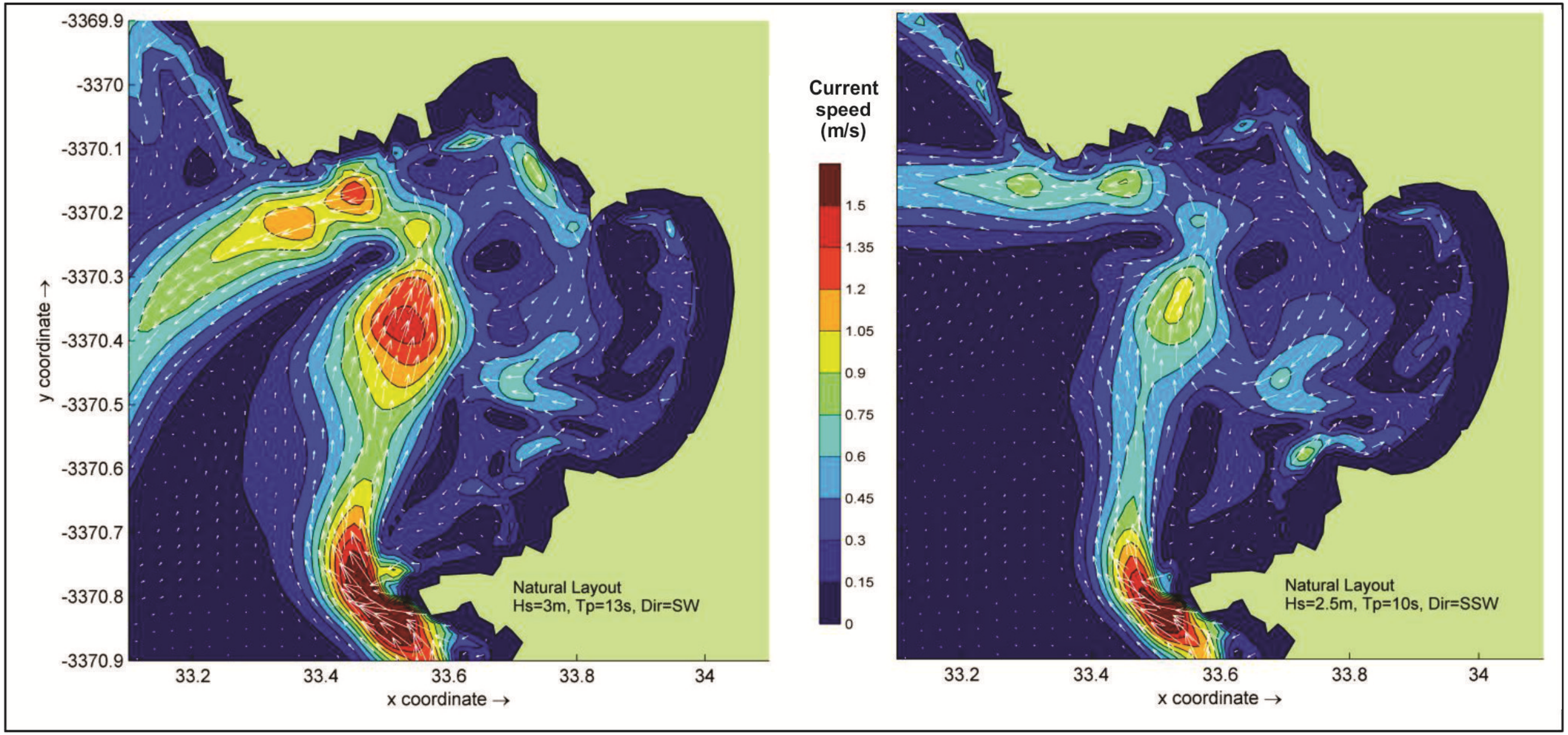

Figure (m) 1 - 2: Currents resulting from a typical swell wave condition (left pane) and southerly sea condition (right pane) for present bay condition.

Currents with Groyne and Partial Sand Fill

The wave driven currents were then simulated with the rock groyne included. Additionally, the seabed in the bay was adjusted for the case of the sand being deposited, either by hydraulic discharge or being trucked and dumped at the shoreline, into the bay.

Sand discharged or dumped into the bay would first deposit into seabed depressions where wave and current energy is low. It is presumed that the sand will be fine, and thus assume a mild underwater slope towards the beach. Sand deposition therefore occurs on the seabed first, before the beach accretes. Further sand input would result in the beach starting to accrete. However, due to the gentle underwater equilibrium profile (see main report), it is estimated that the seaward end of the sand profile would move out of the bay before significant beach accretion occurs. Note that coarser sand would have a steeper equilibrium slope and allow greater beach accretion prior to sand moving out of the bay.

The groyne cuts off sand movement out of the south of the bay. Figure (m) 1 – 3, below shows the bathymetry if the bay is partially filled with sand such that the sand level is just lower than the shallowest part of the channel in the north of the bay – see yellow arrow in Figure (m) 1 -1. The seaward end of the sand profile would be constrained within the bay at this point.

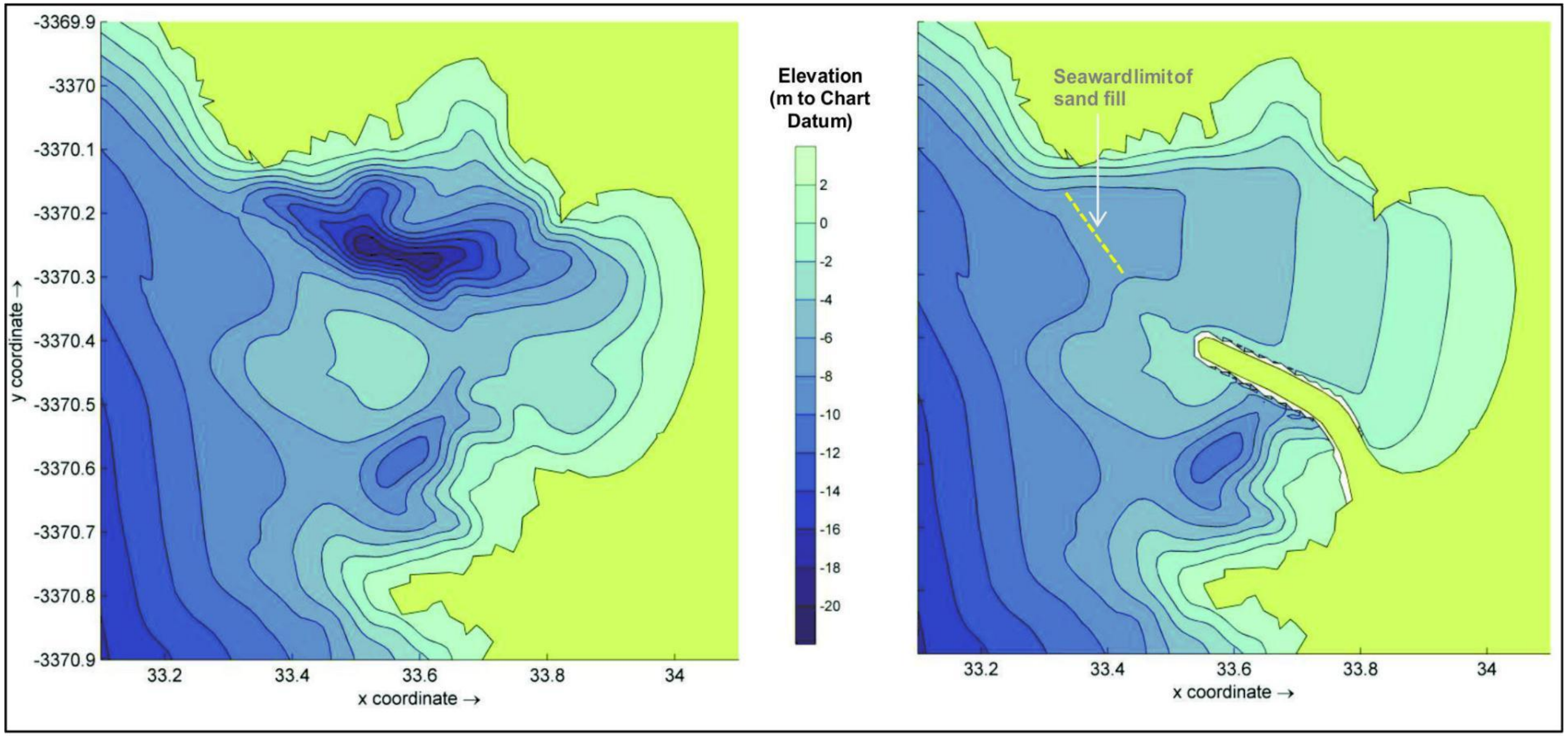

Figure (m) 1 - 3: Present bathymetry (left pane) and with groyne and partial sand fill (right pane)

The wave-driven currents were simulated with the partial sand fill and groyne included. The results are shown in Figure (m) 1 - 4 below for the same wave conditions as in Figure (m) 1 - 2. Comparing the results, it is noted that the groyne and sand-fill have the following effect:

- Current speeds inside the bay are slightly lower, with a clockwise circulation pattern;
- The seaward directed current is more focussed, with a slightly more northerly direction;
- Currents outside the bay, opposite the southern and northern rocky shorelines, are generally similar to the natural condition.

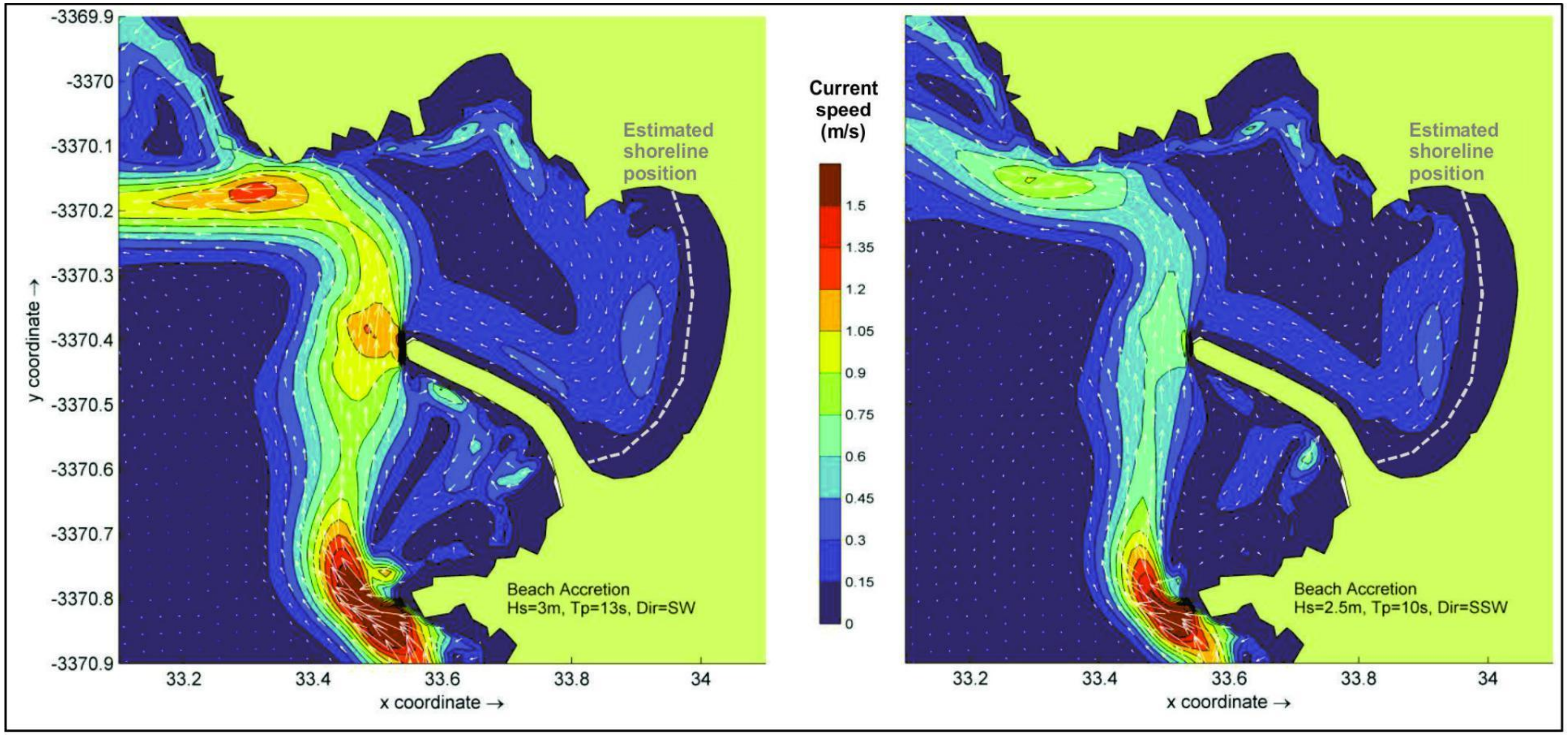

Figure (m) 1 - 4: Currents simulated with groyne and partial sand-fill in the bay for swell (left pane) and sea (right pane) wave conditions.

Wave Conditions in the Bay

The near shore wave heights and directions that cause the above currents are shown in Figure (m) 1 - 5. The colour scale indicates the significant wave height and the arrows indicate the mean direction.

- Bathymetry features on the seabed outside the bay cause a focussing of wave energy towards thecentre of the bay.
- High waves occur over the reef in the centre of the bay, as well as opposite the coastline to the northland south of the bay.
- The southern part of the beach is sheltered as a result of the groyne.
- The seaward end of the groyne is located in an area of high wave energy.

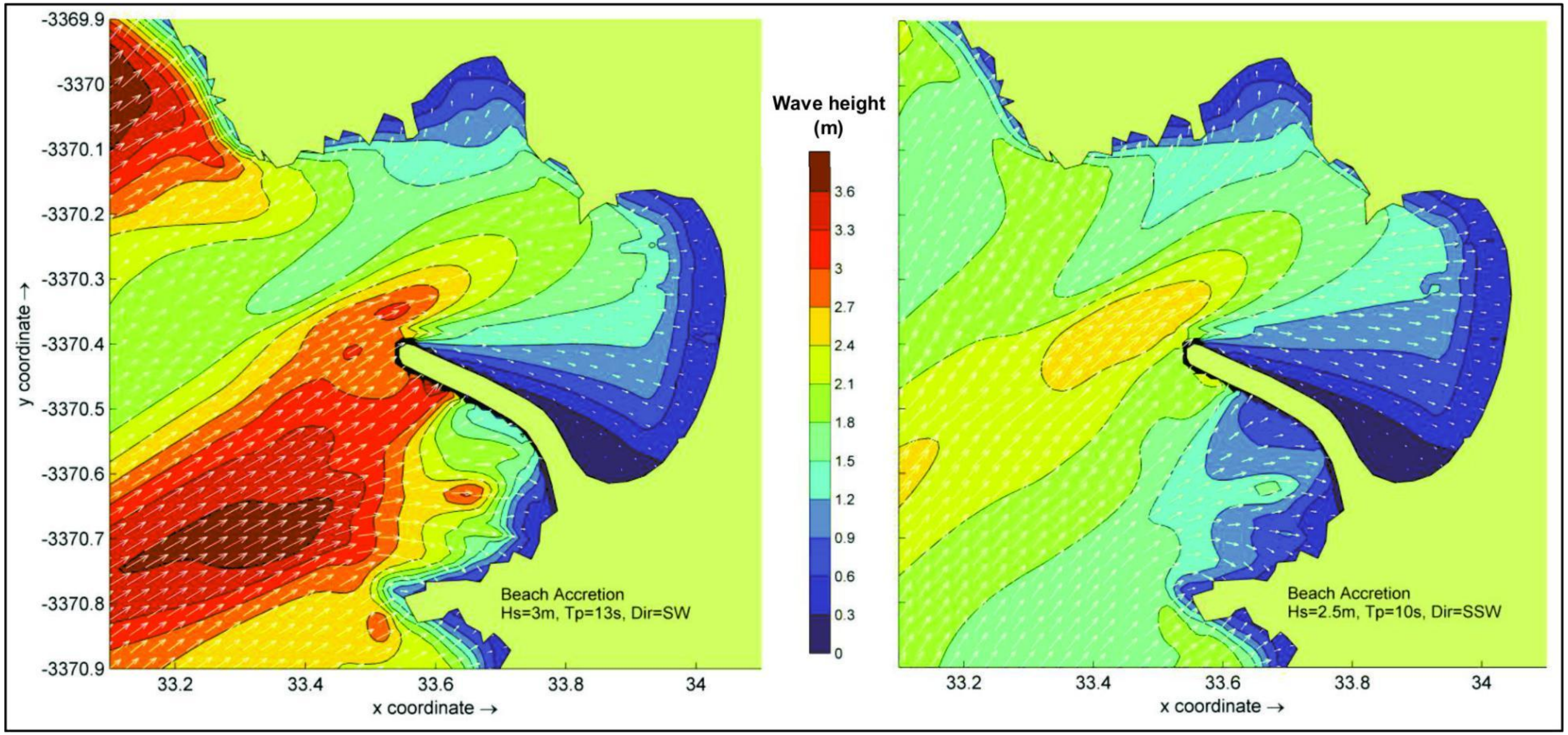

Figure (m) 1 - 5: Wave conditions in the bay for swell (left pane) and sea (right pane) wave conditions

Sand Movement

- The likely movement of sand can be inferred from the wave and current modelling results described in the previous sections.
- Current speeds near the present (natural case) beach are too low to transport sand out of the bay. This remains unchanged with the groyne and sand fill.
- Sand discharged or dumped into the bay would first deposit into seabed depressions where wave and current energy is low. Further discharge would result in the seabed accreting until the seaward end of the sand slope starts to extend out of the bay. This would first occur in the south – the groyne would be effective at cutting off this sediment pathway.
- The groyne and sand fill result in only slight changes to the currents.
- Seaward directed current speeds are sufficiently high to move suspended sand westward and into
- Deeper water, where suspended sand would settle to the seabed.
- Outside the bay, to the north and south, the wave-driven currents are directed such that they would tend to move sand towards the bay.

While the preferred site for future slime dams is not going to impact on the Swartlintjies Estuary, the alternative site 9 km upstream (Option 2, alternative to Site A, C and G) was considered to be a potential risk to the Estuary. This alternative site is an existing slime dam and is located within the Swartlintjies River catchment (Figure (g) (i) 4.1 - 2) Although the prevailing wind carries most of the dried saline sediment to the north-east, it is likely that the surface runoff during episodic rainfall events washes salt from the dam into the Swartlintjies River.

It is evident that the rainfall has carried salty sediment from the small abandoned slime dam situated in the northern part of the EFZ down towards the river channel and has had an impact on the vegetation. A salt pan is situated directly below the dam, which could be an indication of increased rates of salt accumulation in the soil. The proposed alternative site for the slime dam could have a similar effect on the river and therefore may impact on the upper reaches of the estuary. This impact would be further exacerbated by the current inability of the system to flush accumulated salts out to sea. Very few plant species can survive in saline soils, which results in the increasing extent of saltmarsh vegetation outcompeting Namaqualand Duneveld and Strandveld vegetation patches.

It is not feasible to cover slime dams while they are in use and salt water runoff into the riverbed can therefore not be mitigated. The impacts on the estuary can only be prevented by utilising the preferred sites north of the estuary, which are situated outside of the Swartlintjies River catchment and are anticipated to drain into the sea via existing abandoned mining channels.

Therefore, the final layout has not been altered from the position of structures, except the decision to rather not construct a slime dam, which is labeled as Option 2 in the slime dam option map (Figure (g) (i) 4.1 - 2).

n) Aspects for inclusion as conditions of Authorisation

Aspects for inclusion as conditions of Authorisation.

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation.

No infrastructure may be located within the 1:100 years flood line area unless the authorisation is granted in accordance to section 21 (c) and (I) of the National Water Act.

o) Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measures proposed).

Soils

The main limitation is that the soil information provided is at 1 : 250 000 scale, and has not been ground-truthed. However, the existing reconnaissance information, supported by the climatic characteristics of the area, indicates that this is a very low potential area for agriculture.

Air quality

As the schedule for the study was set for the month of July and unusually heavy rains fell during June and early July, no evidence of dust coatings of plants nor visibility impact (such as shown in Photo 2) were evident during the site visit of 6-7 July 2016 but the levels that would occur in dry summer months under the prevailing southerly winds are known to the author and photographs of this element will be used from other West Coast assessments which are directly comparable.

Given the fact that the latest Google Earth™ image for February 2016 is patchy, thereby not allowing consistent assessment of the sand plume intensity levels, the consistent images of 2014 were rather used after determining that the date difference did not hold significant implications for the definition of the extent of the plumes as captured as .shp files in the base-line data. This is largely to be expected as the DBMN discontinued active mining over much of the study area in excess of 6 years ago.

Sensitivity of the receiving environment

In this regard, a distinction is drawn between Samsonsbak Mining Right Area in the north and the Koingnaas and Mitchell's Bay areas in the central and southern area, given that very little mining disturbance has occurred to-date in the Samsonsbak area as opposed to the extensive mining disturbances in the other two Mining Right Areas.

The receiving environment is that of the ex-DBNM alluvial diamond mine which has operated since the 1940's both as inland terrace mining and beach and back-of-beach mining with wide-spread intensive disturbances by excavations, overburden dumps, roads, mining plant and slime dams (fine tailings ponds). The matter of sensitivity of the receiving environment is therefore closely related to the extent of existing mining disturbances and the distribution of natural plumes, both having a direct bearing on the degree to which impact is further considered.

Aquaculture Study

The study is based on the project description made available to the specialist at the time of the commencement of the study. The assessment is limited to a “desktop” approach and thus relies on existing information only; no new data were collected as part of the study.

Biodiversity

The study was carried out in winter. The seasonal timing of the study was not optimal but acceptable. Vegetation in Namaqualand is at its best in spring. However, a high level of confidence was achieved in the observations made so season was not a limiting factor in this study.

The study is large and the logistics within the mine are difficult due to security constraints. Therefore, only limited time could be assigned to field-work. The rapid assessment approach allowed for appropriate sampling to be carried out within the time available. It would always be desirable to spend as much time as possible surveying vegetation but despite the limited time, adequate information was collected and this is not seen as a limitation for the study.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorised or not

Biodiversity

The project should be authorized because this is true in the study area where the vegetation is mainly Namaqualand Strandveld with limited areas of Namaqualand Coastal Duneveld and Namaqualand Seashore Vegetation. It is contended that there are no botanical fatal flaws for the area investigated but that there are ‘red flags’. Certain plant communities and plant species within the general vegetation matrix are sensitive. These plant communities and species are described in the report and if the recommended mitigation measures are implemented as per the management plan, then there would no significant loss of biodiversity.

Socio-economic

WCR concluded a transaction with De Beers in October 2014 whereby WCR acquired, amongst others, the KNC and SBC mining rights. Both these rights have been exploited by De Beers for over 60 years and the diamond resources on land are largely depleted. What remains are very low grade or buried under thick overburden. The key remaining high value diamond resources remaining are those that De Beers could not access due to:

- Its proximity to the Trans Hex owned marine concessions; and
- Deposits that DBCM discovered towards the end of the life of their operation. The majority of these deposits are located directly adjacent to the coast, on the beaches or in the shallow marine environment.

The shareholders of WCR together with the Industrial Development Corporation (IDC) has invested over R250 million to date to recapitalize the operations at Koingnaas. This investment has resulted in the creation of over 100 permanent employment opportunities, the majority of which has been filled by people from the nearby towns and the broader Namaqualand community. The project is expected to have a life of mine of 10-15 and create 250-300 permanent jobs over this period.

The no-development alternative would result in a lost opportunity to create employment and business opportunities associated with the proposed mining operations. The no-development option would also result lost opportunity to support local community initiatives in the area and act as a catalyst to revitalise the towns of Koingnaas and Kleinzee. The no-development option is therefore not supported.

Table (p) 1 - 1: Assessment of no-development option

No-development option would result in the lost opportunity for the local economy and community		
	Without Mitigation	**Assuming Enhancement**
Severity/Intensity	High	High
Duration	Medium term	Medium-term
Extent	Local-Regional	Local-Regional
Consequence	High	High
Probability	Likely	Likely
Significance	High	High
Status	Negative	Positive
Confidence	High	High
Nature of Cumulative impact	Negative cumulative impact linked to lost opportunity for local economy and communities. Positive cumulative impact linked to benefit for opportunity for local economy and communities.	
Degree to which impact can be reversed	N/A	
Degree to which impact may cause irreplaceable loss of	N/A	

resources	
Degree to which impact can be enhanced	High

Water resources

The proposed diamond mining activities will very small negative impact on groundwater resources for reasons listed below:

- Mining excavations will be limited to shallow depths of less than 20 metres below surface, by most probability above the water-table.
- The natural or ambient groundwater quality in the proposed mining area is of very poor quality; hence further degradation through contamination by sea-quality water will not make a big difference.
- Diamond processing relies on the physical properties of the mineral no active chemicals with potential to introduce toxins are added. This means that the process water emerging from the plant will have been little altered in chemical composition from its original state. The impact of contaminated groundwater discharging into the sea on the marine ecology is currently a subject of debate, but logically, should be negligible. The project should be authorised.

However, it should be noted that the study was not exhaustive and definitive as it was based entirely on existing data. No primary data were generated in this study. The presence or absence of potable groundwater in the proposed mining area needs further investigation by way of siting and drilling exploratory boreholes in the 500 metre wide coastal strip of the mining area as recommend in the geohydrological study, presented under Volume 4 of the EIAr.

ii) Conditions that must be included in the authorisation

(1) Specific conditions to be included into the compilation and approval of EMPr

Risks posed by workers to local communities

The potential impacts on local communities associated with workers are typically associated with projects located in rural areas or small towns, such as Hondeklip Bay, where workers from outside the area are employed. The section of the community that is usually at most risk is younger women and school girls. However, young men can also be exposed to risks, including drugs.

About 93% of the current work force come from and live in the local towns in the area. WCRs are also committed to maximizing the employment of locals for the remaining 150-200 positions that will be associated with full operation. The potential risk posed by workers to local communities is therefore likely to be low.

While the potential threat posed by workers to the community as a whole is likely to be low, the impact on individual members who are affected by the behavior of workers has the potential to be high, specifically if they are affected by STDs etc.

Location of infrastructure

General Notice 704 (GN704) of 1999, regulations on use of water for mining and related activities aimed at the protection of water resources. Specifically related to this proposed project the following restrictions are applicable in terms of GN704

Activity 4: No person in control of mine or activity may:

- 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 meters from watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become water-logged, undermined, unstable or cracked;
- Except in relation to a matter contemplated in regulation 10, carry on any underground or opencast mining, prospecting or any other operation or activity under or within 1:50 year flood line or within a horizontal distance of 100 meters from any watercourse or estuary, whichever is the greatest;
- Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; or
- Use any area or locate any sanitary convenience, fuel 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 or estuary.

Surface water quality monitoring

The surface water quality monitoring plan must include the proposed water monitoring points. This plan can be used as a management tool to ensure that potential impacts on surface water resources are managed according to the hierarchy of water and impact management. This tool will ensure that negative impacts are identified at the early stages and that the appropriate action is implemented for the protection of water resources.

Water Management System must be implemented for proper record keeping. This system must be populated with Water Quality Objectives (like RWQO published by the DWS) as well as monthly water quality results.

However, it must be noted that due to the dry nature of the study area, it may not be possible to collect water samples unless after significant storm events.

Two additional monitoring points are recommended as follows:

- Sea water abstraction points;
- Shore based operations release of water from classifiers or related screening infrastructure back into the sea

These additional monitoring points will be used as a management tool to identify and manage potential impact on Sea Water Quality from the mining activities. Should there be any significant impact from the mining processes, reasonable measures will be in place.

Impact on groundwater Levels

Of all the mining operations, land mining has the biggest potential to impact on groundwater levels. Theoretically, as soon as mining excavation breaches the water-table, groundwater will flow into the pit thereby necessitating dewatering of the pit to facilitate mining. This in turn will have potential to deplete groundwater resources in the area, as well as trigger seawater intrusion into aquifers adjacent to the mining operations.

The risk of this happening is, however, considered negligible due to the fact that mining operations will be taking place at relatively shallow depth, generally less than 20 metres below surface; thus above the water-table. To date, no potable groundwater has been encountered within the proposed mining area. At the time of the EIAr site visit on 22 June 2016, one of the excavations was about 17 metres deep and only seawater was seeping into the pit, Plate 9.1 of the geohydrological report, Volume 4 of this EMPr.

Impact on groundwater quality

Potential negative impact on groundwater quality emanating from the mining operations relate to possible contamination of groundwater through leakage from waste containment facilities such as slime dams and rock dumps; and from petroleum products at the workshops. The slime dams contain seawater used during diamond processing.

Available water quality data indicate that the entire area proposed for mining is characterised by highly saline groundwater with electrical conductivity of above 1000 mS/m. This is supported by the fact that there are no water supply boreholes around, and south of Koingnaas. Potable groundwater is currently sourced from the Somnaas Noupaquifer located about 20 km north of Koingnaas.

The natural groundwater quality in the proposed mining area is very poor and is not suitable for basic human needs. There is no evidence that groundwater contributes to land-based ecological systems in the proposed mining area; in the form of springs, wetlands or river base flow in dry seasons.

Contamination from the slime dams, which contain sea-quality type water, will further degrade groundwater quality that is already very poor. Ground water ultimately discharges into the sea.

Diamond processing relies on the physical properties (mainly density and hardness) of the mineral for extraction, no chemically active substances are added, which may potentially introduce toxins. This means that the process water emerging from the process plant will have been little altered in chemical composition from its original state.

Biodiversity

Correct alignment of roads to minimize impacts would be essential. All mining activities must be contained within designated areas and there should be avoidance of botanically sensitive areas

2) Rehabilitation requirements

Rehabilitation requirements are outlined under Table (i) 1-1 under rehabilitation and commissioning phase.

The core closure objectives will include the following:

Rehabilitating the disturbed land to a state that is:

- Suitable for its agreed post closure uses (to be determined in conjunction with landowners, stakeholders and IAPs).
- Reduces visual impact of the disturbed land; and
- Provides for minimal need of closure management.
- Keep relevant authorities and key stakeholders, landowners and IAPs informed of the progress of the decommissioning phase.
- Submit monitoring data to the relevant authorities as required.

The determination of the post land use will also be derived from the status quo i.e. current land use and current state of the biophysical environment.

The main objectives of the rehabilitation are outlined below.

- To ensure the availability of sufficient finances to attain the set environmental measures to be executed at the planning stage and during implementation of the EMPr.
- To ensure maintenance of the biodiversity on site.
- To ensure re-establishment and sustainability of vegetation in the rehabilitated land, and thereby avoiding loss of any species habitat.
- To ensure that the rehabilitated land is in the state that is suitable for its agreed upon post-closure uses.

- To develop good remediation methods and proper closure plans, so as to minimize degradation of the environment.
- Rehabilitate disturbed land and drill deposits to a state that:
    - Facilitates compliance with applicable environmental quality objectives (air quality and water quality guidelines);
    - Reduces visual impact of the disturbed land;
    - Limits post closure management.
- To ensure that the infrastructure is safe after rehabilitation.
- To keep relevant authorities informed of the progress of the decommissioning phase.
- Submit monitoring data to the relevant authorities as required.
- Maintain required pollution control facilities and rehabilitated land until closure
- To ensure that the disturbance of the beach are reduced i.e. beaches should be clean

The rehabilitation of the site will involve the following:

Overburden Dumps

- Backfill where appropriate.
- Mainly partial backfill by load, haul and tip as especially in the dragline area and rounding of remnant dumps then applied to 1:3 slopes.
- Full rounding of dumps to 1:3 slope inclusive of smooth rounding of the central dump top applied to 50% of the dump area.
- Shoulder rounding of flat dumps with perimeter sloping from angle of repose to 1:3.
- Surface remedial treatment of rounded but significantly eroding dumps.

Face Edge (high-wall) Sloping

- All faces of excavations and sides of trenches to be sloped to 1:3 (excluding shallow trenches in isolation where natural revegetation is already well advanced.
- Sloping to be preceded by doze-back of topsoil adjacent to the face edge and subsequent re-dozing of the topsoil over the dozed face slope. Such face edge sloping is to be conducted on all steep cuts inclusive of high walls from palaeo cliff mining in the north-east, dragline faces, excavation edges of mine blocks and high trench edges.

Back-fill Edge Sloping

This involves sloping all backfilled edges (angle of repose slopes).

Smoothing of Dumped Areas

All areas where material has been dumped or where especially dozing activities have left an undulating surface, such areas are identified for smoothing by dozer in three categories:

- Smoothing of rough areas (SRA's) (undulations greater than 3 m).
- Smoothing of medium undulating areas (SMA's) (undulations 1,5 -3 m).
- Smoothing of dumped areas (SDA's) (tipper truck dumps).

Topsoil Recovery and Re-topsoiling of Sloping

Where sloping of faces (high walls), adjacent natural vegetation and topsoil is to be back-dozed in a strip proportional in width to the height of the treatment feature with dozing to 0,3-0,5 m deep to a temporary berm. Such dozing to include the occurrence of topsoil berm immediately above many of the later dated cut faces where topsoil stripping of the excavation retains the topsoil in these berms which to date have also acted as safety berms.

Upon completion of the slope dozing, the topsoil is to be replaced by dozing over the 1:3 slope to minimum 100 mm deep (note: that despite the 300-500 mm target depth, the achievement of this depth is subject to the inspection of suitability of the soil to such depth to serve a growing medium.

Fine Residue (Tailings) Dams (FRD's)

Cover surface of dams after drying with coarse tailings from adjacent coarse tailings dumps assessed to have low ore-grade or with material already re-processed) to a depth of 150-200 mm average 175mm as soon as dumps have dried sufficiently to carry equipment (avoiding loss of dozers by solfluction of the slime by especially dozer vibration). Interim netting should be applied to control dust generation during the drying period.

Shape perimeter walls of FRD's to 1:3 to permit similar armouring (cover with coarse tailings as above).

Provide FRD walls with basic outer paddock to catch seepage water and prevent such saline water spreading into the veld.

Plant Area Rehabilitation

As all processing plants are determined to be demolished to floor level by a demolition contractor (as per current Jet Demolition Contract) (at "no" cost to the Mine given sale of equipment/scrap by the contractor) the only additional works include to the following:

- Cover of remaining reinforced concrete foundations and floors with 1m deep coarse tailings to the De Beers Namaqualand Mines (DBNM) EMP spec of "retaining concrete foundations below -1 m below final ground level".
- Demolish reinforced concrete retaining walls of the primary hopper ramps to retain the lower 50% of current height above nil which will be covered by the rounding of the ramp perimeter as costed as a backfill edge sloping.
- Ripping of the general compacted areas surrounding the plants and promoting revegetation by netting and seeding (with light top soiling if locally available).
- Providing a basic interim paddock around the perimeter of the CRD's to trap fines washed from the toe of the dumps. Such paddock may be later upgraded if still in place post re-processing of the dump.

Roads

- The main spine road and access roads to future farming portions, sea-water pumps, and probable mariculture sites will be retained.
- Other layered roads will be grader-ripped prior to the grader blading the roadside topsoil berm back over the road surface to provide target of 20-50 mm topsoil over the ripped road surface. Such treated roads will be netted with seeding to promote revegetation.

Tracks will be lightly scarified by tractor and "grop" to promote seed entrapment.

Closure of such rehabilitation sections by signposting and placement of drums, rocks or berms must complement the above.

- Smooth and profile uncontaminated mounds or heaps.
- Back-fill or slope excavated areas (e.g. quarries, trenches).
- Level the disturbed area to a condition resembling its natural profile.

The activities to be undertaken during decommissioned will include:

As all processing plants are determined to be demolished to floor level by a demolition contractor (at "no" cost to the Mine given sale of equipment/scrap by the contractor) the only additional works include the following:

- The plant and associated disused infrastructure will be demolished. Building foundations will be removed. All land exposed by the demolition of infrastructure and other land disturbed will be rehabilitated.
- Cover of remaining reinforced concrete foundations and floors with 1 m deep coarse tailings to the DBNM EMP spec of "retaining concrete foundations below -1 m below final ground level".

- Demolish reinforced concrete retaining walls of the primary hopper ramps to retain the lower 50% of current height above nil which will be covered by the rounding of the ramp perimeter as costed as a backfill edge sloping.

q) Period for which the Environmental Authorisation is required

The Life of Mine is anticipated to be 11 years.

Production Scheduling

The production process involves five phases. These include the following:

Phase 1: Because of the planned use of existing mining and treatment facilities, the Koingnaas mine is ready to start production without major constructional delay. During Phase 1, the mine will start up by commissioning a newly constructed 200 tonnes per hour (tph) screening and scrubbing plant. This plant will feed the existing 50 tph Michell's Bay DMS plant which is still in excellent condition.

Phase 2: As mining progresses toward Koingnaas, the Michell's Bay plants will be relocated to an appropriate plant site in about year three with the possible addition of a new modular 200 tph treatment facility. This depends on the situation at the time and the outcome of exploration programmes that will be conducted continuously in order to increase the resource. The modular Michell's Bay plant can be relocated within weeks whereas the new 200 tph plant may take six months to design, construct and erect on site.

Phase 3: During Phase 3: a 450 tph tailings treatment facility, to be constructed initially at the Langhoogte Tailings Mineral Resource (TMR), will be relocated to Koingnaas to treat the Koingnaas TMR. It is estimated that this facility could be relocated to and recommissioned at Koingnaas within a maximum period of six months starting production in year four of operations.

Phase 4: Mining will involve surf zone mining, particularly in the northern Samson's Bak Right area by means of two shore-pump units. Sea wall mining will also proceed simultaneously by means of two separate operations, mining favourable sandy beaches and fluvial channel extensions into the beach-zone and beyond. These channels extend to undetermined limits offshore and mining will continue as far offshore as conditions allow. These operations can be established at short notice. Phase 4 mining will run continuously and concurrently with Phase 1 to 3.

Phase 5: Ongoing exploration drilling and sampling and Research-and-Development programmes will run concurrently with these production phases in order to further develop surf zone and offshore-beach channel mining techniques, as well as to unlock and upgrade the potential of the on land Megalodon and Cretaceous fluvial channel resource. For further exploration, a SONIC drill rig (Photo d-3) has been acquired and is currently operational and delineating mine blocks in existing resource/reserve areas.

The drill will also be deployed for wider exploration and refined resource delineation on e.g. the Megalodon and other Cretaceous channels within the mining right area. A special 10 tph mobile DMS plant (Photo d-4) has been purchased to treat future bulk samples generated during these exploration programmes.

Beach and offshore channel (or coffer dam) mining and surf zone pumping will commence as early as year one of operations, as soon as the EIA process has been completed and approved. Current estimates of the potential surf zone, beach and offshore channel 'resource' amounts to 0.13 Mega carats (Mcts) of Inferred Resource and 0.82 Mcts of Deposit-level 'resource', including the Rooiwal Bay resources and once in production, these operations will boost production substantially. Two shore-based pumping units are scheduled to process 7 895 m³ of screened ore per annum and offshore-beach mining another estimated 126 000 m³ per annum.

Timeframes for Mining

Based on current ore reserves and production costs, the Life of Mine has been calculated to the year 2029. The total production rate in the overall WCR mining areas is approximately 0.1 million carats per year. This production rate will be maintained for the remainder of the Life-of-Mine (LoM). The production rates as described in the Mine Plan are, however subject to change due to a variety of factors including:

- Changes in the costs of production;
- Changes in the diamond market; and
- Discovery of new deposits.

Timeframes for activities that is ready to commence (those which do not need EIA)

Contract finalisation was undertaken in November 2014. The site establishment commenced in May 2015 and operations commenced from October 2015.

Timeframes for activities that is dependent on the EIA (those which require EIA before commencement). The awarding of contracts was planned for the last quarter of 2015 and operations would commence once the EIA has been approved. There is no fixed date at this stage for decommissioning and closure, as it is dependent on the diamond resources to be mined, estimated at 10 - 15 years.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

s) Financial provision

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.

i) Explain how the aforesaid amount was derived

Rehabilitation Costs

- A summary of the results of the environmental risk report and details of identified residual and latent impacts was incorporated into the costing;
- A summary of the results of progressive rehabilitation undertaken were considered;
- A description of the methods to decommission each prospecting component and the mitigation or management strategy proposed to avoid, minimize and manage residual or latent impacts will influence the overall calculation;
- Details of any long-term management and maintenance expected will be considered;
- Details of a proposed closure cost and financial provision for monitoring, maintenance and post closure management;
- A final and future land use proposal and arrangements for the site will input the calculations;
- A record of interested and affected persons consulted; and
- Technical appendices, if any.

A surveyed plan of the areas on the site was provided as input into the Quantum Calculation. All the disturbances were categorised using the DMR guideline document for finance calculation. The machinery requirements and volumes of materials to be moved were determined, and rates for such rehabilitation were determined. Requirements for aftercare and maintenance are understood, and allocations of rates and fees for such will be provided. In addition, closure objectives and how these relate to the mine operation, and its environmental and social setting formed the basis of the closure calculation. The Estimated cost for coffer dam rehabilitation is R66 038 780.99. The detailed financial provision quantum calculation is included as Appendix i.

ii) Confirm that this amount can be provided for from operating expenditure

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

t) Deviations from the approved scoping report and plan of study

There were no divisions from the scoping report and plan of study.

i. Deviations from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

ii) Motivation for the deviation

u) Other information required by the competent Authority

i) Compliance with the provisions of Sections 24 (4) (a) and (b) read with section 24 (3) (a) and (7) of the Environmental Management Act (Act 107 of 1998). The EIA Report must include the:-

(2) Impact on the socio-economic conditions of any directly affected person. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix 2.19.1 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

A social and labour plan characterizes the socio-economic environment of the mining area. The various projects which will improve livelihoods and provide improved socio-economic benefits for the community have been identified and stipulated in the social and labour plan, which was submitted to DMR in support of the mining right application. The provisions of the social and labour plan are not duplicated in this section. However, the key driving through processes and approaches are outlined. It is noted that key socio-economic considerations formed the corner stone of the social and labour plan development.

The objectives of the Social and Labour plan as stated in the MPRDA is to consider the operation of WCR mining operations in context of generally recognised standards of sustainable development by integrating the social, economic and environmental factors in planning the mining operations throughout the life of the mine, by:

- Promoting and advancing the social and economic welfare of the people of the Namakwa District Municipality and South Africa in general
- Contributing to the transformation of the mining industry; and
- Extending Namaqualand Mines contribution to the socio-economic development of the Namakwa District Municipality
- Some of the key challenges that have been highlighted in the Municipal IDPs are skills gap within the local population and lack of jobs and economic development as well as lack of support for emerging entrepreneurs. The seasonality of employment opportunities due to reliance to agriculture is also a key challenging factor.

During the compilation of this mentioned social and labour plan, assessment of socio-economic patterns and trends were considered to ensure that proposals that are made to help uplift the community are sound and appropriate. The identified trends and patterns were used to identify the type and nature of support that should be brought in to enhance the implementation of the proposed projects.

Development of community revival strategies – the mitigation actions from the socio-economic patterns and trends as well as the profile of the community informed some of the revival strategies that will be looked-upon. These strategies will take into consideration economic, capacity and capability development.

The development opportunities in the form of projects that WCR will support were compiled. These were targeted to address economic requirements i.e. new business ventures or improve current ventures as well as to improving the capacity and capability of the community through skills and competency development. The objective is to initiate and implement projects successfully and in a sustainable manner. The objective is to ensure that there is visibility and transparency on what is being done, the outcomes that are achieved, key risks that have been identified and the management of any issues that may threaten the successful implementation of the community development and upliftment selected projects.

To this end the analysis of the challenges on the ground were factored in the development of strategy of the key consciology are outlined below:

Creation of opportunities to revitalise Koingnaas and Kleinzee

Given the limited economic opportunities in the area the mining operations proposed by WRCs provide an opportunity to act as catalyst to revitalise the towns of Koingnaas and Kleinzee. In this regard the presence of WCRs employees in these towns will create demand for services, such as doctors, pharmacists, etc. and facilities, such as supermarkets, sports facilities and restaurants. Friends and family members of WCR employees will also visit the towns, thereby increasing the demand for services and facilities and also increasing the exposure of these towns to the public.

In the absence of the potential opportunities created by the proposed mining there is a very real risk that the towns of Koingnaas and Kleinzee would deteriorate and become dysfunctional, run-down towns. If this happens it will pose a financial burden on the NKLM and KLM.

Support for community initiatives

In discussions with representatives from the NKLM and KLM WCRs have identified a number of community initiatives to support, including up-grading school facilities and covering salaries for school teachers and the establishment of play parks and internet cafes. A budget of ~ R 10 million has been allocated to supporting community initiatives over the next five years.

However, based on the feedback from the local community one of the key challenges facing the communities in Hondeklip Bay and Soebatsfontein was access to affordable public transport. There is no bus service that services the local small towns in the area and transport costs associated with travelling to towns such as Springbok, Garies and Kamieskroon are high. One the key costs that local parents are faced is the cost of transporting children to the high school in Garies. Due to the high transport costs a number of families cannot afford to send their children to high school. As a result they do not complete school and this places them at a disadvantage in later life. The other issue identified by representatives from Hondeklip Bay was the lack of sports facilities for the youth. The only sport facility is the rugby field, which has not ablution facilities or change rooms. The cost associated with hiring transport for away games was also raised as an issue.

Employment opportunity

According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%), etc. (Figure (u) 1 – 1).

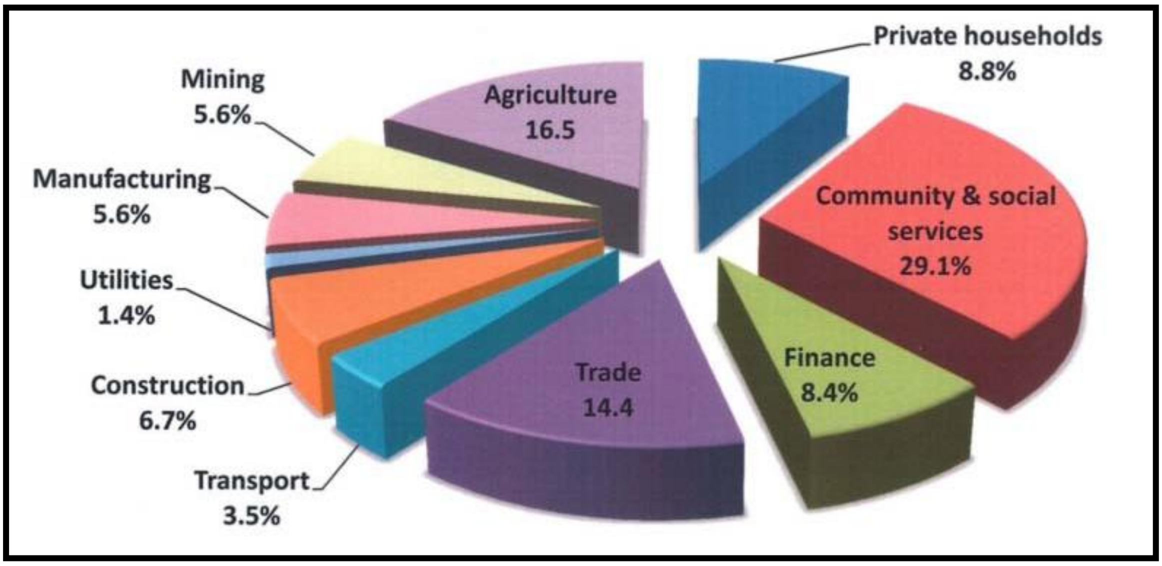

Figure (u) (i) 1 - 1: Employment by Economic Sector and Industry (Source: Statistics South Africa 2012).

The current operations employ ~ 100 permanent staff, of which 93 (93%) are historically disadvantaged individuals (HDIs). In terms of employees from the local area, 93 (93%) of the total workforce comes from local towns in the area. All of these workers are HDIs.

At full production the total workforce will number 250-300. As in the case of the current breakdown, more than 90% of this workforce will be HDIs. The proposed mining development will therefore create significant employment opportunities for HDIs. Although the employment opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the local economy in the KLM and NKLM.

The total annual wage bill associated with the current operations which employs ~ 100 staff is R 31 million (2016 rand values). The annual total wage bill associated with a workforce of between 250 and 300 will be in the region of R 90 million (2016 rand values). The total wage bill (excluding annual increases) over the 10 to 15 life of mine would therefore be in the region of R 900 million to R 1.35 billion (2016 rand values).

As indicated above, 93% of the current employees are HDIs and live in local towns in the study area. These figures are also likely to apply to the full production workforce of 250-300. A significant portion of the annual wage bill is and will be earned by HD members from the area and will be spent in local towns in the area. The injection of wage income over the 10 and 15 year life of mine (R 900 million to R 1.35 billion) will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

Training and skills development

86 out of the current total of 100 current employees have undergone some form of training and skills development within the first 12 months of being employed. All of the recipients are HDIs. Similar on-going training and skills development opportunities will be provided for the additional workers employed when full production is achieved (250-300). As is currently the case, the majority of the beneficiaries will be HDIs from local communities in the NKLM and KLM. The proposed mining development will therefore create significant training and skills development opportunities for HDIs. Although these opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the workers and will increase their chances of finding alternative employment when the mining operations stop.

Creation of business opportunities

The creation of business opportunities will be linked to capital expenditure and procurement expenditure by WRC and wage spend by employees in the local economy.

WRCs capital expenditure associated with start-up activities amounts to ~ R 26 million (2016 rand values) for the first year of operations. The capital expenditure for the remaining 10 -15 years life of mine is estimated to be region of R 128 million (2016 rand values). This expenditure creates business opportunities for local companies involved in the mining sector.

In addition to capital expenditure WCR outsource a number of their operations to mining, service and security contractors etc. The total expenditure by WCR for period 2015/16 was therefore in the region of R 55 million (2016 rand values). This, like the annual wage bill, will increase when mining operations move into full production and will create opportunities for local businesses in the NKLM and KLM. WCRs are committed to the implementation of a preferential procurement plan as per the requirements set out in the Social Labour Plan (April 2015).

In addition to the business opportunities associated with the mining related expenditure a percentage of the annual wage bill (R90 million at full employment) will be spent in the towns where the workers live. As indicated above the total wage bill over the 10-15 life of mine will be in the region of R 900 million to R 1.34 billion. The local spend of a percentage of this wage income will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

(2) Impact on any national estate referred to in Section 3 (2) of the National Heritage Resources Act. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

v) Other matters required in terms of Sections 24 (4) (a) and (b) of the Act.

(The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist.

Specialist terms of reference for archaeological investigation have been developed and formed part of the specialist investigations.

The background on archaeological resources and known significant sites is at regional level and is part of the existing EMP documented information. The environmental impact assessment Table (i) 1-1 do provide for management of impacts associated with heritage resources.

The heritage impact assessment report is also incorporated as Appendix 2.19.2.

Site of archaeological and cultural interest

Later Stone Age people settled along the coastal regions of the Northern Cape from approximately 30 000 years (Before Present (BP). The landscape was generally dominated by hunter-gatherer occupation until the introduction of pastoralists into the area approximately 2 000 years BP. The Northern Cape is characterised by a low Iron Age presence on the landscape, as a result of the general high aridity of the region. Arid areas are usually not conducive to cattle rearing and agriculture. During prehistoric times these areas were mostly occupied by Stone Age hunter-gatherers (San) and nomadic pastoral Khoekhoen (Khoi-Khoi) groups.

The archaeological site survey revealed about 38 coastal or shoreline shell middens of varying sizes and densities. Most of these were determined to be of medium to high significance, and one site was found to be very highly significant. Two formal cemeteries were documented, both of which carry high significance. Archaeological remains can be defined as human-made objects, which reflect past ways of life, deposited on or in the ground. All archaeological remains, artificial features and structures older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the National Heritage Resources Act (NHRA) (Act No. 25 of 1999). All the shell middens and historical structures are protected under this Act. A permit will require to be obtained from SAHRA before any site can be destroyed. All historical structures (including graves) older than 60 years must be extensively documented and a permit must be obtained from SAHRA before a structure can be destroyed. In excavations on the farm Nuttabooi shared by the Dikgat and

Buffels Inland Rights, bioturbated quartizites have been discovered, but with no body fossils. Fossilised wood and vertebrate material has previously been reported from the Buffels Bank a few kilometres upstream of the Buffels Inland Right. Based on the highly indurated nature of the sediments in the Buffels River valley, a Tertiary age has been proposed, but until diagnostic fossils are found this remains uncertain.