

APPENDIX D: DETAILED ASSESSMENT OF POTENTIAL IMPACTS

Potential biophysical, cultural/heritage and socio-economic impacts were identified by SLR, specialists and I&APs. These impacts are discussed under the relevant headings in this section. It should be noted that cumulative impacts and latent impacts are discussed where relevant.

SLR's impact assessment methodology used to rate each impact is outlined in section 7.6. The potential impacts are rated with the assumption that no management actions (which assumes that no consideration is given to the mitigation of environmental and social impacts) are applied and then again with management actions which is the mitigated scenario and represents the residual impact. A summary of the impact assessment is provided in chapter 9.

Management actions identified to prevent, reduce, control or remedy the assessed negative impacts, or enhance positive impacts are provided under the relevant impact discussions sections.

It is important to note that while the impacts identified below relate to the Operation Phase of the proposed project, this does not indicate that impacts were not considered during other phases of development, i.e. Planning, Decommissioning and Closure Phases. Impacts were considered during all phases of development; however, were not considered significant in the context of the proposed development.

1. IMPACT ON SOILS DUE TO SOIL EROSION

1.1 DESCRIPTION OF IMPACT

Soil is a valuable resource that supports a variety of ecological functions and is key to re-establishing post-closure land capability. A number of activities arising from the proposed project have the potential to disturb soil through erosion. Soil erosion is a measurable deterioration that will occur as a result of vegetation removal from the soil surface.

1.2 IMPACT ASSESSMENT

1.2.1 Operation Phase

1.2.1.1 Potential Impacts

Soil erosion will result in a minor deterioration in soils and land capability as a result of vegetation removal and topsoil stripping prior to the undertaking of drilling and trenching activities associated with the proposed project. Soil erosion will affect the soils' ability to sustain natural vegetation and may alter land capability; however, it is anticipated that trenches will be dug, samples removed, trenches closed, and soil levelled – all in one phase. It follows that the risk of soil erosion will be a short-term risk and will be localised. With mitigation, the extent of the impact can be reduced from Low to Very Low, but the duration of the impact will remain the same. The impact significance is **VERY LOW** with and without mitigation (see Table 1).

Table 1: Impact Summary – Operation Phase: Soil Erosion

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Very minor change or disturbance (VL)
Duration	Short-term (L)	Short-term (L)
Extent	Whole site (L)	A part of the site (VL)
Consequence	Low (L)	Very Low (VL)
Probability	Possible (M)	Possible (M)
Significance	Very Low (VL)	VERY LOW (VL)
Nature of cumulative impacts		
	The soils found in the proposed project area have a Moderate land capability indicating an arable or grazing land capability. The cumulative impact is considered to be Low, as there are no crop fields in the vicinity and it is assumed that livestock will continue to graze around the PR area.	
Degree to which impact can be reversed	Post decommissioning of the project the soils can be reinstated. Due to the limited extent and duration, there is a high degree of reversal.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.	
Residual impacts	The residual impact is considered to be Very Low.	

1.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Vegetation clearance must be limited to only the areas where trenching will be undertaken, and boreholes drilled.
- Vegetation clearance must be planned for dry seasons, i.e late Autumn, winter and early spring, as far as possible.
- Following heavy rains, access roads and adjacent areas must be inspected for signs of erosion and rectified if necessary.

1.2.1.3 Monitoring

Monitoring of trenches once they have been closed must be undertaken for up to one year after the conclusion of prospecting activities, so as to ensure that the natural vegetation has re-established itself.

2. DISTURBANCE OF ORIGINAL SOIL PROFILES

2.1 DESCRIPTION OF IMPACT

As mentioned previously, soil is a valuable resource that supports a variety of ecological functions and is key to re-establishing post-closure land capability. The distribution and profile of specific soil forms are closely linked to topography and parent materials. The better drained soils are generally associated with a less basic parent material; while the more structured and more clay rich (less easily drained) soils are

associated with the intrusive, basic parent material. Trenching and drilling activities associated with the proposed project have the potential to disturb soil profiles and horizon sequences.

2.2 IMPACT ASSESSMENT

2.2.1 Operation Phase

2.2.1.1 Potential Impacts

The drilling and trenching activities associated with the proposed project have the potential to result in the disturbance of original soils profiles, thereby affecting the soils' ability to sustain natural vegetation and alter land capability. During trenching parent materials underneath will be brought to the surface and be stockpiled. This may result in the disturbance of original horizon sequences and the creation of a mixture of soil materials that are returned to the trenches after the removal of samples. The extent of the impact will be limited, as it will only affect the areas where trenching will take place. The duration will; however, vary in the unmitigated and mitigated scenario, ranging from Permanent to Low, respectively. The impact significance is Low without mitigation, and **VERY LOW** with mitigation (see Table 2).

Table 2: Impact Summary – Operation Phase: Disturbance of Original Soil Profiles

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Very minor change or disturbance (VL)
Duration	Long-term (H)	Short-term (L)
Extent	A part of the site (VL)	A part of the site (VL)
Consequence	Low (L)	Very Low (VL)
Probability	Probable (H)	Possible (M)
Significance	Low (L)	VERY LOW (VL)
Nature of cumulative impacts		
	The soils found in the proposed project area have a Moderate land capability indicating an arable or grazing land capability. The cumulative impact is considered to be Low, as there are no crop fields in the vicinity and it is assumed that livestock will continue to graze around the PR area.	
Degree to which impact can be reversed	Post decommissioning of the project the soils can be reinstated. Due to the limited extent and duration, there is a high degree of reversal.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.	
Residual impacts	The residual impact is considered to be Very Low.	

2.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Soil removal must be limited to only the areas where trenching will be undertaken.
- Removed topsoil and underlying soil must be stockpiled separately from underlying parent material.

- Trenches must not be filled with soils removed from other trenches
- Rehabilitation of trenches must first include the replacement of rock and parent material, then topsoil.

2.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring should be undertaken to identify any potential soil profile disturbance issues and to ensure proposed mitigation measures are enforced.

3. IMPACT ON SOILS DUE TO CHEMICAL POLLUTION

3.1 DESCRIPTION OF IMPACT

Mining-related projects in general have the potential to result in the loss of or damage of soil resources through contamination. Contamination of soil resources could result from accidental spillages of hydrocarbons and other hazardous materials (unplanned events), leading to an altered soil chemistry which could in turn result in a decrease in the rehabilitation and post-closure land use potential.

3.2 IMPACT ASSESSMENT

3.2.1 Operation Phase

3.2.1.1 Potential Impacts

The proposed prospecting activities will be undertaken using vehicles, plant and other earthmoving equipment. The day-to-day operation during prospecting presents a continued risk of soil pollution which may result from incidents such as spills from machinery, vehicles and plant and from leaks from chemical storage areas. Soil chemical pollution is considered to be a moderate negative impact on the soil resource, is a temporary impact that can be reversed, and will be localised within the site boundary. The impact significance is likely to be Medium without mitigation, but with proper waste management and immediate clean-up measures, the significance can be reduced to **VERY LOW** (see Table 3).

Table 3: Impact Summary – Operation Phase: Soil Chemical Pollution

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Minor change or disturbance (L)
Duration	Long-term (H)	Long-term (H)
Extent	Whole site (L)	A part of the site (VL)
Consequence	Medium (M)	Low (L)
Probability	Probable (H)	Possible (M)
Significance	Medium (M)	VERY LOW (VL)

Nature of cumulative impacts	The soils found in the proposed project area have a Moderate land capability indicating an arable or grazing land capability. The cumulative impact is considered to be Low, as there are no crop fields in the vicinity, and it is assumed that livestock will continue to graze around the PR area.
Degree to which impact can be reversed	Post decommissioning of the project the soils can be reinstated. Due to the limited extent and duration, there is a high degree of reversal.
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.
Residual impacts	The residual impact is considered to be Very Low.

3.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Spillages of fuel, lubricants etc. from oil sumps and steering racks of vehicles and equipment must be contained using drip trays filled with plastic sheeting and absorbent material.
- The use of biodegradable hydraulic fluids, lined sumps for the collection of hydraulic fluids, recovery and treatment of contaminated soils and the safe storage of dried waste mud by burying it in a purpose-built containment area must be implemented.
- Waste disposal on site must be avoided wherever possible, by segregating, trucking out and recycling waste off-site.
- Spills kits, to remediate and clean up hazardous leaks and spills, must be kept on site at all times.
- Spillages of potentially contaminating liquids and solids must be cleaned up immediately.
- Implement the emergency response procedures as outlined in Table 29-1.

3.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring should be undertaken to identify any potential hydrocarbon/hazardous material spillages and to ensure proposed mitigation measures are implemented.

4. LOSS OF FLORAL HABITAT AND DIVERSITY

4.1 DESCRIPTION OF IMPACT

The proposed project will require the removal of approximately 1 ha of vegetation for the construction of temporary structures associated with the operation phase such as, site camps and equipment parking areas, as well as in the development footprint i.e. the areas where trenching and prospecting activities will be undertaken.

4.2 IMPACT ASSESSMENT

4.2.1 Operation Phase

4.2.1.1 Potential Impacts

The proposed project will result in the localised clearance of vegetation which may lead to a loss of floral habitat diversity within the area. While the clearing activities could result in the loss of species diversity

within the project footprint, it is not likely that floral communities in the surrounding area will be affected. Furthermore, given that no borehole sinking or trenching activities will be undertaken within the Freshwater Habitat (floral communities ranging from semi- to strongly riparian in nature), and given the largely modified and degraded nature of the Thornveld Habitat and Degraded Thornveld Habitat units identified on site, and the associated moderately low sensitivity of the environment from a floral perspective, the intensity of the impact is Medium in the unmitigated scenario. The Freshwater Habitat is susceptible to indirect, edge effects, therefore the implementation of mitigation measures will be key to limiting the impact in this moderately sensitive area. The implementation of mitigation measures would limit the proliferation of alien and invasive species, woody encroachment and erosion. In the unmitigated scenario the impact significance is rated as Medium. This can be reduced to **LOW** with mitigation (see Table 4).

Table 4: Impact Summary – Operation Phase: Loss of Floral Habitat and Diversity

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change or disturbance (M)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Whole site and surrounds (M)	Part of the site (L)
Consequence	Medium (M)	Low (L)
Probability	Definite (VH)	Probable (H)
Significance	Medium (M)	LOW (L)
Nature of cumulative impacts		
	Possible loss of floral habitat and species diversity outside of the project footprint due to footprint creep or poorly managed edge effects. Proliferation of alien and invasive species.	
Degree to which impact can be reversed		
	Clearance of land would be for temporary prospecting activities. It follows that there is a High, degree to which the impact can be reversed.	
Degree to which impact may cause irreplaceable loss of resources		
	The degree to which the impact may cause irreplaceable loss of resources is Very Low.	
Residual impacts		
	The residual impact is considered to be Low.	

4.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Planning Phase:
 - Minimise the loss of indigenous vegetation through adequate planning by considering the sensitivity map of the Terrestrial Biodiversity Study.
 - All prospecting equipment must be in a good working order, so as to prevent potential spills and leaks.
 - An alien and invasive Plant Management Plan must be compiled for implementation. The following must be taken into consideration in the compilation of the Plan:
 - Removal of alien and invasive species must be undertaken during the operation phase and continue through the rehabilitation phase.
 - No alien and invasive plant propagules must be allowed to spread.
 - The Plan must be implemented by a qualified professional.

- Chemical control of alien and invasive plants must not occur without the input of a certified professional and/or within the Freshwater Habitat.
 - A Rehabilitation Plan must be compiled for implementation. The following must be taken into consideration in the compilation of the Rehabilitation Plan:
 - The Rehabilitation Plan must consider all phases of prospecting activities indicating rehabilitation actions to be undertaken during prospecting activities and once prospecting has been completed.
 - Any natural areas disturbed beyond the project footprint must be rehabilitated using indigenous species.
 - Rehabilitation must be implemented concurrently where possible, and disturbed areas must be rehabilitated as soon as these areas become available.
 - Rehabilitation must be done in such a way so as to ensure that the habitat that was present prior to project activities is recreated.
 - Rehabilitation must be implemented to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated.
 - A Dust Management Plan must be designed and compiled for implementation.
- Operation Phase:
 - The prospecting footprint must be kept as small as possible to minimise the impact on the surrounding environment.
 - The prospecting footprint must be demarcated so as to ensure that prospecting activities are restricted to those areas. Shade cloth/barrier mesh fencing is considered preferable as this will provide for visual obstruction for faunal species.
 - Appropriate sanitary facilities must be provided for staff and waste must be removed to an appropriate waste disposal site.
 - Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved project footprint.
 - Existing access roads must be used as far as possible. Any additional road construction must be limited to what is absolutely necessary.
 - Collection of indigenous floral species must not be allowed.
 - All compacted soils must be ripped, profiled and re-seeded as soon as possible.
 - The spread of alien and invasive species must be managed. Any removed alien species must not be allowed to lay on unprotected ground as seeds may disperse upon it. All cleared material must be disposed of at a licenced waste facility that complies with legal standards.
 - Any spills/leaks from plant and equipment must be cleaned up immediately and disposed of at a licensed facility.
 - Upon completion of prospecting activities, no bare areas must remain. Indigenous species must be used to revegetate the disturbed area.
 - No fires must be made on site during operations.
 - No dumping of litter must be allowed on site.

4.2.1.3 Monitoring

- A Floral Monitoring Plan must be designed and implemented throughout all phases. Permanent plots must be established within the target area and surrounding area (reference). These plots must be designed to accurately monitor the following parameters:
 - Species diversity and abundance.
 - Proliferation of indigenous species and of alien and invasive species, including alien vs indigenous plant ratios.

- Erosion levels and efficacy of erosion control measures.
- Vegetation community structures, including species composition and diversity, which must be compared to pre-development conditions and work towards the post-closure objectives.
- Monitoring of all natural areas must continue throughout the Decommissioning and Rehabilitation Phases to ensure systems are not adversely affected by associated activities.
- The Rehabilitation Plan must be continuously updated in line with monitoring results.
- The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

5. LOSS OF FLORAL SCC

5.1 DESCRIPTION OF IMPACT

The proposed project will require the removal of vegetation for the construction of temporary structures associated with the operation phase such as site camps and equipment parking areas, as well as in the development footprint i.e. the areas where trenching and prospecting activities will be undertaken. Floral SCC may be disturbed if they are located within the footprint of the prospecting activities.

5.2 IMPACT ASSESSMENT

5.2.1 Operation Phase

5.2.1.1 Potential Impacts

The proposed project will result in the localised clearance of vegetation which may lead to a loss of floral SCC within the area. While the prospecting activities would be associated with the loss of floral SCC within the project footprint, it is not likely that floral SCC in the surrounding area will be affected. No floral SCC were recorded within the habitat units; however, the propensity of the area to support SCC is considered to be moderate to high. The Freshwater Habitat identified on site is considered representative of the CBA 2 area (as identified within the North West Biodiversity Sector Plan 2015); however, the proposed prospecting activities will not be undertaken within this area. The implementation of mitigation measures would limit the impact of edge effects in this area. In the unmitigated scenario the impact significance is rated as Medium. This can be reduced to **LOW** with mitigation (see Table 5).

Table 5: Impact Summary – Operation Phase: Loss of Floral SCC

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change or disturbance (M)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Whole site and surrounds (M)	Part of site (L)
Consequence	Medium (M)	Low (L)
Probability	Probable (H)	Probable (H)
Significance	Medium (M)	LOW (L)

Nature of cumulative impacts	Possible loss of floral SCC outside of the project footprint due to footprint creep or poorly managed edge effects. Proliferation of alien and invasive species.
Degree to which impact can be reversed	Due to the nature of environmental sensitivity, there is a High degree to which the impact can be reversed.
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Very Low.
Residual impacts	The residual impact is considered to be Low.

5.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Planning Phase:
 - Prior to the commencement of any prospecting activities, a summer season walkthrough of the site must be undertaken by a suitably qualified professional to identify and mark all floral SCC within the project footprint.
 - If floral SCC are encountered within the project footprint, these species must, where possible, be relocated to suitable habitat surrounding the project footprint.
 - Appropriate permits must be obtained prior to the relocation of any floral SCC.
- Operation Phase:
 - No collection of floral SCC must be allowed.

5.2.1.3 Monitoring

Monitoring of rescued and relocated floral SCC must be undertaken and continue through to the rehabilitation phase, until it is evident that the species has successfully established itself.

6. LOSS OF FAUNAL HABITAT AND DIVERSITY

6.1 DESCRIPTION OF IMPACT

The proposed project will require the removal of vegetation for the construction of temporary structures associated with the operation phase such as site camps and equipment parking areas, as well as in the development footprint i.e. the areas where trenching and prospecting activities will be undertaken.

6.2 IMPACT ASSESSMENT

6.2.1 Operation Phase

6.2.1.1 Potential Impacts

The proposed project will result in the localised clearance of vegetation which may lead to a loss of faunal habitat and species diversity within the area. While the prospecting activities would be associated with the loss of faunal habitat and species diversity within the project footprint, it is not likely that faunal communities in the surrounding area will be affected. The faunal habitat on site is already in a degraded and modified state, therefore it follows that the intensity of the impact is only Moderate. Where mitigation measures are implemented, the extent and nature of impacts to faunal communities can be decreased to

Low. In the unmitigated scenario the impact significance is rated as Medium. This can be reduced to **LOW** with mitigation (see Table 6).

Table 6: Impact Summary – Operation Phase: Loss of Faunal Habitat and Diversity

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change or disturbance (M)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Whole site and surrounds (M)	Whole site (L)
Consequence	Medium (M)	Low (L)
Probability	Definite (VH)	Probable (H)
Significance	Medium (M)	LOW (L)
Nature of cumulative impacts		
	Possible loss of faunal habitat and species diversity outside of the project footprint due to footprint creep or poorly managed edge effects. Proliferation of alien and invasive species.	
Degree to which impact can be reversed	Clearance of land for temporary prospecting activities. It follows that there is a High degree to which the impact can be reversed.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Very Low.	
Residual impacts	The residual impact is considered to be Low.	

6.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- No hunting/trapping/collection of faunal species must be allowed.
- Barrier fencing must be erected around sections that will be excavated in order to prevent faunal species from accessing the prospecting site.
- Smaller species of invertebrates and reptiles are likely to be less mobile during colder periods. Should any be observed in the footprint areas during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Operational personnel are to be educated about these species and the need for their conservation. Harmless reptiles should be carefully relocated by a suitably nominated person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own.

6.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be undertaken to identify instances of destruction to faunal habitat and diversity on and adjacent to site and to ensure proposed mitigation measures are implemented.

7. LOSS OF FAUNAL SCC

7.1 DESCRIPTION OF IMPACT

The proposed project will require the removal of vegetation for the construction of temporary structures associated with the operation phase such as site camps and equipment parking areas, as well as in the development footprint such as the areas where trenching and prospecting activities will be undertaken. Faunal SCC may be disturbed if they are located within the footprint of the prospecting activities.

7.2 IMPACT ASSESSMENT

7.2.1 Operation Phase

7.2.1.1 Potential Impacts

The proposed project will result in the localised clearance of vegetation which may lead to a loss of faunal SCC within the area. While the prospecting activities could be associated with the loss of faunal SCC within the project footprint, it is not likely that faunal SCC in the surrounding area will be affected. No faunal SCC were recorded within the habitat units; however, the propensity of the area to support SCC is considered to be moderate to high due to large cliff faces which exist within 2 km of the project area. This area provides ideal roosting and breeding locations for various avifaunal SCC and while they may be located a distance from the project area, the faunal species may forage across the project area and surrounds. The implementation of mitigation measures would limit the impact of edge effects. In the unmitigated scenario the impact significance is rated as Medium. This can be reduced to **LOW** with mitigation (see Table 7).

Table 7: Impact Summary – Operation Phase: Loss of Faunal SCC

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change or disturbance (M)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Whole site and surrounds (M)	Part of site (L)
Consequence	Medium (M)	Low (L)
Probability	Probable (H)	Probable (H)
Significance	Medium (M)	LOW (L)
Nature of cumulative impacts		
	Possible loss of faunal SCC outside of the project footprint due to footprint creep or poorly managed edge effects. Proliferation of alien and invasive species.	
Degree to which impact can be reversed	Due to the extent and nature of environmental sensitivity, there is a High degree to which the impact can be reversed.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Very Low.	
Residual impacts	The residual impact is considered to be Low.	

7.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Planning Phase:
 - Prior to the commencement of any prospecting activities, a walkthrough of the site must be undertaken to identify all faunal SCC within the project footprint.
 - If faunal SCC are encountered within the project footprint, these species must, where possible, be relocated to suitable habitat surrounding the project footprint.
 - Appropriate permits must be obtained prior to the relocation of any faunal SCC.
- Operation Phase:
 - No collection of faunal SCC must be allowed.
 - In the event of the encounter of faunal SCC, an appropriate relocation plan, guided by relevant specialists and provincial authorities, must be compiled and implemented.

7.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be undertaken to identify instances of destruction to faunal SCC and to ensure proposed mitigation measures are enforced.

8. SEDIMENTATION OF SURFACE WATER RESOURCES

8.1 DESCRIPTION OF IMPACT

The proposed project has the potential to present a risk to surface water resources. The low risk of impacts on watercourses is as a result of the ephemeral nature of the Mothlabe River; the location of the proposed prospecting activities; and the moderately modified ecological condition of the Mothlabe River.

8.2 IMPACT ASSESSMENT

8.2.1 Operation Phase

8.2.1.1 Potential Impacts

The clearing of natural vegetation and stripping and stockpiling of topsoil during prospecting activities could result in increased runoff of sediment from the project area into watercourses located downstream. Water flowing down trenches and access roads, as well as the movement of vehicles, plant equipment and personnel during operation, could cause additional sediment to accumulate in downstream areas. The potential siltation of riparian systems downstream could alter geomorphologic functioning, hydrological functioning, as well as impact on water quality. While unlikely, the impact will be exacerbated during periods of high rainfall where the implementation of mitigation measures becomes essential. Due to the ephemeral nature of the Mothlabe River; the location of the proposed prospecting activities; and the moderately modified ecological condition of the Mothlabe River, the intensity of the impact is considered to be Low. This impact has been rated as being Very Low without mitigation and can be reduced to **INSIGNIFICANT** with mitigation (see Table 8).

Table 8: Impact Summary – Operation Phase: Sedimentation of Surface Water Resources

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Beyond the site boundary (M)	A part of the site (VL)
Consequence	Low (L)	Low (L)
Probability	Possible (M)	Unlikely (VL)
Significance	Very Low (L)	INSIGNIFICANT
Nature of cumulative impacts		
	Due to the ephemeral nature of the Motlabe River; the location of the proposed prospecting activities; the moderately modified ecological condition of the Motlabe River and the unlikely event of high rainfall periods the cumulative impact is Low.	
Degree to which impact can be reversed	Post decommissioning of the project sedimentation within the watercourse can be cleared. It follows that there is a High degree of reversal.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.	
Residual impacts	The residual impact is considered to be Insignificant.	

8.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Sheet runoff from compacted areas should be slowed down by the strategic placement of berms.
- It is considered ideal that activities occur within the dry season (low rainfall) to minimise impacts of sedimentation.
- As much vegetation growth as possible (of indigenous floral species) must be encouraged to protect soils.
- Temporary stockpiling of excavated material from trenches must be retained alongside trenches, as required for backfilling. Any soil to be stockpiled for longer than a month must be moved to a designated stockpile area which should be located outside the 32 m zone of regulation, as approved by the EO.
- All soils compacted during the repair and maintenance phase must be ripped and profiled.

8.2.1.3 Monitoring

A monitoring plan for the development and the immediate zone of influence must be implemented to prevent erosion and incision. Visual monitoring can also be undertaken to identify potential instances that could lead to sedimentation and to ensure proposed mitigation measures are enforced.

9. CONTAMINATION OF SURFACE WATER RESOURCES

9.1 DESCRIPTION OF IMPACT

The proposed project has the potential to present a risk to surface water quality. Due to the ephemeral nature of the Mothlabe River, the location of the proposed prospecting activities; and the moderately modified ecological condition of the Mothlabe River the risk is considered to be low.

9.2 IMPACT ASSESSMENT

9.2.1 Operation Phase

9.2.1.1 Potential Impacts

The proposed prospecting activities have the potential to present additional sources of surface water contamination. Potential contamination sources include accidental spills and leaks from trucks, plant, equipment and vehicles. At elevated pollution concentrations, these contaminants can be harmful and can have long-term impacts on downstream surface water users such as livestock. The project is located adjacent to the Mothlabe River, which means contamination of the site could likely find its way into downstream environments during high rainfall events. However, due to the ephemeral nature of the Mothlabe River; the location of the proposed prospecting activities; and the moderately modified ecological condition of the Mothlabe River, the intensity of the impact is considered to be Low. This impact has been rated as being Very Low without mitigation and can be reduced to **INSIGNIFICANT** with mitigation (see Table 9).

Table 9: Impact Summary – Operation Phase: Contamination of Surface Water Resources

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Beyond the site boundary (M)	A part of the site (VL)
Consequence	Low (L)	Low (L)
Probability	Possible (H)	Unlikely (VL)
Significance	Very Low (L)	INSIGNIFICANT
Nature of cumulative impacts		
	Due to the ephemeral nature of the Mothlabe River; the location of the proposed prospecting activities; the moderately modified ecological condition of the Mothlabe River and the unlikely event of high rainfall periods the cumulative impact is Low.	
Degree to which impact can be reversed	Post decommissioning of the project sedimentation within the watercourse can be cleared. It follows that there is a High degree of reversal.	
Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.	
Residual impacts	The residual impact is considered to be Insignificant.	

9.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- The development footprint must remain as small as possible and should only encroach into the freshwater ecosystem if considered absolutely essential.
- The boundaries of the prospecting area, including contractor laydown areas, must be clearly defined and it must be ensured that all activities remain within defined footprint areas. Edge effects must be carefully controlled.
- Planning of temporary roads and access routes must avoid freshwater ecosystem areas and be restricted to existing roads which traverses the freshwater ecosystem.
- Appropriate sanitary facilities must be provided for all phases of the project.
- All waste must be removed to an appropriate licensed waste facility.
- All hazardous chemicals, as well as stockpiles, must be stored in sealed containers (where possible) and on bunded surfaces and have facilities constructed to control runoff from these areas.
- All hazardous storage containers and storage areas must comply with the relevant SABS standards to prevent leakage.
- No fires should be permitted in or near the project area.
- An adequate number of waste bins and spill kits must be provided.
- Implement the emergency response procedures as outlined in Table 29-1.

9.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be undertaken to identify any potential hydrocarbon/hazardous material spillages and to ensure proposed mitigation measures are implemented.

10. CONTAMINATION OF GROUNDWATER RESOURCES

10.1 DESCRIPTION OF IMPACT

Groundwater is a valuable resource and is defined as water which is located beneath the ground surface in soil/rock pore spaces and in the fractures of lithological formations. Mining-related projects in general, have the potential to contaminate groundwater resources, through accidental leaks and spills from plant, equipment and materials stored and used on site.

10.2 IMPACT ASSESSMENT

10.2.1 Operation Phase

10.2.1.1 Potential Impacts

The proposed project presents a potential for long-term contamination through accidental spills and leaks from trucks, plant, equipment and vehicles, that may seep into the ground and affect groundwater resources. At elevated pollution concentrations, these contaminants can be harmful; however, due to the limited duration and extent of the proposed project, as well as the required mitigation measures around spill clean up, this impact has been rated as being **INSIGNIFICANT**.

11. REDUCED AIR QUALITY

11.1 DESCRIPTION OF IMPACT

Mining-related projects in general have the potential to affect nearby AQSRs during general operations, including activities associated with material handling, vehicle entrainment from unpaved roads and from the release of emissions from smelters or similar developments. AQSR generally include places of residences and areas where members of the public may be affected by air pollution.

11.2 IMPACT ASSESSMENT

11.2.1 Operation Phase

11.2.1.1 Potential Impacts

The proposed project presents a number of sources that can have a negative impact on the ambient air quality and surrounding land uses. Sources include clearing of vegetation, materials handling, wind erosion from stockpiles and disturbed areas, as well as vehicle tailpipe emissions from plant, equipment and vehicles. The afore-mentioned activities will be localised during operation but have the potential to disturb AQSRs. No AQSRs are located within the proposed PR area (proposed 5 ha area); however, potential AQSRs such as smaller towns and villages located further afield include Mabeleleng (± 4 km south); Tlhatlhaganyane (± 7 km east); Makgope (± 8 km north-west); and Mkoshong (± 4.5 km south-west). It is; however, important to note that the proposed project does not present additional sources of air pollution that differ from those in the existing area, with specific reference to and in the context of the existing illegal mining activities. In this regard, the intensity of the impact is considered to be Low. This impact has been rated as being Very Low without mitigation and can be reduced to **INSIGNIFICANT** with mitigation (see Table 10).

Table 10: Impact Summary – Operation Phase: Reduced Air Quality

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Beyond the site boundary (M)	A part of the site (VL)
Consequence	Low (L)	Low (L)
Probability	Possible (H)	Unlikely (VL)
Significance	Very Low (L)	INSIGNIFICANT
Nature of cumulative impacts	Due to the location of the proposed prospecting activities in proximity to AQSRs and within the context of existing illegal mining activities, the cumulative impact is Low.	
Degree to which impact can be reversed	Due to the nature and source of impact on air quality, this impact has a High degree of reversibility.	

Degree to which impact may cause irreplaceable loss of resources	The degree to which the impact may cause irreplaceable loss of resources is Low.
Residual impacts	The residual impact is considered to be Insignificant.

11.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Dust suppression measures (wet and dry) must be implemented to minimise the dust generated from vegetation clearing, topsoil stockpiling and material handling activities.
- Vehicle exhaust emissions must be reduced through the use of better-quality diesel.
- Inspection and maintenance programmes for all plant and equipment must be implemented.

11.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be undertaken to identify any dust generating activities and to ensure proposed mitigation measures are implemented.

12. INCREASE IN DISTURBING NOISE LEVELS

12.1 DESCRIPTION OF IMPACT

Mining activities and infrastructure have the potential to cause an increase in ambient noise levels that may cause a disturbance to nearby NSRs. Impacts are anticipated to result in localised noise impacts only.

12.2 IMPACT ASSESSMENT

12.2.1 Operation Phase

12.2.1.1 Potential Impacts

The noise-generating activities associated with the proposed project include movement of vehicles, trenching and borehole drilling and access control. The afore-mentioned activities will be localised during operation but have the potential to disturb NSRs. No NSRs are located within the proposed PR area (proposed 5 ha area); however, potential NSRs such as smaller towns and villages located further afield include Mabeleleng (± 4 km south); Tlhatlhaganyane (± 7 km east); Makgope (± 8 km north-west); and Mkoshong (± 4.5 km south-west). It is; however, important to note that the proposed project does not present additional sources of noise that differ from those in the existing area, with specific reference to and in the context of the existing illegal mining activities. The noise-generating activities will be limited to the day-time, as well as be limited in duration and extent. In this regard, the intensity of the impact is considered to be Low. This impact has been rated as being Very Low without mitigation and can be reduced to **INSIGNIFICANT** with mitigation (see Table 11).

Table 11: Impact Summary – Operation Phase: Increase in Disturbing Noise Levels

Phase: Operation		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance (L)	Minor change or disturbance (L)
Duration	Short-term (L)	Short-term (L)
Extent	Beyond the site boundary (M)	A part of the site (VL)
Consequence	Low (L)	Low (L)
Probability	Possible (H)	Unlikely (VL)
Significance	Very Low (L)	INSIGNIFICANT
Nature of cumulative impacts		
	Due to the location of the proposed prospecting activities in proximity to NSRs and within the context of existing illegal mining activities, the cumulative impact is Low.	
Degree to which impact can be reversed		
	Due to the nature and source of noise associated with the proposed prospecting activities, this impact has a High degree of reversibility.	
Degree to which impact may cause irreplaceable loss of resources		
	The degree to which the impact may cause irreplaceable loss of resources is Low.	
Residual impacts		
	The residual impact is considered to be Insignificant.	

12.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- Prospecting activities must be limited to the daytime.
- A grievance mechanism/procedure must be implemented in the event of a noise-related complaint.

13. NEGATIVE VISUAL IMPACTS

13.1 DESCRIPTION OF IMPACT

Mining activities and infrastructure have the potential to alter the landscape character of an area through the establishment of infrastructure. Although the project area is considered to have a low scenic quality, the flat savanna plains and treed hills are considered to have a moderate to high value. The proposed prospecting activities may be visible from the following areas, The Black Rhino Nature Reserve (higher elevations); and The Pilanesberg National Park (through the “poort” access to the park).

13.2 IMPACT ASSESSMENT

13.2.1 Operation Phase

13.2.1.1 Potential Impacts

Majority of the proposed prospecting will be undertaken within a 5 ha area and within an area where illegal mining activities are currently being undertaken. It follows that the proposed project is unlikely to generate additional negative views that would be noticeable in the context of an environment which is already

characterised by mining activities. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

14. ROAD DISTURBANCE AND TRAFFIC SAFETY

14.1 DESCRIPTION OF IMPACT

Traffic from mining projects has the potential to affect the capacity of existing road networks, as well as result in public road safety issues. There is an existing network of roads that provide access to PPM which include the regional P54-1; the regional tarred R510 through Saulspoort/Moruleng; the gravel P50-1 that links the P54-1 and R510; the D511 gravel road; the D531 gravel road; and the Z536 gravel road running south from Ngweding. Minimal traffic impact is; however, expected during operation.

14.2 IMPACT ASSESSMENT

14.2.1 Operation Phase

14.2.1.1 Potential Impacts

The proposed project will require some movement of heavy vehicles and a small number of passenger cars as the proposed project components have very few requirements for external materials or labour during the operation phase. Due to the nature, extent and duration of the proposed project, traffic is likely to be immaterial to the current baseline and any impact would be negligible. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

15. LOSS OF CULTURAL/HERITAGE RESOURCES

15.1 DESCRIPTION OF IMPACT

Mining infrastructure has the potential to impact on cultural/heritage resources through the placement of infrastructure and physical disturbance. Possible rudimentary stone walled sites may be located within the northern-most section of the proposed PR area.

15.2 IMPACT ASSESSMENT

15.2.1 Operation Phase

15.2.1.1 Potential Impacts

Possible cultural/heritage resources may be located within the northern-most section of the proposed PR area; however, due to the lack of the possibility of undertaking a site visit, the presence of these features could not be confirmed. Should the presence of these features be established, the proposed project may impact these resources. However, it is unlikely that these resources are located in the footprint. The significance of the impact has been rated as **VERY LOW**, before and after mitigation.

15.2.1.2 Mitigation Measures

The following mitigation measures should be implemented:

- The stone walled sites must be avoided by all developmental activities.

- An archaeological walk-over of the northern most parts of the project area and all borehole and trenches must be undertaken prior to construction and a report submitted to SAHRA for commenting. SAHRA reserves the right to object to the development pending the results of the walk-down.
- In the event of the uncovering of a heritage resource, implement the following chance find procedure:
 - The person or group (identifier) who identified or exposed the heritage resource or graves must cease all activity in the immediate vicinity of the site.
 - The identifier must immediately inform the senior on-site manager of the discovery.
 - The senior on-site manager must make an initial assessment of the extent of the find and confirm that further work has stopped and ensure that the site is secured, and that controlled access is implemented.
 - The senior on-site manager will inform the EO and H&S officers of the chance-find and its immediate impact on the project. The EO will then contact the project archaeologist.
 - If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Elijah Katsetse/Phillip Hine 021 462 4502) must be alerted as per section 35(3) of the NHRA.
 - Based on the comments received from the authorities the project archaeologist will provide the mine with a Terms of References Report and associated costs if mitigation measures must be implemented.
- In the event of the uncovering of grave, implement the following chance find procedure:
 - The project archaeologist must confirm the presence of graveyards and graves and follow the following procedures.
 - Inform the local SAPS and traditional authority.
 - The project archaeologist in conjunction with the SAPS and traditional authority will inspect the possible graves and make an informed decision whether the remains are of forensic, recent, cultural-historical or of archaeological significance.
 - The project archaeologist will notify the SAHRA BGG Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490).
 - The project archaeologist will provide advice with mitigation measures for the graveyards and graves.
 - In the event of a chance-find, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

15.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be implemented to identify any cultural/heritage resources and to ensure proposed mitigation measures are enforced.

16. LOSS OF PALAEOLOGICAL RESOURCES

16.1 DESCRIPTION OF IMPACT

Intrusive work as is required for prospecting has the potential to impact on palaeontological resources through physical disturbance. The proposed PR area is located on the RLS and the Western Limb of the BIC.

The rocks of the RLS range from ultrabasic pyroxenites and anorthosites in the lower parts, to norite, gabbro and magnetite gabbro in the upper parts. They are of volcanic and plutonic origin and have been metamorphosed so they do not contain any fossils. In more recent times, the overlying sediments have been eroded from this region and replaced by Tertiary and Quarternary sands. This fluvial and aeolian sourced cover is extensive and covers large parts of the north-west and west of South Africa. These sands form one of the largest palaeo-ergs in the world.

16.2 IMPACT ASSESSMENT

16.2.1 Operation Phase

16.2.1.1 Potential Impacts

The proposed project has a very low chance of impacting on fossils. The proposed PR area is considered to be Moderately sensitive, as per SAHRA's paleo-sensitivity map; however, this sensitivity applies only to the surface deposits of sands and alluvium. Young sands such as these are unlikely to preserve fossils, because the medium is transported, loose and well-aerated so does not provide the necessary conditions. Sands may bury features that could preserve fossils, such as paleo-pans or paleo-springs. Pans are much more common further north-west. These features are generally visible on satellite imagery, and have not been identified within the PR area. It must also be noted that the proposed PR area and surrounds have been subjected to illegal mining activity. It is possible that this illegal mining activity could have disturbed any existing fossil material. The significance of the impact has been rated as **INSIGNIFICANT** before mitigation, however, the Chance Find Protocol must be implemented should any fossils be discovered during excavating activities.

16.2.1.2 Chance Find Protocol

The following mitigation measures should be implemented In the event of the uncovering of a paleontological resource on the surface or during prospecting activities:

- When excavations begin, the rocks must be given a cursory inspection by the ECO or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place so as not to interrupt project activities.
- Photographs of similar fossil plants must be provided to the Contractor to assist in recognizing the fossil plants in the shales and mudstones. This information must be built into the EMPr training and awareness plan and procedures.
- Photographs of the putative fossils must be sent to a palaeontologist for a preliminary assessment.
- If there is any possible fossil material found by the Contractor/EO/mine workers, then a palaeontologist must visit the site to inspect the selected material and check the dumps, where feasible.
- Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site, a permit from SAHRA must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- If no good fossil material is recovered, then no site inspections by a palaeontologist will be necessary. A final report by a palaeontologist must be sent to SAHRA once the project has been completed and only if fossils were found.
- If no fossils are found and the excavations have completed, then no further monitoring is required.

16.2.1.3 Monitoring

No formal monitoring programme is required; however, visual monitoring can be undertaken to identify any palaeontological resources and to ensure proposed mitigation measures are implemented.