

Mr S.J. Meyer

Environmental Impact/Risk Assessment and Management Report: Application for Environmental Authorisation for a mining permit in terms of Section 27 of the MPRDA, 2002 (Act 28 of 2002) on the farm Hoffmans Rust 173/RE, Wepener District

Reference No.: FS 30/5/1/3/2/10205 MP

January 2017



Prepared for:

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Environmental Impact/Risk Assessment and Management Report

Remaining Extent of the farm Hoffmans Rust 173

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**PROJECT: ENVIRONMENTAL IMPACT/RISK ASSESSMENT AND MANAGEMENT
REPORT IN RESPECT OF AN APPLICATION FOR A MINING PERMIT FOR THE FARM
HOFFMANS RUST 173/RE**

1. PROJECT DESCRIPTION

Proper Consulting Engineers (Pty) Ltd was appointed to manage an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA), 1998 (Act 108 of 1998) and related regulations for a mining permit in terms of Section 27 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002).

The details of the application is as follow:

Applicant:	Mr. S.J. Meyer
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Contact No.:	Tel.: 051 – 443 8942 Fax: 051 – 443 8942
Farm:	A portion of the Remaining Extent of the farm Hoffmans Rust 173
Magisterial District:	Wepener
Region:	Free State
Mineral type:	Sand
Mine size:	4.9 Ha
Application reference:	FS 30/5/1/3/2/10205 MP



2. SCOPE

A Basic Assessment process in terms of regulations 19 and 20 of the NEMA Environmental Impact Assessment (EIA) Regulations, 2014 was commenced with as part of the EA application for the following listed activities:

Activity	Activity description
Listing Notice 1, No. 21 of GNR 983 of the NEMA EIA Regulations, 2014	<i>Any activity including the operation of that activity which requires a mining permit in terms of Section 27 of the MPRDA, 2002 (Act 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of Section 106 of the MPRDA, 2002 (Act 28 of 2002).</i>
Listing Notice 1, No. 27 of GNR 983 of the NEMA EIA Regulations, 2014	<i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</i> <i>(i) The undertaking of a linear activity; or</i> <i>(ii) Maintenance purposes undertaken in accordance with a maintenance management plan.</i>

An application for a Water Use Authorisation for a Section 21(c) and 21(i) water use in terms of the National Water Act (NWA), 1998 (Act 36 of 1998) will form part of this project. The required application and supporting documentation will be submitted to the Department of Water and Sanitation (DWS) for processing.

The purpose of this Environmental Impact Assessment/Risk and Management report is to identify and assess the significance of the potential impacts expected to be associated with the proposed operation as well as to develop environmental management/mitigation measures to be implemented to prevent and/or limit these expected impacts.



3. METHODOLOGY USED IN DETERMINING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

The criteria for determining impact significance as specified in the "DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism (DEAT)" was adopted to determine and rank the potential impacts expected to be associated with the proposed operation as well as issues raised by Interested and/or Affected Parties (I&APs) during the consultation process.

The criteria is based on the a) Extent or spatial scale of the impact; b) Intensity or nature of the impact; c) Expected duration of the impact; d) Mitigatory potential of impacts; e) Acceptability of impacts; f) The probability of the impacts occurring; g) The status of the impact, i.e. positive, negative or neutral; and h) Identify the specific legal and permit requirements relevant to the project. All of these are used to determine the ultimate significance (Table 7).

The rating for the extent of an impact is related to the area that is likely to be affected by the impact, e.g. limited to the site or local area (Table 1).

Table 1: Extent or spatial scale of impacts

Rating	Description
High	Regional / National / International scale
Medium	Beyond site boundary
Low	Within site boundary (i.e. mining permit area)

The intensity of an impact is rated to be high, medium or low and is based on legal standards and information from specialist studies as far as possible (Table 2). Where no legal standard is available, best practice is considered.

Table 2: The intensity or nature of impacts

Rating	Description
High	Disturbance of pristine areas that have important conservation value. / Destruction of rare or endangered species.



Rating	Description
Medium	Disturbance of areas that have potential conservation value or are of use as resources. / Complete change in species occurrence or variety.
Low	Disturbance of degraded areas, which have little conservation value. / Minor change in species occurrence or variety.

It is determined what the expected duration of the impact occurring would be, i.e. short term, medium term, long term or considered to be permanent (Table 3).

Table 3: The expected duration of impacts

Rating	Description
High (Long term)	Permanent / Long term (More than 15 years)
Medium (Medium term)	Medium term (5 – 15 years)
Low (Short term)	Short term (0 – 5 years)

Based on experience and known results from environmental management and/or mitigation measures on similar projects, the mitigatory potential of an impact is estimated to be low, medium or high (Table 4). Also refer to Table 9 in this report for the expected significance rating of each impact after management measures have been implemented to limit and/or prevent the expected impact or the extent thereof.

Table 4: The mitigatory potential of impacts

Rating	Description
High	High potential to mitigate negative impacts to the level of insignificant effects.
Medium	Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative effects.
Low	Little or no mechanism to mitigate negative impacts.

Although there is criteria and standards in terms of the acceptability level of impacts that are emissions-based or that relate to the receiving environment, e.g. air quality, water quality or noise, it often depends on the stakeholders and I&APs directly affected by the proposed project (DEAT, 2002). The ratings proposed for this impact assessment criteria are indicated in Table 5.

**Table 5: The acceptability of impacts**

Rating	Description
High (unacceptable)	Redesign project to remove or avoid impact.
Medium (Manageable)	With regulatory controls. / With project proponent's commitments.
Low (Acceptable)	No risk

The degree of certainty of the impact actually occurring is described to be unlikely, likely, highly likely or definite (i.e. impact will occur regardless of prevention measures) (Table 6).

Table 6: The probability of the impact occurring

Rating	Description
Definite	More than 90% sure of a particular fact. Substantial supportive data exist to verify the assessment.
Highly likely	Over 70% sure of a particular fact or of the likelihood of that impact occurring.
Likely	Possible: Only over 40% sure of a particular fact or of the likelihood of an impact occurring.
Unlikely	Less than 40% sure of a particular fact or the likelihood of an impact occurring.

All the criteria described, the environmental features as a whole together with the expected impact on the local community are considered in rating the significance of an impact (Table 7).

Table 7: The rating of impact magnitude and significance

Magnitude / Significance rating	Description
High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. In the case of beneficial impacts, the impact is of a substantial order within the bounds of impacts that could occur.



Magnitude / Significance rating	Description
Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.
No impact	Zero impact

4. IDENTIFIED ENVIRONMENTAL IMPACTS AND RISKS

The potential impacts were identified through a desktop study of the study area, a site assessment, specialist studies (i.e. ecological- and wetland assessment; and a heritage assessment) and involvement from identified I&APs and stakeholders.

- i) The potential impacts/risks expected to be associated with the proposed sand recovery operation include the following:
- Clearance of vegetation and impact on the riparian area;
 - Habitat loss and effect on the general biodiversity;
 - Destabilisation of the riverbank;
 - Establishment of alien vegetation;
 - Erosion;
 - Change in storm water flow;
 - Impact on the water quality of the river (e.g. spillage, increase in suspended solids);
 - Dust generation;
 - Elevated noise levels;
 - Health and safety risk to employees on site and people entering the mining area;
 - Safety risk for road users and degradation of the road due to an increase in heavy vehicles on the access road;



- Spillage of potential hazardous substances (e.g. fuel and oil) to the surrounding environment and into the river;
- Pollution to the surrounding environment if waste is not managed;
- Impact on the general aesthetics of the area and Immediate visual impact;
- Risk of veld fires;
- Positive impact on employment opportunities and skills development; and
- Positive impact of economic development in Wepener and opportunity to provide construction sand to needed development in the surrounding area.

The main concerns raised by I&APs and stakeholders during consultation are as follow:

- The mining permit areas of permits that have lapsed on adjacent properties should be rehabilitated and closed;
- An application for a Water Use License in terms of Section 21 of the National Water Act (NWA), 1998 (Act 36 of 1998) is required; and
- Implementation of storm water management measures and erosion control.

Refer to Tables 8 - 10 of this document for an assessment of each impact expected to be associated with the proposed development in respect of the preferred locality and final site layout without mitigation and with mitigation.



Table 8: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (without mitigation)

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Site establishment (Clearance of vegetation; establishment of equipment; access road; etc.)	Clearance of riparian vegetation	Negative	Low	Low	Low	Definite	Manageable	Low	High
	Establishment of alien vegetation	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	High
	Habitat destruction	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Erosion	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	High
	Loss of topsoil	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Visual scarring	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Loss of agricultural potential	Negative	Low	Low	Low	Definite	Manageable	Low	High
	Destruction of wetlands	Negative	Low	Medium	Medium	Highly likely	Manageable	Medium	Medium
Recovery of sand through pumping and excavation	Water quality: Increase in suspended solids	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Instability of the riverbank	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Change in surface water drainage	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Visual scarring	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Dust generation	Negative	Low	Low	Low	Unlikely	Acceptable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Destruction of objects/artefacts of importance	Negative	Low	Low	Low	Unlikely	Manageable	Low	Medium
Loading & hauling	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High



Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Loading & hauling	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Deterioration of the gravel road	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	High
Stockpiling	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Change in surface water drainage	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Likely	Manageable	Low	High
Settling dams	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Change in surface water drainage	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Erosion	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Water quality: Increase in suspended solids	Negative	Medium	Medium	Low	Unlikely	Manageable	Medium	High
	Instability of the riverbank	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
Material storage (e.g. fuel, oil, gas) and waste disposal	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Littering	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Fire risk	Negative	Medium	Low	Low	Unlikely	Manageable	Low	Medium
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Negative	Medium	Low	Low	Likely	Manageable	Low	High



Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
General operational activities in respect of I&APs and employees	Pollution to the surrounding environment as a result of sewage spillage.	Negative	Low	Medium	Low	Likely	Manageable	Medium	Medium
	Risk of injury to people and animals entering the operational area	Negative	Low	Low	Low	Unlikely	Manageable	Medium	Medium
	Risk of injury to employees working with machinery/equipment on site	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Job creation & skills upliftment	Positive	Low	Low	Low	Definite	Acceptable	Medium	-
	Economic development in the region	Positive	Medium	Low	Low	Highly likely	Acceptable	Medium	-
Rehabilitation (e.g. removal of equipment, reshaping & revegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Change in surface water drainage	Positive	Low	Low	Low	Likely	Acceptable	Medium	-
	Erosion & loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Medium	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Highly likely	Manageable	Medium	High
	Establishment of a self-sustaining ecosystem	Positive	Low	Low	Medium	Likely	Acceptable	Medium	-
Cumulative impacts	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Medium	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Instability of the riverbank	Negative	Medium	Low	Low	Likely	Manageable	Medium	Medium



Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Cumulative impacts	Loss of riparian vegetation and ecosystem	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
	Water quality: Increase in turbidity of the river due to a possible increase of suspended solids in the river	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium



Table 9: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (with mitigation)

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Site establishment (Clearance of vegetation; establishment of equipment; access road; etc.)	Clearance of riparian vegetation	Negative	Low	Low	Low	Definite	Manageable	Low	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Highly likely	Manageable	Low	High
	Habitat destruction	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Erosion	Negative	Medium	Low	Low	Highly likely	Manageable	Low	High
	Loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Visual scarring	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Loss of agricultural potential	Negative	Low	Low	Low	Highly likely	Acceptable	Low	High
Recovery of sand through pumping and excavation	Destruction of wetlands	Negative	Low	Medium	Low	Unlikely	Manageable	Low	Medium
	Water quality: Increase in suspended solids	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Instability of the riverbank	Negative	Low	Low	Low	Likely	Manageable	Low	Medium
	Change in surface water drainage	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Visual scarring	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Dust generation	Negative	Low	Low	Low	Unlikely	Acceptable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
Loading & hauling	Destruction of objects/artefacts of importance	Negative	Low	Low	Low	Unlikely	Manageable	Low	Medium
	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Deterioration of the gravel road	Negative	Medium	Low	Low	Highly likely	Manageable	Low	High



Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Stockpiling	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Change in surface water drainage	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Loss of topsoil	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Likely	Manageable	Low	High
Settling dams	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Change in surface water drainage	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Erosion	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Water quality: Increase in suspended solids	Negative	Medium	Medium	Low	Unlikely	Manageable	Low	High
	Instability of the riverbank	Negative	Low	Low	Low	Likely	Manageable	Low	Medium
Material storage (e.g. fuel, oil, gas) and waste disposal	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Littering	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Fire risk	Negative	Medium	Low	Low	Unlikely	Manageable	Low	Medium
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Pollution to the surrounding environment as a result of sewage spillage.	Negative	Low	Medium	Low	Likely	Manageable	Low	Medium
	Risk of injury to people and animals entering the operational area	Negative	Low	Low	Low	Unlikely	Manageable	Low	Medium



Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
General operational activities in respect of I&APs and employees	Risk of injury to employees working with machinery/equipment on site	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Job creation & skills upliftment	Positive	Low	Low	Low	Definite	Acceptable	Medium	-
	Economic development in the region	Positive	Medium	Low	Low	Highly likely	Acceptable	Medium	-
Rehabilitation (e.g. removal of equipment, reshaping & revegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Unlikely	Acceptable	Low	Medium
	Change in surface water drainage	Positive	Low	Low	Low	Likely	Acceptable	Medium	-
	Erosion & loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Highly likely	Manageable	Low	High
	Establishment of a self-sustaining ecosystem	Positive	Low	Low	Medium	Highly likely	Acceptable	Medium	-
Cumulative impacts	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Instability of the riverbank	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
	Loss of riparian vegetation and ecosystem	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
	Water quality: Increase in turbidity of the river due to a possible increase of suspended solids in the river	Negative	Medium	Medium	Low	Likely	Manageable	Medium	Medium



Table 10: Significance of the potential impacts/risks expected in respect of the preferred locality and final site layout (without and with mitigation measures)

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Site establishment (Clearance of vegetation; establishment of equipment; access road; etc.)	Clearance of riparian vegetation	Aesthetics; Land use; Biodiversity	Commissioning	Low	Avoid through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Establishment of alien vegetation	Vegetation; Biodiversity	Commissioning	Medium	Remedy through rehabilitation; Limit footprint; Control through management and monitoring	Low
	Habitat destruction	Vegetation; Fauna; Biodiversity	Commissioning	Low	Avoid through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Erosion	Aesthetics; Land use; Water quality	Commissioning	Medium	Remedy through rehabilitation; Limit footprint; Control through storm water control; Control through erosion measures and monitoring	Low
	Loss of topsoil	Soil	Commissioning	Low	Control through appropriate topsoil stockpiling; Control through storm water control; Control through erosion measures and monitoring; Remedy through rehabilitation	Low
	Visual scarring	Aesthetics; Visual	Commissioning	Low	Remedy through rehabilitation; Limit footprint; Limit through site layout	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Site establishment (Clearance of vegetation; establishment of equipment; access road; etc.)	Elevated noise levels	Noise; I&APs; Health and Safety	Commissioning	Low	Control through operational procedures (including working hours); Control through noise control	Low
	Loss of agricultural potential	Land use	Commissioning	Low	Avoid through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Destruction of wetlands	Vegetation; Fauna; Biodiversity; Ecosystem function	Commissioning; Operational	Medium	Avoid through site locality & layout; Control through operational procedures; Remedy through rehabilitation; Limit footprint	Low
Recovery of sand through pumping and excavation	Increase in suspended solids in the river	Water quality	Operational	Medium	Control through operational procedures; Limit footprint; Remedy through concurrent rehabilitation	Medium
	Instability of the riverbank	Riparian area; Land use	Operational; Decommissioning	Medium	Control through operational procedures; Remedy through concurrent rehabilitation; Control through slope management and monitoring	Low
	Change in surface water drainage	Natural flow path; Water quantity	Operational	Low	Control through operational procedures; Control through storm water controls; Limit through site layout	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Recovery of sand through pumping and excavation	Visual scarring	Aesthetics; Visual	Operational	Low	Control through operational procedures; Remedy through concurrent rehabilitation; Limit through site layout	Low
	Dust generation	Air quality; I&APs	Operational	Low	Control through operational procedures; Control through monitoring	Low
	Elevated noise levels	Noise; I&APs	Operational	Low	Control through operational procedures (including working hours); Control through noise control	Low
	Destruction of objects/artefacts of importance	Heritage	Operational	Low	Avoid through site locality & layout; Limit footprint; Create awareness with employees	Low
Loading & hauling	Dust generation	Air quality; I&APs	Operational	Low	Control through operational procedures; Control through dust control; Control through monitoring	Low
	Elevated noise levels	Noise; I&APs	Operational	Low	Control through operational procedures (including working hours); Control through noise control	Low
	Deterioration of the gravel road	Infrastructure; I&APs; Road safety	Operational; Decommissioning	Medium	Remedy through maintenance of the road; Control through speed control; Control through monitoring	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Stockpiling	Dust generation	Air quality; I&APs	Operational	Low	Control through operational procedures; Control through dust control and monitoring; Remedy through rehabilitation	Low
	Visual scarring	Aesthetics; Visual	Operational	Low	Remedy through rehabilitation; Limit through site layout	Low
	Change in surface water drainage	Topography; Storm water	Operational	Low	Control through storm water controls; Limit through site layout; Remedy through rehabilitation	Low
	Loss of topsoil	Soil	Operational	Low	Control through appropriate topsoil stockpiling; Control through storm water control; Control through erosion control and monitoring	Low
	Establishment of alien vegetation	Vegetation; Biodiversity	Operational; Decommissioning	Low	Remedy through rehabilitation; Control through management and monitoring	Low
Settling dams	Visual scarring	Aesthetics; Visual	Operational	Low	Limit through site layout; Control through operational procedures; Remedy through rehabilitation	Low
	Change in surface water drainage	Topography; Storm water; Water quantity	Operational	Low	Limit through site layout; Control through operational procedures; Control through storm water controls; Remedy through rehabilitation	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Settling dams	Erosion	Aesthetics; Land use; Water quality; Soil	Operational	Low	Control through operational procedures; Control through storm water controls; Control through erosion control and monitoring; Remedy through rehabilitation	Low
	Increase in suspended solids	Water quality	Operational	Medium	Control through operational procedures; Limit footprint; Remedy through rehabilitation	Low
	Instability of the riverbank	Riparian area; Land use	Operational; Decommissioning	Medium	Control through operational procedures; Avoid through construction method; Remedy through rehabilitation; Control through slope management and monitoring	Low
Material storage (e.g. fuel, oil, gas) and waste disposal	Soil contamination from spillages and waste disposal	Soil; Land use; Waste management	Operational; Decommissioning	Medium	Avoid through operational procedures; Prevent through management; Remedy through rehabilitation	Medium
	Water pollution due to spillages and waste disposal	Water quality	Operational; Decommissioning	Medium	Prevent through site layout; Avoid through operational procedures; Prevent through management; Remedy through rehabilitation	Medium
	Littering	Land use; Aesthetics; Water quality	Operational; Decommissioning	Low	Prevent through waste management	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Material storage (e.g. fuel, oil, gas) and waste disposal	Fire risk	Health and safety; Biodiversity	Operational	Low	Avoid through operational procedures; Avoid through management & appropriate storage control	Low
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Aesthetics; I&APs	Commissioning; Operational; Decommissioning	Low	Remedy through rehabilitation; Limit through site locality & layout; Control through operational procedures	Low
	Pollution to the surrounding environment as a result of sewage spillage.	Water quality; Soil; Health and safety; I&APs	Commissioning; Operational; Decommissioning	Medium	Prevent through standard cleaning and management procedures; Limit through site locality & layout; Remedy through cleaning and rehabilitation	Low
	Risk of injury to people and animals entering the operational area	Health and safety; I&APs	Operational; Decommissioning	Medium	Avoid through access control; Avoid through rehabilitation	Low
	Risk of injury to employees working with machinery/equipment on site	Health and safety	Operational; Decommissioning	Medium	Avoid through appropriate PPE; Avoid through awareness & appropriate training to personnel on site	Medium
	Job creation & skills upliftment	Community/Economy	Commissioning, Operational; Decommissioning	Medium (Positive)	Achieve through continuation with proposed operation; Achieve through operational procedures; Achieve through training	Medium (Positive)
	Economic development in the region	Community/Economy	Commissioning, Operational	Medium (Positive)	Achieve through continuation with proposed operation; Achieve through operational procedures	Medium (Positive)



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Rehabilitation (e.g. removal of equipment, reshaping & revegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Soil; Land use	Decommissioning	Medium	Avoid through rehabilitation procedures; Prevent through management; Remedy through rehabilitation	Medium
	Water pollution due to spillages and waste disposal	Water quality	Decommissioning	Medium	Avoid through rehabilitation procedures; Prevent through management; Remedy through rehabilitation	Medium
	Elevated noise levels	Noise; I&APs	Decommissioning	Low	Control through rehabilitation procedures; Control through noise control	Low
	Change in surface water drainage	Topography; Storm water; Water quantity	Decommissioning; Closure	Medium (Positive)	Achieve through levelling and rehabilitation of disturbed areas; Achieve through storm water controls	Medium (Positive)
	Erosion & loss of topsoil	Soil; Land use	Decommissioning; Closure	Medium	Control through storm water controls; Remedy through rehabilitation; Control through erosion control & monitoring	Low
	Establishment of alien vegetation	Vegetation; Biodiversity	Decommissioning; Closure	Medium	Remedy through rehabilitation; Control through management and monitoring	Low
	Establishment of a self-sustaining ecosystem	Land use; Aesthetics; Biodiversity	Decommissioning; Closure	Medium (Positive)	Achieve through rehabilitation	Medium (Positive)
Cumulative impacts	Dust generation	Air quality; I&APs	Operational; Decommissioning	Low	Control through operational procedures; Control through management and monitoring; Control through dust control; Remedy through rehabilitation	Low



Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Cumulative impacts	Visual scarring	Aesthetics; Visual	Commissioning; Operational	Medium	Reduced once existing mining areas on adjacent properties have been fully rehabilitated and closed; Limit through operational procedures; Remedy through rehabilitation	Low
	Elevated noise levels	Noise; I&APs	Commissioning; Operational; Decommissioning	Low	Control through operational procedures (including working hours); Control through monitoring; Control through noise control	Low
	Instability of the riverbank	Riparian area; Land use	Operational; Decommissioning	Medium	Control through operational procedures; Avoid through construction method of settling dams; Remedy through rehabilitation; Control through slope management and monitoring	Low
	Loss of riparian vegetation and ecosystem function	Vegetation; Biodiversity; Ecosystem function	Commissioning; Operational	Low	Limit through site locality & layout; Remedy through rehabilitation; Limit footprint; Control through operational procedures	Low
	Increase in suspended solids in the water	Water quality	Operational	Medium	Control through operational procedures; Limit footprint; Remedy through rehabilitation; Limit through storm water control measures; Limit through erosion control measures	Medium



5. RECOMMENDED ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

Information gathered from the desktop study, specialist studies and the site assessment were used to identify the potential impacts expected to be associated with the proposed operation. Refer to Table 11 for a description of the environmental management and mitigation measures to be implemented as minimum throughout all the phases of the operation to prevent and/or limit the environmental impacts.

Table 11: Recommended environmental management/mitigation measures to be implemented

Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; general management, etc.)	Keep a photograph record of the site before any clearance during site establishment.	Prior to site clearance during commissioning.	Site manager
	No permanent infrastructure will be constructed on site, within the river or on the riverbank.	During commissioning	Applicant / Site manager
	Limit removal of vegetation and topsoil to areas directly affected by the proposed operation, e.g. access road, stockpile area and settling dams.	During commissioning phase	Site manager
	Clear any proclaimed weed/alien species on disturbed areas before seeding.	During commissioning, operational and decommissioning phases	Site manager
	No fires will be allowed within the mining permit area if not in adequate facilities for this purpose.	During commissioning, operational and decommissioning phases	Site manager
	Storm water management measures, e.g. berms and channels will be implemented to control storm water at the site and on the gravel access road to prevent erosion.	During commissioning, operational and decommissioning phases	Site manager
	Any areas where erosion is evident will be repaired and appropriate measures will be implemented to prevent re-occurrence.	During commissioning, operational and decommissioning phases	Site manager
	No operational activities will be undertaken within 100m of the banks of the river without the required authorisations.	During commissioning	Applicant / Site manager



Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; general management, etc.)	Any alien vegetation and declared weeds will be cleared before seeding as far as possible. Due to the locality of the site, the use of chemical substances will only be used if necessary and in accordance with the user specifications. The chemical should also be certified to be safe for use near a water resource.	During commissioning, operational and decommissioning phases	Site manager
	No toilet facilities or containers with substances likely to cause pollution will be situated within the 1:100 year flood line of the river.	During commissioning, operational and decommissioning phases	Site manager
	Ponding of water on site and stockpile areas will be managed and limited through storm water control measures, e.g. diversion berms and channels.	During operational phase	Site manager
	Nuisance dust is expected to be low due to the type of activity to be undertaken. However, dust will be controlled through the implementation of operational procedures, speed control on the access road and limiting loading of material during high wind periods.	During operational phase	Site manager
	Due to the locality and type of activities that will be associated with the proposed operation, the potential impact of nuisance noise are anticipated to be low. The nearest dwelling is approximately 1.5 km from the site. Mining activities will be limited to daytime working and speed control will be enforced on the access roads.	During commissioning, operational and decommissioning phases	Site manager / Operators
	The site will be left in a safe and clean condition at the end of every day to limit any environmental risks/impacts.	During commissioning, operational and decommissioning phases	Site manager / SHE representative / ECO
	A register will be kept to record any complaints received from I&APs and any environmental incidents.	During commissioning, operational and decommissioning phases	Site manager / ECO
Recovery of sand and operation of the settling dams	A floating pump will be located on the river and no permanent structure will be constructed in the river.	During operational phase	Site manager
	Pumping of sand will not be deeper than the river base.	During operational phase	Site manager / Operator
	The settling dams that will be used for the settling of sand will be formed from sand on the site. No additional material will be imported and no physical structures will be constructed.	During commissioning and operational phases	Site manager / Operator
	Water from the settling dams will be allowed to drain back into the river. No consumptive water use will be undertaken as part of the operation.	During operational phase	Site manager / Operator



Aspect	Recommended management/mitigation	Phase	Responsible person
Recovery of sand and operation of the settling dams	Excavation of sand from the riverbed during dry periods will not be deeper than the river base.	During operational phase	Site manager / Operator
	Recovery of sand from the riverbank will be limited as far possible to limit the potential impact on the stability of the riverbank.	During operational phase	Site manager / Operator
	The implementation storm water control, erosion control and the re-vegetation of disturbed riparian areas will assist in maintaining stability of the riverbank. In addition, the settling dams on the riverbank will be constructed in such manner so as to limit potential instability and recovery of sand through excavation will be limited to the riverbed during dry periods with not recovery of the riverbank. In this event, access to the deposited areas will be gained with a temporary ramp from the riverbank down to the riverbed. However, the main recovery method will be through means of pumping sand from the riverbed, thus excavation activities are expected to be minimal.	During operational phase	Site manager / Operator
Loading & hauling	Material will be loaded directly from stockpiles onto transporting trucks.	During operational phase	Site manager
	Speed limits of maximum 40km/h will be enforced on trucks on the gravel road to prevent accidents and to limit dust generation.	During operational phase	SHE representative / Site manager
	The gravel access road on the property to the mining area will be maintained as and when necessary.	During commissioning, operational and decommissioning phases	Applicant / Site manager
Stockpiling	Topsoil stockpiles will be placed in an area not prone to erosion for use during rehabilitation.	During commissioning and operational phases	Site manager
	Topsoil stockpiles will not exceed a height of 2m.	During commissioning and operational phases	Site manager
	Storm water management measures such as berms will be implemented to divert clean storm water around the stockpile area.	During operational phase	Site manager
	Material stockpiles will be placed outside the 1:50 year flood line and outside the identified wetland buffer area.	During operational phase	Site manager
	Clear any proclaimed weed/alien species on stockpiles before seeding.	During commissioning, operational and decommissioning phases	Site manager



Aspect	Recommended management/mitigation	Phase	Responsible person
Water activities use	No consumptive water will be used as part of the operation.	During commissioning, operational and decommissioning phases	Site manager
	Due to the nature of the proposed activity, a Water Use Authorisation for a Section 21(c) and 21(i) water use in terms of the NWA, 1998 (Act 36 of 1998) will be required. The necessary approvals will be obtained from DWS prior to the commencement of any Water Use.	During commissioning, operational and decommissioning phases	Applicant / ECO / Site manager
Material storage	Fuel, oil and lubrication products will be delivered to the site as needed. It is not anticipated that any fuel, oil or lubricants will be stored on site.	During commissioning, operational and decommissioning phases	Site manager
	If any products need to be stored on site, it will be in a secured and bunded area with an impermeable lining to prevent pollution. This area will be located outside the 1:100 year flood line of the river.	During commissioning, operational and decommissioning phases	Site manager
	Any gas will be stored in a secure, well-ventilated area situated outside the 1:100 year flood line of the river.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
General operational activities	All mining equipment will be maintained in a good working condition and operations will be limited to daytime to limit noise disturbance.	During commissioning, operational and decommissioning phases	Site manager
	Any major services and/or repairs will be undertaken at a workshop. Only minor services will be allowed within a dedicated area during which appropriate management measures, e.g. drip trays, should be implemented to prevent any spillage of oil, diesel etc.	During commissioning, operational and decommissioning phases	Site manager / Operators
	Drip trays etc. should be used where necessary to prevent and/or limit any spillages to the surrounding environment.	During commissioning, operational and decommissioning phases	Site manager / Operators
	Any spillage of a substance with a pollution risk should be cleaned immediately and the affected footprint reinstated.	During commissioning, operational and decommissioning phases	Site manager / Operators
	Any contaminated soil will be removed and placed into suitable receptacles for disposal at an appropriately permitted waste disposal facility. Alternatively, the contaminated soil/material can be treated with proven in situ rehabilitation products if only small volumes are present.	During commissioning, operational and decommissioning phases	Site manager / ECO



Aspect	Recommended management/mitigation	Phase	Responsible person
General operational activities	In the case of a major spill the responsible departments (i.e. DMR, DWS and DESTEA FS) will be notified within 24 hours.	During commissioning, operational and decommissioning phases	Site manager / ECO
Waste generation (i.e. domestic solid waste, sewage, hazardous waste)	Appropriate waste management and waste minimisation shall be implemented on site.	During commissioning, operational and decommissioning phases	Site manager
	Solid waste will be collected in appropriate bins on site and final disposal shall be at the nearest authorised landfill site on a weekly basis or more regularly if necessary.	During commissioning, operational and decommissioning phases	Site manager / Operators
	Any hazardous waste, e.g. used oil, lubricants and cleaning materials will be collected in a holding tank and sent back to the supplier or collected by a specialist oil recycling company.	During commissioning, operational and decommissioning phases	Site manager
	A chemical toilet will be placed on site outside the 1:100 year flood line of the river. The toilet will be cleaned regularly. Service certificates will be kept on site for inspection on request.	During commissioning, operational and decommissioning phases	Site manager
	No littering and/or disposal of any waste will be allowed on site.	During commissioning, operational and decommissioning phases	Site manager
	All sections of the NEM: Waste Act, 2008 (Act 59 of 2008) pertaining to the disposal of waste must be adhered to.	During commissioning, operational and decommissioning phases	Site manager
Heritage	Should any object or site of heritage importance be unearthed, activities in the immediate vicinity will be stopped and the South African Heritage Resource Agency will be contacted.	During commissioning, operational and decommissioning phases	Site manager / Operator
Health & Safety	PPE will be provided to employees on site. No person or contractor will be allowed on site without the necessary PPE.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Health & Safety legislation will be adhered to at all times and the necessary induction will be provided to employees as per the required time frames.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Access control will be implemented at the entrance to the mining area.	During commissioning, operational and decommissioning phases	Site manager / SHE representative



Aspect	Recommended management/mitigation	Phase	Responsible person
Health & Safety	All employees working with mining equipment and machinery will be properly trained in their specific tasks to limit injuries.	During commissioning and operational phases	Site manager / SHE representative / Operator trainer
	A register will be kept to record any incidents related to Health and Safety aspects.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
Environmental awareness	All employees should be given an induction on environmental awareness. This should include awareness of the environmental risks of their work and mitigation measures to be implemented in the event of an incident such as a major oil spill, etc. Proof of such induction will be kept on site for inspection on request.	During commissioning and operational phases	Site manager / ECO
Rehabilitation	Concurrent rehabilitation is to be undertaken where possible on disturbed areas.	During operational phase	Site manager / ECO
	No equipment, waste or settling dams will remain on site after rehabilitation.	During decommissioning and Closure	Site manager
	Any waste on site during the Decommissioning Phase will be disposed of appropriately at a registered waste disposal facility.	During decommissioning and Closure	Site manager
	Final rehabilitation of disturbed areas, e.g. stockpile areas will include shaping, topsoil and revegetation with natural occurring vegetation if vegetation does not recover within a reasonable time.	During decommissioning and Closure	Site manager / ECO
	If it is found that vegetation does not establish within a reasonable time after top soiling was done, analyses will be done and the area seeded with a natural occurring vegetation if necessary.	During decommissioning and Closure	Site manager / ECO
Environmental monitoring and reporting	The mining and rehabilitation process will be monitored and controlled on a daily basis. Environmental incidents will be recorded monthly and reported in the annual performance assessment report.	During commissioning, operational and decommissioning phases	Site manager / SHE representative / ECO
	The establishment of alien vegetation will be monitored through weekly visual checks and any such vegetation manually removed.	During commissioning, operational and decommissioning phases	Site manager / ECO
	The site will be inspected for erosion on a weekly basis. Areas with excessive erosion will be reinstated and appropriate measures will be implemented to prevent reoccurrence.	During commissioning, operational and decommissioning phases	Site manager / ECO



Aspect	Recommended management/mitigation	Phase	Responsible person
Environmental monitoring and reporting	Visual checks of the banks of the river will be undertaken on a weekly basis to identify any potential instable areas. Measures such as erosion control, storm water control and stabilisation control will be implemented to mitigate any instability risk areas.	During commissioning, operational and decommissioning phases	Site manager / ECO
	Any complaints received from I&APs and regarding non-compliance with the EMPr will be recorded and measures will be implemented to mitigate the non-compliance.	During commissioning, operational and decommissioning phases	Site manager / ECO
	An annual performance assessment will be undertaken. A financial provision review will form part of this assessment.	During operational and decommissioning phases	Independent consultant