	Activity	Impact	Direct/Indirect/Cumulative	Severity	Duration	Extent	C	Frequency	Probability	L	WoM	Mitigation Measure	Severity	Duration	Extent	C	Frequency	Probability	L	
A		Geology																		
A1	Placement of infrastructure and activities in close proximity to mineral resources	Loss and sterilisation of mineral resources		2	3	2	2,3	1	1	1	2,3	Not applicable	2	3	2	2,3	1	1	1	2,3
B		Soil																		
B1	Site clearance soil removal; Foot and vehicular movement on site	Loss of topsoil from the site.	Direct & Cumulative	2	3	1	2	3	2	2,5	5,0	Ensure the areas cleared are the minimum possible. Only areas where excavation or site establishment occurs are to be cleared. Mark out areas for clearance prior to clearing works.	1	3	1	1,7	3	2	2,5	4,2
		Increased erosion due to lack of vegetation coverage.	Direct	2	3	1	2	3	3	3	6,0	Ensure the areas cleared are the minimum possible. Only areas where excavation or site establishment occurs are to be cleared. The drilling site and temporary access roads should be appropriately grassed as soon as possible following completion to achieve a high basal cover. Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas. Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area.	1	3	1	1,7	2	2	2	3,3
B2	Stockpiling	Loss of nutrients from stockpiled soils due to leaching and increased erosion due to lack of vegetation coverage.	Direct	2	2	2	2,0	2	2	2	4,0	Topsoil must not be stockpiled for long periods, and natural vegetation establishment should be promoted. Stockpiles should be a sufficient distance from sensitive areas. The stockpile area should be vegetated or covered, or protected from high winds and rain.	2	2	2	2,0	2	1	1,5	3,0
B3	Storage of hazardous goods	Soil contamination from dirty water run-off and / or dirty water storage	Direct	1	2	1	1,3	2	3	2,5	3,3	Storage of hazardous materials / goods should be restricted to the hazardous storage cage placed in a drip tray.	1	2	1	1,3	2	1	1,5	2,0
B4	Parked vehicles leaking / dripping	Soil contamination from leaking or dripping hydrocarbons from parked vehicles	Direct	1	2	1	1,3	2	3	2,5	3,3	Vehicles or machinery should be well maintained and regularly inspected for leaks and faults. Vehicles or machinery should use drip trays if stationary for extended periods.	1	2	1	1,3	2	1	1,5	2,0
B5	Use of ablution facilities	Soil contamination from leaking or poorly maintained portable ablution facilities.	Direct	2	2	1	1,7	2	3	2,5	4,2	Ablution facilities must be well maintained and cleaned regularly. Dirty surface run-off should be directed to water-tight holding facilities i.e. contained on site,	2	2	1	1,7	2	1	1,5	2,5
B6	Rehabilitation post drilling activities	Loss of soil to erosion and sedimentation due to improper vegetation establishment.	Direct & Cumulative	2	2	1	1,7	2	3	2,5	4,2	Re-vegetation of cleared and disturbed areas must occur as soon as practical once the prospecting activities have shifted along. Open or bare soil must not be allowed to remain for extended periods. Continually monitor the progress/success of rehabilitation efforts and adapt if rehabilitation targets are not met in acceptable timeframes.	2	2	1	1,7	2	2	2	3,3
C		Land Use																		
C1	Drilling operations	Alternative land uses are not possible during the prospecting activities.	Direct	1	2	2	1,7	5	1	3	5,0	Not applicable	1	2	2	1,7	5	1	3	5,0
D		Hydrogeological																		
D1	Storage of hazardous goods	Leaks, spills of hazardous goods / materials during operation of the pit may seep into and contaminate ground water resources	Direct	2	3	2	2,3	3	2	2,5	5,8	Storage of hazardous materials / goods should be within an impermeable bund.	2	2	2	2,0	2	1	1,5	3,0
E		Hydrological																		
E1	Site clearance vegetation and soil removal	Loss of topsoil from the site and deposition into sensitive areas.	Direct & Cumulative	2	3	2	2,3	2	3	2,5	5,8	Topsoil must be removed and stockpiled separately for later use during rehabilitation. Erosion protection must be implemented to ensure sedimentation of surrounding areas is prevented.	2	3	2	2,3	2	2	2	4,7
E2	Use of ablution facilities by contractors	Potential contamination of surface water resources and surrounds to be contaminated by raw sewage.	Indirect	3	3	2	2,7	2	3	2,5	6,7	Portable septic toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage. Under no circumstances may ablutions occur outside of the provided facilities. No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority. In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately.	2	2	2	2,0	1	3	2	4,0
E3	Storage, handling, and use of dangerous or hazardous materials on site	Potential contamination of water sources due to hydrocarbon leaks/spills/improper storage and use.	Direct	3	2	2	2,3	2	3	2,5	5,8	Hydrocarbons and/or chemicals must be stored in an impermeable bund. SDS' must be readily available and only personnel trained in hydrocarbon handling should handle such materials. Spill kits must be well stocked and readily available to contain possible leaks and or spills. Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants. A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas. Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils. Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to an approved waste site. Concrete shall only be mixed on mixing trays and in areas which have been specially demarcated for this purpose. All concrete that is spilled outside these areas shall be promptly removed by the Contractor and taken to an approved dumpsite. After all the concrete / tar mixing is complete all waste concrete / tar shall be removed from the batching area and disposed of at an approved dumpsite. All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring.	2	2	1	1,7	2	3	2,5	4,2

	Activity	Impact	Direct/Indirect/Cumulative	Severity	Duration	Extent	C	Frequency	Probability	L	WoM	Mitigation Measure	Severity	Duration	Extent	C	Frequency	Probability	L	
E4	Incorrect disposal of waste	Litter deposited by the drilling contractor may be washed into wetlands and surface water bodies.	Direct	3	2	2	2,3	2	3	2,5	5,8	Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area. Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed. The construction site should be cleaned daily and litter removed. Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.	2	1	2	1,7	2	2	2	3,3
E5	Storm water management	Contamination of storm water due to site establishment and drilling activities	Direct	2	3	2	2,3	3	3	3	7,0	The determination and separation of clean and dirty water areas should be implemented via a storm water management plan.	2	3	2	2,333333333	3	2	2,5	5,833
E6	Drilling Activities	Surface water resources and/or wetland degradation	Direct	4	4	2	3,3	3	2	2,5	8,3	No construction activities shall be allowed within 500 m of wetlands and/or riparian zones without consent from the DWS.	4	4	2	3,3	3	2	2,5	8,3
F		Flora																		
F1	Vehicular movement on site	Increased soil disturbance and vehicle use on and around the site could increase alien invasive species propagation in the area and onsite.	Direct & Cumulative	3	2	3	2,7	2	3	2,5	6,7	Ensure the areas cleared are the minimum possible. Mark out areas for clearance prior to clearing works. Ensure alien plant species are not allowed to establish and/or are removed at regular intervals should they establish. Seed collection, propagation and re-planting of saplings to make up for lost species should also be considered. Minimise clearing and operations in habitats with indigenous vegetation, rehabilitate as soon as possible. Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible. Wheels of large machinery should be checked prior to entering the site and cleared of seed material of alien invasive plants if transport routes go through infested areas (especially of species with spiny or bur-like seeds). Such seed must be destroyed.	3	2	3	2,7	2	2	2	5,3
F2	Site clearance and site establishment, as well as soil stockpiling	Extensive disturbance of indigenous vegetation and topsoil, which creates a window of opportunity for the establishment of alien invasive species.	Indirect	3	2	2	2,3	2	3	2,5	5,8	If filling material or topsoil is to be used for areas to be rehabilitated, this should be sourced from areas free of invasive species.	2	2	1	1,7	1	2	1,5	2,5
		Increased habitat fragmentation and loss of biodiversity.	Indirect	3	3	2	2,7	2	4	3	8,0	Ensure that the rehabilitation plan is implemented to mitigate fragmentation and re-introduce biodiversity.	3	3	1	2,3	2	3	2,5	5,8
		Loss of potential conservation important species during site clearing and loss of habitat.	Direct	4	3	2	3,0	2	4	3	9,0	Where possible, identification of protected species must occur ahead of clearing and these species removed and stored, or relocated, or used later for rehabilitation. Ensure that the rehabilitation plan is implemented to mitigate fragmentation and re-introduce biodiversity.	3	3	1	2,3	2	2	2	4,7
		Increased invasive plant species propagation on site.	Direct	4	3	2	3,0	2	3	2,5	7,5	An exotic/invasive species monitoring and management plan should be put in place to manage exotic and invasive species. All cleared alien invasive material, especially if seed is present, must be treated as hazardous waste.	2	3	1	2,0	2	2	2	4,0
G		Fauna																		
G1	All construction activities (site clearing, excavations, drilling, establishment of temporary access roads etc)	Loss of Plant Species of Conservation Concern, Primary and Secondary Indigenous Vegetation.	Direct & Cumulative	3	4	2	3,0	2	3	2,5	7,5	Avoid the destruction of species of conservation concern and minimise operations in habitats with a High sensitivity rating, rehabilitate as soon as possible. Prior to construction, clearly delineate and cordon off the activity footprint area. No machine or vehicle may be allowed on any area beyond the activity footprint. Prior to any new groundworks: o Obtain all GPS reference points on protected species from the investigating specialist. o Protected species must all be relocated, ensuring the necessary relocation permits from the relevant authorities are in place. o Species that cannot be relocated directly into an area where they will not be disturbed again, should be looked after in a nursery until they can be relocated to a suitable area. Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible. Continually monitor the progress/success of rehabilitation efforts and adapt if rehabilitation targets are not met in acceptable timeframes.	2	3	1	2,0	2	3	2,5	5,0
G2	Site clearance and site establishment	Loss of faunal habitat during clearing and construction and rehabilitation activities.	Indirect	3	3	2	2,7	2	3	2,5	6,7	Avoid any direct impacts on open water and riparian areas of wetlands. No construction activities shall be allowed within 500 m of wetlands and/or riparian zones without consent from the DWS. Minimise clearing and operations in habitats with indigenous vegetation, rehabilitate as soon as possible.	2	3	2	2,3	2	2	2	4,7
G3	Use of lighting and noisy vehicles / machinery	The use of lighting may disturb fauna (especially nocturnal fauna) resulting in migration to the surrounding areas.	Direct	2	3	1	2,0	3	3	3	6,0	Only use lighting when and where it is essential to the safe operation of the plant. Where lighting is necessary to the plant operation, they should face down. The use of infrared or coloured lighting should be considered as an alternative to white lighting to avoid impacting nocturnal fauna or avifauna e.g. owls and rodents.	2	2	1	1,7	2	3	2,5	4,2
G4	An increase in on-site personnel, construction workers and vehicle activity	Site personnel, construction workers encountering animals on site and probable vehicle collision with animals.	Indirect	3	3	2	2,0	4	3	3,5	7,0	No wild animals may under any circumstance be handled, removed or be interfered with by construction workers. No hunting or collection of fauna. Any snares or traps found on or adjacent to the site must be removed and disposed of. Any faunal species located on the site during the construction phase, which cannot relocate themselves (e.g. burrowing animals) or may pose a risk to workers (e.g. snakes), must be moved to a more suitable location. This should be undertaken by a suitable qualified staff member. A low speed limit can be strictly enforced in order to reduce collisions with animals on the road.	2	2	1	1,7	4	2	3	5,0

	Activity	Impact	Direct/Indirect/Cumulative	Severity	Duration	Extent	C	Frequency	Probability	L	WoM	Mitigation Measure	Severity	Duration	Extent	C	Frequency	Probability	L	
G5	Machinery movement	Direct destruction of plant species of conservation concern and direct reduction of viable populations of such species.	Direct & Cumulative	3	3	3	3,0	2	3	2,5	7,5	Avoid any direct impacts on any surrounding or adjacent area with primary vegetation or any adjacent or nearby wetland habitats (except the clearing of alien invasive species). During construction and operation, restrict all movement of vehicles and heavy machinery to permissible areas, these being designated access tracks, turning points, parking bays or operational areas. No off-road driving beyond designated areas may be allowed.	2	2	2	2,0	2	2	2	4,0
G6	Usage of hydrocarbons or other pollutants	Compaction and pollution of topsoil by possible hydrocarbon spills and unauthorised/uncontrolled off-road driving, especially with heavy machinery.	Direct & Cumulative	3	2	1	2,0	3	3	3	6,0	Parking areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur. Prevent spillage of hydrocarbons, possible construction materials and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMP.	2	1	1	1,3	3	2	2,5	3,3
H		Air Quality																		
H1	Site clearing	Generation and emission of dust into the atmosphere.	Direct	3	2	3	2,7	2	5	3,5	9,3	Dust suppression through watering or re-vegetation of bare soils should be completed regularly or at a frequency determined with the ECO so as to ensure dust generation is not a nuisance on site or to surrounding land owners/occupiers. Access road must be the minimum length and width, and speed limits must be enforced.	2	3	2	2,3	2	3	2,5	5,8
H2	Vehicle, machinery and equipment use	Emission of carbon monoxides and dioxides, as well as other potential air pollutants.	Direct	2	3	3	2,7	2	3	2,5	6,7	Vehicles must be well maintained and records should be kept as evidence of such. Vehicles found to be emitting lots of black or discoloured smoke must be removed from site for repair.	2	3	3	2,7	2	2	2	5,3
I		Noise														0			0	0
I1	Vehicle, machinery and equipment use	Increased ambient noise during operational hours.	Direct	2	3	2	2,3	2	4	3	7,0	Drilling activities must be limited to daylight hours. Vehicles, equipment, machinery generating loud noise volumes must be repaired or fitted with noise abatement protection.	2	2	2	2,0	2	3	2,5	5,0
J		Visual														0			0	0
J1	Potential visual impact on the surrounding communities during drilling activities	The proposed project site may cause unpleasant views for residents.	Direct	2	2	2	2,0	1	5	3	6,0	Screen the site by retaining existing vegetation and/or erecting screens along sensitive viewing areas.	1	2	1	1,3	2	4	3	4,0
K		Traffic																		
K1	Vehicle and machinery accessing the site	Increased traffic congestion along access roads to and from the site, particularly peak hours.	Direct	2	3	2	2,3	2	3	2,5	5,8	Speed limits and traffic signs and rule must be adhered to on and off site. Access to surrounding roads must be minimised during peak hour traffic and wherever possible right turns across lanes should be avoided e.g. plan routes before construction phase.	1	3	1	1,7	2	2	2	3,3
L		Socio-economic																		
L1	Appointment of drilling contractors and subsequent sub-contractors	This will result in temporary and permanent jobs during the construction, rehabilitation and operation phase of the proposed prospecting activity	Direct	3	3	3	3,0	2	4	3	9,0	Local contractors should be used as far as practical. Promotion of local labour use by subcontractors must be employed.	3	3	3	3	3	4	3,5	10,5
L2	Skills transfer and mentorship, as well as on the job training	Increase in the employability of local communities.	Indirect	3	3	3	3,0	4	3	3,5	10,5	Ntuthuko Exploration and Mining should encourage the appointed contractor to provide on the job training and mentorship to facilitate skills transfer among contractor employees.	3	3	3	3	4	4	4	12
L3	Potential for mineral discovery which may lead to mining activity	Contribute to the Local GDP.	Indirect	2	3	3	2,7	3	3	3	8,0	Not applicable	2	4	3	3,0	3	3	3	9,0
L4	Potential protest action	Community unrest may cause interruptions to drilling activities.	Indirect	2	3	2	2,3	2	3	2,5	5,8	Open communication must be established for the community and the applicant. The applicant must ensure that there is an individual designated to addressing community issues. A complaints register must be placed at the project site and be made to community members to allow them to record any disputes.	1	3	1	1,7	2	2	2	3,3
M		Archaeological, Cultural																		
M1	Site clearing and excavations	During the excavation activities the contractor may unearth archaeological or culturally significant artefacts, or graves.	Direct	5	5	2	4,0	1	2	1,5	6,0	If it happens that artefacts are discovered during prospecting, then a heritage impact assessment will be conducted, and the site will be reported to SAHRA as per National Legislation. The contractor should induct all employees on the importance of the heritage sites and resources that they should not be impacted in any way. This is to ensure that even if any heritage resources are found during the construction phase or exposed due to construction apart from the ones that have been identified, they should by no means be impacted or destroyed any further. Should any heritage resources be found on site during the excavation; be it archaeological artefacts such as stone tools and pottery; graves and structures; the contractor should cease construction immediately and contact the client. A heritage expert should be called to site to assess the significance of the archaeological artefacts and the impacts of the proposed activities on such artefacts, and then provide mitigation measures. The possibility of uncovering unearthed burial grounds and graves during excavation should not be ruled out. Should potential human remains be found on site, the contractor should cease construction immediately and the South African Police Service and the client should also be contacted. Should the remains be below 60 years old since time of death, it is considered a forensic case and further investigations will be conducted by the police. Should the remains be above 60 years old since time of death, it becomes a South African Heritage Resources Agency case. This means an archaeologist should be called on site to remove the remains at the expense of the client.	5	5	2	4,0	1	1	1	4,0