

APPENDIX B - IMPACT TABLES

PLANNING AND DESIGN PHASE

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
GENERAL IMPACT ASSESSMENT													
Environmental Policy													
Legal and Policy Compliance	During the planning and design phase, non-compliance with the laws and policies of South Africa pertaining to the environment could lead to damage to the aquatic and terrestrial environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Negative	Indirect	Severe	National	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	HIGH -	<ul style="list-style-type: none"> The mining of the borrow pits and quarries must not commence prior to receiving an EA. Should the borrow pits and quarries receive an EA, the project team must adhere to the conditions stipulated in the EA. A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. No activities must commence within watercourses or within the regulatory buffers of watercourses without authorisation from the DWS. All legal matters pertaining to permitting must be completed prior to any construction activity. In particular, all necessary Water Use Licences must be in order for abstraction or any construction activities within 32 metres of a watercourse and within 500 m of a wetland. The proposed mining must be consistent with the local IDP's and SDF's. The planning and design of the proposed development must adhere to the recommendations of the Free State Biodiversity Plan (2015). 	LOW -
Built Environment													
Mining layout & design	During the planning and design, inappropriately designed borrow pits can lead to subsidence, face collapses, erosion and stormwater issues during mining.	Negative	Direct	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> The borrow pits and quarries must be designed by an appropriately qualified engineer. 	LOW -
Infrastructure	During the planning and design phase, planning and placement of structures and associated infrastructure in sensitive areas could lead to the damage and degradation of natural areas as well as to the structures themselves.	Negative	Direct	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Planning for and placement of infrastructure must be done so as to avoid sensitive areas as far as possible. Stormwater, Rehabilitation, Alien Vegetation and Erosion Management Plans must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. The contractor should clearly demarcate construction and operational areas so as to minimise site disturbance. 	LOW -
Stormwater management	During the planning and design phase, inadequate planning for stormwater during the construction and operational phases within the site could result in erosion and contamination of the soil and surrounding watercourses if there is not appropriate stormwater management structures in place.	Negative	Direct	Severe	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	HIGH -	<ul style="list-style-type: none"> A Stormwater Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. All infrastructure situated on slopes must incorporate stormwater diversion. Flood attenuation and stormwater management plans must be drawn up by a qualified engineer and approved by DEFF, the ECO and DWS. Stormwater design must be in line with SANRAL and DHSWS requirements. 	LOW -
Waste management	During the planning and design phase, failure to plan for the storage, handling and disposal of general and hazardous waste during the construction and operation phase may lead to littering and pollution of the surrounding environment, unsanitary conditions and health risks.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> A Waste Management Plan must be compiled during the planning and design phase of the proposed project. This management plan should include waste management considerations for handling onsite general and hazardous waste during the site establishment, mining and decommissioning phases. An appropriate area must be identified where waste can be stored before disposal. All hazardous substances such as paints, diesel and cement must be stored in a secure bunded area with an impermeable surface beneath them. 	LOW -

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Socio-economic													
Health and safety	During the planning and design phase, failure to plan for potential health and safety risks during the construction and operation phase may result in the harm of labourers, staff, surrounding landowners and the public.	Negative	Direct, Indirect	Severe	Study area	Short-term	Possible	Irreversible	Resource will be lost	Achievable	HIGH -	<ul style="list-style-type: none"> A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be drawn up by and HSE officer prior to construction to ensure workers safety. Roadside safety protocols need to be implemented during construction and operational phases. 	LOW -
Rehabilitation and maintenance													
Inadequate rehabilitation and maintenance	During the planning and design phase, inadequate planning for rehabilitation and maintenance of infrastructure could lead to degradation of the study area and surrounding areas.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	HIGH -	<ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during site establishment, mining and decommissioning phases. This method statement must be approved by the appointed ECO. 	LOW -
SPECIALIST ECOLOGICAL IMPACT ASSESSMENT													
Stormwater and erosion management	During the Planning and Design Phase an inadequate management of stormwater can result in erosion, loss of valuable topsoil and sedimentation of nearby watercourses. In addition, the failure to plan for the rehabilitation of impacted areas will lead to ongoing erosion of disturbed areas and unnecessary loss of valuable soil.	Negative	Direct, Indirect, Cumulative	Moderate	Study area	Medium-term	Probable	Reversible	Resource will be partly lost	Achievable	MODERATE -	<ul style="list-style-type: none"> A Stormwater and Erosion Management Plan must be developed and implemented to control runoff and prevent erosion and loss of soil and sedimentation of watercourses during all phases of the project. A Rehabilitation Plan must be developed for implementation during the site establishment, mining and decommissioning phases. 	LOW -
Terrestrial and aquatic habitats	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary loss of natural vegetation and aquatic habitats.	Negative	Direct, Indirect, Cumulative	Severe	Localised	Permanent	Definite	Reversible	Resource will be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Project infrastructure and mining activities must be designed in such a way as to minimise the impact on surrounding terrestrial and aquatic habitats. The boundary of the mining areas must be demarcated to ensure minimal loss of intact natural terrestrial and aquatic (i.e. wetlands and watercourses) habitats. 	LOW -
Control of alien species	During the planning and design phase failure to plan for the removal and management of alien vegetation will result in the invasion of alien vegetation in sensitive areas during the construction and operational phases. In addition, failure to plan for the rehabilitation of impacted areas will lead to the establishment of alien vegetation.	Negative	Direct, Indirect, Cumulative	Moderate	Study area	Medium-term	Probable	Reversible	Resource will be partly lost	Achievable	MODERATE -	<ul style="list-style-type: none"> An Alien Vegetation Management Plan and Rehabilitation Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. 	LOW -

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SPECIALIST HERITAGE IMPACT ASSESSMENT													
Damage to Colonial Period structures (Historical Period sites) Exigo-BP77.7-HP01	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary damage to Historical Period sites.	Negative	Direct, indirect	Moderate	Localised	Short-term	Probable	Irreversible	Resource will be partially lost	Achievable	VERY LOW -	<ul style="list-style-type: none"> Site monitoring, avoidance, 20m conservation buffer. Phase 2 Study and destruction permitting if impacted on. 	VERY LOW +
Damage to Colonial Period structures (Features) Exigo-BP39.6-FT01, Exigo-BP52.8-FT01, Exigo-BP52.8-FT02, Exigo-BP56.3-FT01, Exigo-BP73.8-FT01	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary damage to Colonial Period Features.	Negative	Direct, indirect	Slight	Localised	Short-term	Probable	Irreversible	Resource will be partially lost	Achievable	VERY LOW -	<ul style="list-style-type: none"> Frequent site monitoring by heritage specialist / ECO. 	VERY LOW +
Damage to burial sites Exigo-BP73.8-CE01	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary damage to burial sites.	Negative	Direct, indirect	Severe	Localised	Short-term	Probable	Irreversible	Resource will be lost	Achievable	LOW -	<ul style="list-style-type: none"> Frequent site monitoring by heritage specialist / ECO, heritage site management plan. 	VERY LOW +

CONSTRUCTION / SITE ESTABLISHMENT PHASE

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
GENERAL IMPACT ASSESSMENT													
Environmental Policy													
Legal and policy compliance	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH -	<ul style="list-style-type: none"> All construction related conditions in the Environmental Authorisation, EMPr and other permits must be adhered to. SANRAL must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. Copies of all applicable licenses, permits and managements plans (EA, EMPr, etc.) must be available on-site at all times. Environmental Awareness Training must be included in site meetings/talks with all workers. 	LOW -
Built Environment													
Infrastructure	During the construction phase, the disturbance/clearing of vegetation and construction activities within or within close proximity to sensitive areas may result in degradation of the surrounding environment.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> A Stormwater, Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. The construction contractor should clearly demarcate construction areas so as to minimise site disturbance. 	LOW -
Material stockpiling	During the construction phase, inappropriate location and management of material stockpiles may result in erosion.	Negative	Direct, Indirect	Moderate	Localised	Short-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. Material stockpiles locations must be approved by the ECO. 	LOW -
Stormwater management	During the construction phase, failure to implement effective stormwater management measures may result in increased surface soil erosion and contamination of stormwater and resulting surrounding watercourses.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. Berms and swaths must be placed in areas that may be prone to erosion. Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. 	LOW -
Waste management	During the construction phase, poor management of handling, disposal and storage of general and hazardous waste may lead to the pollution of the surrounding environment.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> All general waste must be disposed of in bins/waste skips labelled "general waste". Sufficient waste bins must be provided throughout the construction site for collecting waste. All general waste collected on site must be disposed of at a licensed general waste disposal site. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. No concrete mixing must take place within 32 m of any watercourse. 	LOW -
	During the construction phase, the mixing of cement on site could result in ground water contamination from compounds in the cement. In addition, a large number of cement mixing stations on site could increase the presence of impermeable areas which in turn could increase rates of run-off and thereby increase the risk of localized flooding, soil erosion, silting, gully formation, etc.	Negative	Direct, Indirect	Severe	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> All general waste must be disposed of in bins/waste skips labelled "general waste". Sufficient waste bins must be provided throughout the construction site for collecting waste. All general waste collected on site must be disposed of at a licensed general waste disposal site. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. No concrete mixing must take place within 32 m of any watercourse. 	LOW -

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Hazardous substances	During the construction phase, spillages of hazardous substances from inappropriate handling, transport and use of the substances may result in pollution of the surrounding environment and watercourse as well as soil contamination. Spillage of hazardous substances may also pose a health and safety risk to the staff on site.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partially lost	Achievable	HIGH -	<ul style="list-style-type: none"> Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. Mixed cement/concrete must not be allowed to flow into any watercourses. Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. Absorbent materials in the form of a spill kit must be provided on site. Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licensed service provider must be maintained on the site. 	LOW -
Socio-economic													
Job creation	During the construction phase, there will be some temporary job opportunities associated with establishment of the mining sites.	Positive	Direct	Slight	Localised	Short-term	Definite	N/A	Resource will not be lost	Easily Achievable	LOW +	<ul style="list-style-type: none"> N/A 	LOW +
Health and safety	During the construction phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	Negative	Direct, Indirect	Moderate	Study area	Short-term	Possible	Irreversible	Resource will be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. Roadside safety protocols need to be implemented during construction and operational phases. 	LOW -
Air quality and dust control	During the construction phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions.	Negative	Direct	Moderate	Study area	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> During windy periods un-surfaced and un-vegetated areas must be dampened down. Vegetation must be retained where possible as this will reduce dust travel. Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions. 	LOW -
	During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.	Negative	Indirect	Moderate	Study area	Short-term	Probable	Reversible	Resource will not be lost	Achievable	MODERATE -		LOW -
Noise	During the construction phase, there is likely to be an increase in traffic volumes to and from the site which may result in vehicle/pedestrian collisions and degrade the existing road conditions	Negative	Indirect	Moderate	Study area	Short-term	Probable	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. 	LOW -

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On-site fire risk	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	Negative	Direct	Moderate	Study area	Long-term	Possible	Irreversible	Resource will be lost	Easily Achievable	MODERATE -	<p>In order to reduce the risk of fires:</p> <ul style="list-style-type: none"> All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Smoking must not be permitted near flammable substances. All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. No open fires must be allowed on site. Fire extinguishers must be available onsite. 	LOW -
Traffic	During the construction phase, there is likely to be an increase in traffic volumes to and from the site which may result in vehicle/pedestrian collisions and degrade the existing road conditions	Negative	Direct	Moderate	Study area	Short-term	Possible	Reversible	Resource will not be lost	Difficult	LOW -	<ul style="list-style-type: none"> Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. Local residents should be made aware of the presence of construction vehicles by making use of high-visibility signage. All traffic safety (flagmen) and traffic calming measures should be in place within the site and where traffic enters the main road. It is recommended that any damage to the road as a result of construction activities and vehicles should be repaired immediately and maintained in the original or improved state prior to construction. 	LOW -
Visual impact of construction activity	During the construction phase, the sight of earthworks and construction of the road may be undesirable by neighbouring landowners and onlookers.	Negative	Direct, Indirect	Slight	Localised	Short-term	Probable	Reversible	Resource will not be lost	Easily Achievable	LOW -	<ul style="list-style-type: none"> Construction activities should only take place during normal working hours (7am to 5pm) The construction contractor should clearly demarcate construction areas so as to minimise site disturbance. The site should be kept neat and tidy. Littering should be fined, and the SHE officer should organise rubbish clean-ups on a regular basis. Night lighting of the construction sites should be minimised within requirements of safety and efficiency. Implement mitigation measures as recommended in the EMPr. 	LOW -
SPECIALIST AQUATIC IMPACT ASSESSMENT													
Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands during construction, operations and decommissioning phases	The physical removal of the riparian zones and disturbance of any watercourses or wetlands is unlikely. Should any loss occur this could also result in additional habitat fragmentation resulting in a loss of connectivity between aquatic systems. As highlighted by NFEPA. These disturbances will be the greatest during the construction	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Unlikely	Reversible	Resource will not be lost	Achievable	LOW -	<ul style="list-style-type: none"> The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by ay runoff in particular any access roads. The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor. 	LOW -

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Increase in sedimentation and erosion within the development footprints	Impacts include changes to the hydrological regime such as alteration of surface run-off patterns which could occur during the construction, operational and decommissioning phases.	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments 	LOW -
Impact on localized surface water quality	During construction and operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) could be washed downslope	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	LOW -	<ul style="list-style-type: none"> Strict use and management of all hazardous materials used on site in line with the specific material safety data sheets, e.g. fuels must be stored within a contained / bunded site with the necessary and spill kits available. Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.). Containment of all contaminated water by means of careful run-off management on the development site. Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the sites. Strict control over the behaviour of construction workers, with regard littering, use and storage of chemicals. Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced. Additional details in this regard in contain in Section 9 of this report and have also been considered in the mitigation assessment process. 	LOW -
SPECIALIST ECOLOGICAL IMPACT ASSESSMENT													
Terrestrial and aquatic habitats	During the construction phase encroachment into natural vegetation, wetlands and riparian areas could result in the unnecessary degradation of terrestrial and aquatic habitats.	Negative	Indirect, Cumulative	Moderate	Study area	Long-term	Possible	Reversible	Resource will be partially lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Construction activities must be restricted to the demarcated mining project footprints. The appointed ECO must ensure that the project footprint has been properly demarked and that activities are restricted to the demarkaed areas. Surrounding terrestrial and aquatic habitats (i.e. watercourses and wetlands, whether artificial or natural) must be avoided. 	LOW -
Stormwater and erosion management	During the Construction Phase, loss of soil due to soil erosion and soil compression during construction could lead to an increase in non-permeable surfaces and result in increased storm water runoff.	Negative	Direct	Moderate	Study area	Short-term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> A Stormwater and Erosion Management Plan must be implemented during the construction phase. Appropriate stormwater structures must be used during the construction phase. The Stormwater and Erosion Management Plan and Rehabilitation Plan must be approved by the appointed ECO prior to implementation. 	LOW -
	In addition, the clearance of vegetation and construction activities could result in the erosion of topsoil in the project site.	Negative	Indirect, Cumulative	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Disturbed areas must be rehabilitated as soon as possible after construction. Regular monitoring for erosion after construction must take place to ensure that no erosion problems have developed as result of the disturbance. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and vegetation techniques. All cleared areas (not used for the development footprint) should be vegetated with indigenous perennial shrubs and grasses from the local area as soon as possible. Natural vegetation that was removed onsite may be used as soil stabilisers by placing them on cleared areas if natural recovery is slow. 	LOW -

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	During the construction phase, the poor rehabilitation of impacted areas will lead to erosion of disturbed areas and unnecessary loss of valuable soil.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. Restoration must be conducted as per the approved Erosion Management Plans. 	LOW -
Rehabilitation of disturbed areas	During the construction phase poor rehabilitation of disturbed areas will lead to the permanent degradation of ecosystems and allow infestation of alien vegetation.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete. Restoration must be conducted as per a Rehabilitation Management Plan. Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation. 	LOW -
Species of Conservation Concern	During the construction phase, activities will permanently damage or destroy plant SCC present on site.	Negative	Direct	Severe	Project level	Permanent	Possible	Irreversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Should any SCC be noted on site by the ECO the necessary permits must be obtained in to remove them. Once removed the, the SCC must be taken to a suitable habitat or nursery for the duration of the construction phase. All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation. 	LOW -
Control of Alien Species	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and will pose a threat to neighbouring ecosystems	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. in accordance with the NEMBA: Alien Invasive Species Regulations. 	LOW -
	During the construction phase poor rehabilitation of disturbed areas will lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans. 	LOW -
Wildlife mortalities	During the construction phase, vehicles, crew and materials will result in animal fatalities through opportunistic hunting, collisions, accidents or baiting and trapping.	Negative	Direct	Moderate	Project level	Short-term	Possible	Irreversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> All staff on site must be trained regarding the proper management and response should animals be encountered on site. No hunting, baiting or trapping must be permitted on site on on adjacent land. 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST HERITAGE IMPACT ASSESSMENT													
Damage to Colonial Period structures (Historical Period sites) Exigo-BP77.7-HP01	During the construction phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to Historical Period sites.	Negative	Direct, indirect	Moderate	Localised	Long-term	Probable	Irreversible	Resource will be partially lost	Achievable	LOW -	<ul style="list-style-type: none"> Site monitoring, avoidance, 20m conservation buffer. Phase 2 Study and destruction permitting if impacted on. 	VERY LOW +
Damage to Colonial Period structures (Features) Exigo-BP39.6-FT01, Exigo-BP52.8-FT01, Exigo-BP52.8-FT02, Exigo-BP56.3-FT01, Exigo-BP73.8-FT01	During the construction phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to Colonial Period Features.	Negative	Direct, indirect	Slight	Localised	Short-term	Probable	Irreversible	Resource will be partially lost	Achievable	VERY LOW -	<ul style="list-style-type: none"> Frequent site monitoring by heritage specialist / ECO. 	VERY LOW +
Damage to burial sites Exigo-BP73.8-CE01	During the construction phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to burial sites.	Negative	Direct, indirect	Severe	Localised	Long-term	Definite	Irreversible	Resource will be lost	Achievable	HIGH -	<ul style="list-style-type: none"> Site monitoring, avoidance, 100m conservation buffer, site management Grave relocation subject to authorisations and permitting if impacted on. 	VERY LOW +
SPECIALIST PALEONTOLOGICAL IMPACT ASSESSMENT													
Impact on possible paleontological findings	During the construction phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, could lead to the unnecessary damage to any possible paleontological findings.	Negative	Direct, indirect	Slight	Localised	Permanent	Unlikely	Irreversible	Resource will be partially lost	Easily Achievable	LOW -	<ul style="list-style-type: none"> In the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to SAHRA This is so that appropriate mitigation (i.e. recording, sampling or collection) by a paleontological specialist can be considered and implemented before rehabilitation of the access road cuttings, quarries or borrow pits takes place These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed quarry and borrow pit developments. 	VERY LOW -

OPERATIONAL / MINING PHASE

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
GENERAL IMPACT ASSESSMENT													
Environmental Policy													
Legal and policy compliance	During the operational phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties and closure of the proposed road upgrade.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH -	<ul style="list-style-type: none"> The proponent must ensure that operations of the mines are compliant with the relevant legislation and policy. These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations. 	LOW -
Built Environment													
Material stockpiling	During the operational phase, inappropriate location and management of material stockpiles may result in erosion.	Negative	Direct, Indirect	Moderate	Localised	Short-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. Material stockpiles locations must be approved by the ECO. 	LOW -
Stormwater management	During the operational phase, failure to implement effective stormwater management measures may result in increased surface soil erosion and contamination of stormwater and resulting surrounding watercourses.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. Berms and swaths must be placed in areas that may be prone to erosion. Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. 	LOW -
Waste management	During the operational phase, poor management of handling, disposal and storage of general and hazardous waste may lead to the pollution of the surrounding environment.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> All general waste must be disposed of in bins/waste skips labelled "general waste". Sufficient waste bins must be provided throughout the construction site for collecting waste. All general waste collected on site must be disposed of at a licensed general waste disposal site. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. 	LOW -
	During the operational phase, the mixing of cement on site could result in ground water contamination from compounds in the cement. In addition, a large number of cement mixing stations on site could increase the presence of impermeable areas which in turn could increase rates of run-off and thereby increase the risk of localized flooding, soil erosion, silting, gully formation, etc.	Negative	Direct, Indirect	Severe	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. No concrete mixing must take place within 32 m of any watercourse. 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Hazardous substances	During the operational phase, spillages of hazardous substances from inappropriate handling, transport and use of the substances may result in pollution of the surrounding environment and watercourse as well as soil contamination. Spillage of hazardous substances may also pose a health and safety risk to the staff on site.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partially lost	Achievable	HIGH -	<ul style="list-style-type: none"> Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. Mixed cement/concrete must not be allowed to flow into any watercourses. Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. Absorbent materials in the form of a spill kit must be provided on site. Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licensed service provider must be maintained on site. 	LOW -
Socio-economic													
Job creation	During the operational phase, there will be numerous temporary job opportunities associated with the mining activities.	Positive	Direct	Slight	Localised	Short-term	Definite	N/A	Resource will not be lost	Easily Achievable	LOW +	<ul style="list-style-type: none"> N/A 	LOW +
Health and safety	During the operational phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	Negative	Direct, Indirect	Moderate	Study area	Short-term	Possible	Irreversible	Resource will be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. Roadside safety protocols need to be implemented during construction and operational phases. 	LOW -
Air quality and dust control	During the operational phase, dust generated by construction vehicles and operational activities could result in significant dust during windy conditions.	Negative	Direct	Moderate	Study area	Short-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> During windy periods un-surfaced and un-vegetated areas must be dampened down. Vegetation must be retained where possible as this will reduce dust travel. Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions. 	LOW -
	During the operational phase poor maintenance and servicing of plant and vehicles may result in an increase in vehicle emissions in the areas.	Negative	Indirect	Moderate	Study area	Short-term	Probable	Reversible	Resource will not be lost	Achievable	MODERATE -		LOW -
Noise	During the operational phase, there is likely to be an increase in traffic volumes to and from the site which may result in vehicle/pedestrian collisions and degrade the existing road conditions	Negative	Indirect	Moderate	Study area	Short-term	Probable	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
On-site fire risk	During the operational phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	Negative	Direct	Moderate	Study area	Long-term	Possible	Irreversible	Resource will be lost	Easily Achievable	MODERATE -	<p>In order to reduce the risk of fires:</p> <ul style="list-style-type: none"> All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Smoking must not be permitted near flammable substances. All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. No open fires must be allowed on site. Fire extinguishers must be available onsite. 	LOW -
Traffic	During the operational phase, there is likely to be an increase in traffic volumes to and from the site which may result in vehicle/pedestrian collisions and degrade the existing road conditions	Negative	Direct	Moderate	Study area	Short-term	Possible	Reversible	Resource will not be lost	Difficult	LOW -	<ul style="list-style-type: none"> Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. Local residents should be made aware of the presence of construction vehicles by making use of high-visibility signage. All traffic safety (flagmen) and traffic calming measures should be in place within the site and where traffic enters the main road. It is recommended that any damage to the road as a result of mining activities and vehicles should be repaired immediately and maintained in the original or improved state prior to construction. 	LOW -
Visual impact of construction activity	During the operational phase, the sight of earthworks and construction of the road may be undesirable by neighbouring landowners and onlookers.	Negative	Direct, Indirect	Slight	Localised	Short-term	Probable	Reversible	Resource will not be lost	Easily Achievable	LOW -	<ul style="list-style-type: none"> Mining activities should only take place during normal working hours (7am to 5pm) The mining contractor should clearly demarcate mining areas so as to minimise site disturbance. The site should be kept neat and tidy. Littering should be fined, and the SHE officer should organise rubbish clean-ups on a regular basis. Night lighting of the construction sites should be minimised within requirements of safety and efficiency. Implement mitigation measures as recommended in the EMP. 	LOW -
Rehabilitation and maintenance													
Inadequate rehabilitation and maintenance	During the operation phase inadequate rehabilitation of disturbed areas and lack of maintenance of infrastructure may lead to the degradation of the surrounding environment.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> A Rehabilitation Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation. 	LOW -

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SPECIALIST AQUATIC IMPACT ASSESSMENT													
Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands during construction, operations and decommissioning phases	The physical removal of the riparian zones and disturbance of any watercourses or wetlands is unlikely. Should any loss occur this could also result in additional habitat fragmentation resulting in a loss of connectivity between aquatic systems. As highlighted by NFEPA. These disturbances will be the greatest during the construction	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Unlikely	Reversible	Resource will not be lost	Achievable	LOW -	<ul style="list-style-type: none"> The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by any runoff in particular any access roads. The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers. Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor. 	LOW -
Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	This could occur within the operational and decommissioning phases. when any of the hard or compacted surfaces (roads or platforms) and open pit areas would either increase or decrease the volume and velocity of the surface runoff dependent on what structure is being considered, i.e. pits will trap flows, roads and stockpile platforms will increase flows. This would impact the hydrological regime which then affects the structure (i.e. larger taller grasses / shrubs / trees) and function (greater attenuation of flows, restricting any runoff from reaching downstream areas). The opposite can also happen. If flows are too concentrated with high velocities, scour and erosion results, with a complete reduction or disturbance of riparian / wetland habitat.	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Unlikely	Reversible	Resource will not be partially lost	Achievable	LOW -	<ul style="list-style-type: none"> Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments 	LOW -
Increase in sedimentation and erosion within the development footprints	Impacts include changes to the hydrological regime such as alteration of surface run-off patterns which could occur during the construction, operational and decommissioning phases.	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact on localized surface water quality	During construction and operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) could be washed downslope	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	LOW -	<ul style="list-style-type: none"> Strict use and management of all hazardous materials used on site in line with the specific material safety data sheets, e.g. fuels must be stored within a contained / banded site with the necessary and spill kits available. Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.). Containment of all contaminated water by means of careful run-off management on the development site. Appropriate ablation facilities should be provided for construction workers during construction and on-site staff during the operation of the sites. Strict control over the behaviour of construction workers, with regard littering, use and storage of chemicals. Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced. Additional details in this regard in contain in Section 9 of this report and have also been considered in the mitigation assessment process. 	LOW -
SPECIALIST ECOLOGICAL IMPACT ASSESSMENT													
Watercourses	During the operational phase encroachment into wetland and riparian areas will result in the unnecessary degradation of aquatic habitats.	Negative	Indirect, Cumulative	Moderate	Study area	Long-term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Mining activities must be kept to the approved and demarcated footprint of each borrow pit and quarry. Surrounding watercourses and wetlands (artificial or natural) must be avoided. 	LOW -
Material stockpiling	During the operation phase, stockpiling of mining material within 32 m of watercourses will result in erosion and mobilisation of the materials into nearby watercourses, resulting in sedimentation and a decrease in water quality and aquatic habitat.	Negative	Direct, Indirect, Cumulative	Moderate	Study area	Medium-term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> No mining material must be stored within 32 m of any watercourse. Stockpiles within 50 m of watercourses must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by the EO, suitable cut-off drains or berms must be placed between the stockpile area and the watercourse. 	LOW -
Stormwater management	During the Operation Phase, failure to monitor and maintain the stormwater management system can result in ongoing erosion and sedimentation of nearby watercourses.	Negative	Direct	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Stormwater management structures must be monitored and maintained throughout the operation phase. 	LOW -
Rehabilitation of disturbed areas	During the operational phase, the poor rehabilitation of impacted areas will lead to further erosion of disturbed areas and unnecessary loss of valuable soil.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated. 	LOW -
Natural vegetation	During the operation phase the clearing of natural vegetation outside the approved mining footprint will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.	Negative	Direct, Indirect, Cumulative	Severe	Localised	Medium-term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> The mining footprint must be surveyed and demarcated prior to mining commencing. No mining activities must be allowed outside the demarcated footprint. No mining activities must be allowed where untransformed areas of natural vegetation occur. Mining activities must be limited to the absolute necessary area only. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. The contractor's staff must not harvest any natural vegetation. 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Control of Alien Species	During the operational phase the loss of natural vegetation will increase the potential invasion by alien plant species. This, coupled with the lack of implementation of an alien vegetation management plan will result in large scale alien plant invasion.	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	LOW -
	When mining is complete poor rehabilitation of disturbed areas will lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Only topsoil from the mining site, which has been appropriately stored, must be used for rehabilitation. All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as mining in the particular area is complete. Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans. 	LOW -
Wildlife mortalities	During the operation phase, vehicles, crew and materials may increase animal fatalities through opportunistic hunting, collisions, accidents or baiting and trapping.	Negative	Direct	Moderate	Project level	Short term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> All staff on site must be trained regarding the proper management and response should animals be encountered. No hunting, baiting or trapping must be permitted on site or on adjacent land. 	LOW -
	During the operation phase, vehicles, crew and materials may increase avifaunal fatalities through collisions, accidents or baiting and trapping.	Negative	Direct, Indirect	Slight	Localised	Medium term	Possible	Reversible	Resource will be partially lost	Achievable	LOW -		LOW -
	During the operation phase, vehicles, crew and materials may increase bat fatalities through collisions, accidents or baiting and trapping.	Negative	Direct, Indirect	Slight	Localised	Medium term	Unlikely	Reversible	Resource will be partially lost	Achievable	LOW -		LOW -
Loss/fragmentation of habitats	During operation, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing localities. Endangered or rare faunal populations will permanently disappear or diminish in size.	Negative	Direct	Moderate	Project level	Long term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> The clearance of vegetation within aquatic habitats must be avoided as far as possible. Should avoidance be impractical, vegetation clearance must be minimised as much as possible. Indigenous tree species should be pruned using loppers or saws where they pose safety threats. If their presence compromises safety mandates entirely, fell and stump treat with appropriate herbicide. 	LOW -
	Alteration of the lowland-highveld interface	Negative	Direct	Moderate	Project level	Long term	Possible	Reversible	Resource will be partially lost	Achievable	MODERATE -		LOW -
SPECIALIST HERITAGE IMPACT ASSESSMENT													
Damage to Colonial Period structures (Historical Period sites) Exigo-BP77.7-HP01	During the operational phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to Historical Period sites.	Negative	Direct, indirect	Moderate	Localised	Permanent	Improbable	Irreversible	Resource will be partially lost	Achievable	VERY LOW -	<ul style="list-style-type: none"> Site monitoring, avoidance, 20m conservation buffer. Phase 2 Study and destruction permitting if impacted on. 	VERY LOW +

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Damage to Colonial Period structures (Features) Exigo-BP39.6-FT01, Exigo-BP52.8-FT01, Exigo-BP52.8-FT02, Exigo-BP56.3-FT01, Exigo-BP73.8-FT01	During the operational phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to Colonial Period Features.	Negative	Direct, indirect	Slight	Localised	Short-term	Probable	Irreversible	Resource will be partially lost	Achievable	VERY LOW -	<ul style="list-style-type: none"> Frequent site monitoring by heritage specialist / ECO. 	VERY LOW +
Damage to burial sites Exigo-BP73.8-CE01	During the operational phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, will lead to the unnecessary damage to burial sites.	Negative	Direct, indirect	Severe	Localised	Short-term	Definite	Irreversible	Resource will be lost	Achievable	HIGH -	<ul style="list-style-type: none"> Site monitoring, avoidance, 100m conservation buffer, site management Grave relocation subject to authorisations and permitting if impacted on. 	VERY LOW +
SPECIALIST PALEONTOLOGICAL IMPACT ASSESSMENT													
Impact on possible paleontological findings	During the operational phase, inappropriate siting and demarcation of activities, as well as indiscriminate excavation, could lead to the unnecessary damage to any possible paleontological findings.	Negative	Direct, indirect	Slight	Localised	Permanent	Unlikely	Irreversible	Resource will be partially lost	Easily Achievable	LOW -	<ul style="list-style-type: none"> In the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to SAHRA This is so that appropriate mitigation (i.e. recording, sampling or collection) by a paleontological specialist can be considered and implemented before rehabilitation of the access road cuttings, quarries or borrow pits takes place These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed quarry and borrow pit developments. 	VERY LOW -

DECOMMISSIONING / CLOSURE PHASE

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
GENERAL IMPACT ASSESSMENT													
Environmental Policy													
Non-compliance with relevant legislation	During the decommissioning phase, non-compliance with the laws and policies of South Africa pertaining to the environment could lead to damage to the aquatic and terrestrial environment, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will not be lost	Achievable	HIGH -	<ul style="list-style-type: none"> The application for closure of the mines must be submitted together with all relevant documents as indicated in Section 43 of Mineral and Petroleum Resources Development Act (Act 28 of 2002), as amended. 	LOW -
Built Environment													
Material stockpiling	During the operational phase, inappropriate location and management of material stockpiles may result in erosion.	Negative	Direct, Indirect	Moderate	Localised	Short-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> All structures comprising the site camp are to be removed from site. All rubble must be removed from the site to an approved disposal site as approved by the ECO. Fences, barriers and demarcations associated with the construction phase must be removed from the site. All residual stockpiles must be removed or spread on site as directed by the ECO. All leftover building materials must be removed from the site. 	LOW -
Stormwater management	During the decommissioning phase, inadequate stormwater during the construction and operational phases within the site could result in erosion and contamination of the soil and surrounding watercourses if there is not appropriate stormwater management structures in place.	Negative	Direct	Severe	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	HIGH -	<ul style="list-style-type: none"> All surfaces hardened due to construction activities must be ripped and imported material thereon removed. The Contractor must check that all watercourses are free from building rubble, spoil materials and waste materials. A programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants. 	LOW -
Waste management	During the planning and design phase, failure to plan for the storage, handling and disposal of general and hazardous waste during the construction and operation phase may lead to littering and pollution of the surrounding environment, unsanitary conditions and health risks.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> The area that previously housed the site camp is to be checked for spills of substances such as oil, paint, etc., and these must be cleaned up and contaminants disposed of appropriately. All rubble must be removed from the site to an approved disposal site as approved by the ECO. Burying of rubble on site is prohibited. The site must be cleared of all litter. 	LOW -
Rehabilitation and maintenance													
Inadequate rehabilitation and maintenance	During the decommissioning phase, inadequate rehabilitation and maintenance of infrastructure could lead to degradation of the study area and surrounding areas.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	HIGH -	<ul style="list-style-type: none"> All areas affected during the site establishment and mining phases must be rehabilitated. All disturbed areas must be re-vegetated with an indigenous seed mix in consultation with an indigenous plant expert, ensuring that during rehabilitation only indigenous shrubs, trees and grasses are used in restoring the biodiversity. A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. The programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants. Final inspection in order to ensure adherence to EMPr guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc. 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST AQUATIC IMPACT ASSESSMENT													
Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands during construction, operations and decommissioning phases	The physical removal of the riparian zones and disturbance of any watercourses or wetlands is unlikely. Should any loss occur this could also result in additional habitat fragmentation resulting in a loss of connectivity between aquatic systems. As highlighted by NFEPA. These disturbances will be the greatest during the construction	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Unlikely	Reversible	Resource will not be lost	Achievable	LOW -	<ul style="list-style-type: none"> The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by any runoff in particular any access roads. The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers. Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor. 	LOW -
Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	This could occur within the operational and decommissioning phases. when any of the hard or compacted surfaces (roads or platforms) and open pit areas would either increase or decrease the volume and velocity of the surface runoff dependent on what structure is being considered, i.e. pits will trap flows, roads and stockpile platforms will increase flows. This would impact the hydrological regime which then affects the structure (i.e. larger taller grasses / shrubs / trees) and function (greater attenuation of flows, restricting any runoff from reaching downstream areas). The opposite can also happen. If flows are too concentrated with high velocities, scour and erosion results, with a complete reduction or disturbance of riparian / wetland habitat.	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Unlikely	Reversible	Resource will not be partially lost	Achievable	LOW -	<ul style="list-style-type: none"> Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments 	LOW -
Increase in sedimentation and erosion within the development footprints	Impacts include changes to the hydrological regime such as alteration of surface run-off patterns which could occur during the construction, operational and decommissioning phases.	Negative	Direct, Indirect, Cumulative	Slight	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments 	LOW -

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
SPECIALIST VEGETATION IMPACT ASSESSMENT													
Stormwater and erosion management	During the decommissioning phase, failure to adequately rehabilitate the mining sites can result in ongoing erosion and sedimentation of nearby watercourses.	Negative	Direct	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Stormwater management structures must be monitored and maintained throughout the operation phase. All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated. 	LOW -
Rehabilitation of disturbed areas	During the decommissioning phase, the poor rehabilitation of impacted areas will lead to further erosion of disturbed areas and unnecessary loss of valuable soil.	Negative	Direct, Indirect,	Moderate	Localised	Long-term	Probable	Reversible	Resource will be	Achievable	MODERATE -	<ul style="list-style-type: none"> All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated. 	LOW -
Control of Alien Species	During the decommissioning phase, the loss of natural vegetation will increase the potential invasion by alien plant species. This, coupled with the lack of implementation of an alien vegetation management plan will result in large scale alien plant invasion.	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	LOW -
	When mining is complete poor rehabilitation of disturbed areas will lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Negative	Direct, Indirect, Cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource will be partially lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Only topsoil from the mining site, which has been appropriately stored, must be used for rehabilitation. All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as mining in the particular area is complete. Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans. 	LOW -

NO-GO ALTERNATIVE

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
GENERAL IMPACT ASSESSMENT													
Built Environment													
Infrastructure	The No-Go alternative in the context of this project implies that the N1-16 route would not be rehabilitated and will likely continue to degrade. The required road upgrade will not be provided.	Negative	Direct	Moderate	Regional	Long-term	Definite	Reversible	Resource will not be lost	Easily Achievable	MODERATE -	<ul style="list-style-type: none"> Proceed with the proposed mining. 	MODERATE +
Socio-economic													
Health and safety	The No-Go alternative in the context of this project implies that the N1-16 route would not be rehabilitated and will likely continue to degrade. This could indirectly lead to an increase in traffic accidents and fatalities, posing safety concerns for road users.	Negative	Indirect	Severe	Regional	Long-term	Possible	Irreversible	Resource could be lost	Achievable	HIGH -	<ul style="list-style-type: none"> Proceed with the proposed mining. 	MODERATE +
No job opportunities	The No-Go Option would not create any job opportunities	Negative	Direct	Moderate	Localised	Medium-term	Definite	Reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> Proceed with the proposed mining. 	MODERATE +
SPECIALIST AQUATIC IMPACT ASSESSMENT													
Status-quo – no mining activities	The no-go alternative assumes that no change in land use or additional activities will occur and that the status quo will persist. This includes existing activities, alien encroachment along with the impact of existing roads crossing watercourses and high level of erosion	Negative	Indirect	Slight	Localised	Permanent	Probable	Completely reversible	Resource will not be lost	Achievable	MODERATE -	<ul style="list-style-type: none"> No mitigation measures will be implemented with the no-go alternative. 	MODERATE -
SPECIALIST VEGETATION IMPACT ASSESSMENT													
No development of mining sites for the road upgrade.	Should the project not proceed, the current land use will remain the same (grassland and shrubland). There will be no vegetation removal.	Positive	Direct, Cumulative	Slightly beneficial	Study area	Long-term	Possible	Reversible	Resource not be lost	Achievable	LOW +	<ul style="list-style-type: none"> N/A 	LOW +