

1 IMPACTS AND RESIDUAL RISKS ASSESSMENT

1.1 Introduction

Impact assessment must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental). It is also imperative that each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted.

The environmental impact assessment is focused on the following phases of the project, namely, the **Construction** and **Operational Phases** only. As the project entails expansion and development of new infrastructure which will be permanent, decommissioning is not applicable to this project.

1.2 Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- **Duration:** Indicates what the lifetime of the impact will be;
- **Intensity:** Describes whether an impact is destructive or benign;
- **Probability:** Describes the likelihood of an impact actually occurring; and
- **Cumulative:** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

The total number of points scored for each impact indicates the level of significance of the impact.

Table 1-1: Criteria to be used for the rating of impacts

Criteria		Description		
EXTENT	National (4) The whole of South Africa	Regional (3) Provincial and parts of neighbouring provinces	Local (2) Within a radius of 2 km of the construction site	Site (1) Within the construction site
DURATION	Permanent (4) Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	Long-term (3) The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	Medium-term (2) The impact will last for the period of the construction phase, where after it will be entirely negated	Short-term (1) The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
INTENSITY	Very High (4) Natural, cultural and social functions and processes are altered to the extent that they permanently cease	High (3) Natural, cultural and social functions and processes are altered to the extent that they temporarily cease	Moderate (2) Affected environment is altered, but natural, cultural and social functions and processes continue, albeit in a modified way	Low (1) Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILITY OF OCCURRENCE	Definite (4) Impact will certainly occur	Highly Probable (3) Most likely that the impact will occur	Possible (2) The impact may occur	Improbable (1) Likelihood of the impact materialising is very low

Table 1-2: Criteria for the rating of classified impacts

Class		Description
+	Any value	Any positive / beneficial 'impact', i.e. where no harm will occur due to the activity being undertaken.
-	Low impact (4 – 6 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
	Medium impact (7 – 9 points)	Mitigation is possible with additional design and construction inputs.
	High impact (10 – 12 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
	Very high impact (12 – 14 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status		Denotes the perceived effect of the impact on the affected area.
Positive (+)		Beneficial impact.
Negative (-)		Deleterious or adverse impact.
Neutral (/)		Impact is neither beneficial nor adverse.
<p>It is important to note that the status of an impact is assigned based on the <i>status quo</i> – i.e. should the project not proceed. Therefore, not all negative impacts are equally significant.</p>		

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

Mitigation measures identified as necessary will be included in an EMPr.

1.3 Rating of Potential Impacts

The potential impacts identified are explained per phase of the project and mitigation measures are provided. The impacts are explained in terms of construction and operational phases.

1.3.1 Soils and Agriculture

Table 1-3: Earth-works – soils and agricultural impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	<p>Aspect: Construction activities (site clearing).</p> <p>Impact: Physical degradation due to the removal and compaction of soil during construction activities.</p>	Without	2	2	2	2	-8	
		With	1	1	1	1	-4	
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Strip topsoil prior to any construction activities. No topsoil may be removed except from those areas where construction will be undertaken. Topsoil must be kept separate from overburden and must not be mixed with other layers of soil and sub-soil. Topsoil must not be stockpiled for an extended period of time. Soil must be returned to any excavated or disturbed area in the correct order, with topsoil on top. The top-soil must then be de-compacted. 						Medium
Construction	<p>Aspect: Construction activities (site clearing).</p> <p>Impact: Physical degradation due to soil erosion as a result of exposed soil and topsoil.</p>	Without	2	2	2	3	-9	
		With	1	1	1	2	-5	
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Soil erosion is related to the water velocity and volume as well as the presence of well-established vegetation. Mitigation measures therefore include the development of velocity barriers/berms for stormwater run-off and ensuring exposed areas are rehabilitated as detailed in the EMPr. Site clearing to be undertaken in a phased manner to minimise the area of soil exposed to erosion. Exposed soil to be protected from erosion, especially during rainfall events 						Medium
Construction	<p>Aspect: Establishment of contractor laydown area (camp).</p> <p>Impact: Impact on land use and land capability – disturbance of soils due to the location of the construction camp and associated infrastructure.</p>	Without	1	2	2	2	-7	
		With	1	1	1	1	-4	
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> The contractor laydown area must not be placed in close proximity to any of the residential houses. The contractor laydown area may not be placed in or in close proximity to any watercourse. No material may be stored or equipment repaired beyond the boundaries of the contractor laydown area. 						Low

1.3.2 Geology and Topography

Table 1-4: Geology and topography impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Foundations.</p> <p>Impact: Disturbance of surface geology resulting in site instability due to inadequate drainage and/or inappropriate engineering planning and interventions.</p>	Without	1	2	3	3	-9
		With	1	2	1	2	2
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> It is important to allow for on-site inspections and evaluations by an experienced engineering geologist / geotechnical engineer so that stability problems can be timeously identified and remedied. All earth-works should be carried out in a manner to promote stable development of infrastructure. It is recommended that earth-works be carried out along the guidelines given in SANS 1200 (current version). Earth-works and drainage measures should be designed in such a way as to prevent ponding of, or high concentrations of, stormwater or groundwater anywhere on the sites. The geology must be returned to pre-construction condition. 					
Construction	<p>Aspect: Construction activities (site clearing).</p> <p>Impact: Gully or 'donga' erosion by concentrated, uncontrolled water-flow.</p>	Without	1	2	2	2	-7
		With	1	1	1	1	-4
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Cut embankments must be protected against surface erosion by the establishment of vegetation immediately after construction. Suitable subsoil drainage, stormwater control and preventable solutions to avoid soil erosion will be required in areas with sandy soils, and particularly in close proximity to watercourses. Adequate stormwater surface drainage must be adopted. 					

1.3.3 Air Quality and Odour

Table 1-5: Air quality and odour impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Construction activities (site clearing, operation of vehicles, equipment etc.).</p> <p>Impact: Fugitive dust emissions from debris handling and debris piles; mobile plant / machinery and general construction activities.</p>	Without	2	2	2	3	-9
		With	1	1	1	2	2
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Dust must be suppressed on the construction-site during dry periods by the regular application of water. Water used for this purpose must be used in quantities that will not result in the generation of run-off. Dust dispersion from construction activities, roads, soil stockpiles and other construction locations will be limited and suppressed to the maximum extent practical. Stockpiles and other fill material sources will be positioned such that they are not vulnerable to wind erosion. Cover skips and trucks which are loaded with construction materials. All stockpiles should be maintained for as short a time as possible and should be enclosed by wind-breaking enclosures of similar height to the pile. 					

	<ul style="list-style-type: none"> ▪ Stockpiles should be situated away from watercourses and nearby receptors and should take into account the predominant wind direction. ▪ A speed limit of 40 km/hr should be set for all vehicles travelling on any gravel roads or near stockpiles. ▪ Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the construction area boundaries. 															
	<p>Aspect: Construction activities (site clearing; operation of vehicles, equipment etc.).</p> <p>Impact: Generation of fumes from vehicle emissions may pollute the air.</p>		2	1	2	3										Medium
			2	1	1	2										Low
	<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ All vehicles and equipment must be in good working order. ▪ A register must be maintained for vehicle maintenance. ▪ Vehicles should travel the shortest distances practical in order to undertake the required construction activities. 															
	<p>Aspect: Chemical toilets.</p> <p>Impact: Release of odours as a result of the chemical toilets on-site.</p>		1	2	3	2										Medium
			1	1	1	2										Low
	<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Chemical toilets must be provided and cleaned on a regular basis. ▪ They must be situated at least 50 m from any watercourse. ▪ They must be provided at a ratio of 1:15 i.e. one toilet for every 15 labourers. ▪ Servicing receipts must be maintained and kept on site within the site environmental file. 															

1.3.4 Waste

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Construction staff, vehicles and equipment.</p> <p>Impact: Increased litter and waste within the project areas due to construction activities and staff</p>	Without	1	1	2	3	Medium
		With	1	1	1	2	Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Ensure that an adequate number of rubbish bins are provided so as to prevent litter and ensure the proper disposal of waste generated during construction activities. ▪ Implement effective waste management in order to prevent construction related waste from impacting on the surrounding environment. ▪ Waste disposal to be done at a registered landfill site. ▪ No burning of waste is permitted. 					
Construction	<p>Aspect: Construction staff, vehicles and equipment.</p> <p>Impact: Accidental spills from vehicles or equipment can pollute the surrounding environment</p>	Without	1	2	2	2	Medium
		With	1	1	1	2	Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Ensure that spill kits are available during construction activities in the event of accidental spills and/or leaks. 					

	<ul style="list-style-type: none"> ▪ Vehicular maintenance should be undertaken at a local workshop, if not available, bunded surfaces will be necessary where any works are undertaken on vehicles. ▪ Re-fuelling should take place at the local petrol station, if not possible, bunded surfaces will be necessary where any re-fuelling is undertaken. ▪ Staff environmental awareness training should be done in toolbox talks.
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1.3.5 Noise

Table 1-6: Noise impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction staff, vehicles and equipment. Impact: Increase in noise pollution from construction vehicles and construction staff.	Without	1	1	3	3	-8 Medium	
		With	1	1	1	2	-5 Low	
		Mitigation measures: <ul style="list-style-type: none"> ▪ All construction activities must be undertaken within daylight working hours. ▪ The Contractor may consider providing all equipment with standard silencers. Maintain silencer units in vehicles and equipment in good working order. ▪ All vehicles and equipment must be regularly maintained to ensure their integrity and reliability. ▪ Construction staff working in an area where the 8-hour ambient noise levels exceed 85 dBA must have the appropriate Personal Protective Equipment (PPE). ▪ All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No. 85 of 1993). ▪ Surrounding landowners are to be notified upfront of noisy construction activities. ▪ A Complaints Register is to be kept at the Site Office at all times. 						

1.3.6 Visual

Table 1-7: Visual impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: During construction the clearing and grading of the site would create a visual scar in the landscape. Construction vehicles and staff will be a visual disturbance to the surrounding community and landowners.	Without	2	3	2	1	-8 Medium	
		With	2	2	1	1	-6 Low	
		Mitigation measures: <ul style="list-style-type: none"> ▪ Vegetation clearing should be limited to the minimum area necessary for upgrading of the road and culverts. ▪ Locate the construction camp and storage areas in zones of low visibility i.e. behind dense bush or away from receptors. ▪ Vegetation clearing should use a phased approach, only clearing vegetation when required. ▪ Rehabilitate cleared areas as soon as possible. ▪ Dust suppression techniques should be made use of. ▪ Maintain a neat construction site by removing rubble and waste materials regularly. 						

1.3.7 Traffic

Table 1-8: Traffic impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Increase in traffic from construction vehicles.	Without	1	2	2	3	-8 Medium	
		With	1	1	1	3	-6 Low	
		Mitigation measures: <ul style="list-style-type: none"> ▪ Arrangements must be made with local communities in order to accommodate construction vehicles on existing road networks. ▪ All damaged roads must be repaired by the contractor. ▪ Construction vehicles are to avoid main roads during peak traffic hours. ▪ All vehicles are to be roadworthy. ▪ Seatbelts are to be worn at all times. ▪ When using heavy or large vehicles / equipment, "spotters" are to be present to assist the driver with his blind spots. ▪ Any incident or damage to a vehicle must be reported immediately. 						

1.3.8 Stormwater

Table 1-9: Stormwater impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Increased run-off as a result of construction activities and bare, exposed ground. Potential knock-on impacts to nearby watercourses and drainage lines through erosion and siltation.	Without	1	2	3	3	-9 Medium	
		With	1	1	1	2	-5 Low	
		Mitigation measures: <ul style="list-style-type: none"> ▪ Sandbag berms must be placed at regular intervals on all exposed steep slopes to minimise erosion and contaminated stormwater run-off into watercourses and/or drainage lines. ▪ Where trenches and excavations are required, the topsoil excavated must be stored on the down-slope side of the trench and the sub-soil on the up-slope side. <ul style="list-style-type: none"> ○ This is important for two reasons: (1) the larger volume of soil is stored upslope of the excavations so that if soil fines and silt are washed off the stockpile during rainfall events, these are washed into the excavation and not into a watercourse, and (2) it is important to separate the two so that the topsoil is placed on top of the subsoil when the soil is backfilled. ○ This is essential to promote rapid growth of vegetation during the rehabilitation phase. ▪ Where culverts are to be constructed within a drainage line or watercourse, the construction area must be isolated by a sandbag bund in order to protect the area from possible silt-contaminated run-off. ▪ Suitable erosion control measures shall be implemented at stormwater discharge points, exposed areas and embankments. These measures could include: <ul style="list-style-type: none"> ○ The suitable use of sand bags or soil saver; ○ The prompt rehabilitation of exposed areas with indigenous vegetation; and ○ The removal of vegetation, only as it becomes necessary for work to proceed. ▪ Over-wetting, saturation and unnecessary run-off during dust control activities must be avoided. ▪ Stormwater run-off to be channelled through natural grass and surrounding vegetation. 						

1.3.9 Biodiversity

Table 1-10: Biodiversity impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Clearing of vegetation for construction.</p> <p>Impact: Loss of plant species of conservation concern and biodiversity loss</p>	Without	1	1	1	2	-5 Low
		With	1	1	1	1	-4 Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Workers must be limited to areas under construction and within the road servitude. ▪ No disturbance to vegetation outside of the construction footprint is permitted. ▪ Collecting of firewood or traditional medicinal plants is prohibited. ▪ Disturbed areas of natural vegetation must be rehabilitated immediately to prevent soil erosion ▪ Due to the linear extent of the road upgrade, as well as the degraded and transformed character of most of the sections of water course observed, and the relatively low density (or number of species encountered per sampling site), the following specifications are recommended: <ul style="list-style-type: none"> ○ Submit a license application for the removal of protected plant species to DEDEAT. ○ Rescued plants should not be planted in areas that will be disturbed in the future, e.g. not along the road reserve where maintenance activities will require their removal or cutting/trimming. 					
Construction	<p>Aspect: Clearing of vegetation for construction activities.</p> <p>Impact: Proliferation of alien vegetation in disturbed areas.</p>	Without	1	4	2	4	-11 High
		With	1	1	1	2	-5 Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> ▪ Remove any alien or non-indigenous plant species as they establish during the construction period. ▪ Alien plant seed dispersal within the top layers of the soil footprint areas, that will have an impact on future rehabilitation, has to be controlled. ▪ Rehabilitate/plant disturbed areas with natural/indigenous plants. ▪ Care should be taken with the choice of any herbicide used to ensure that no additional impact and loss of indigenous plant species occurs. 					

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Construction of roads and culverts. Vegetation and site clearing.</p> <p>Impact: Degradation and loss of soil.</p>	Without	1	1	2	3	-7 Medium
		With	1	1	1	2	-5 Low
<p>Mitigation measures:</p> <ul style="list-style-type: none"> Top soil stripping must be restricted to the construction footprint and appropriately stored for later use in back-filling. Sub-soil and topsoil (the top ± 30–50 cm of the soil) should be stored separately. Soil stockpiles are to be protected from possible erosion, e.g. through covering of the stockpiles with tarpaulin, and limiting the height and angle of the stockpile. Soil stockpiles must not exceed 1 m in height. Soil stockpiling areas must be sufficiently situated away from drainage areas. Any erosion channels developed during the construction period or during the vegetation establishment period should be backfilled and compacted to promote vegetation growth. The Contractor should ensure that cleared areas are effectively stabilised to prevent and control erosion. Disturbed areas of natural vegetation must be rehabilitated immediately to prevent further soil erosion. In accordance with the Conservation of Agricultural Resources Act, Act No. 43 of 1983, any slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. 							
Operational	<p>Aspect: Maintenance and repairs of roads.</p> <p>Impact: Disturbance of rehabilitation.</p>	Without	1	1	2	3	-7 Medium
		With	1	1	1	1	-4 Low
<p>Mitigation measures:</p> <ul style="list-style-type: none"> Implementation of an operational EMPR to ensure that any maintenance and repairs to the roads are undertaken in a manner that is least intrusive to the surrounding natural environment. 							
Operational	<p>Aspect: Maintenance and repairs of roads.</p> <p>Impact: Disturbed areas and exposed soils along the road side provide the opportunity for alien invasive species to establish.</p>	Without	1	1	2	3	-7 Medium
		With	1	1	2	1	-5 Low
<p>Mitigation measures:</p> <ul style="list-style-type: none"> The road reserve should be cleared of alien vegetation during maintenance activities. 							

1.3.10 Heritage

Table 1-11: Heritage impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Site clearing.</p> <p>Impact: Potential disturbance of sites of archaeological, historical and cultural significance.</p>	Without	1	4	1	2	-8 Medium
		With	1	1	1	2	-5 Low
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Archaeological and cultural heritage desktop information indicates a low probability of the likelihood of protected heritage resources in the vicinity of the study site. In the event of any incidental archaeological and cultural heritage resources, as defined and protected by the NHRA 1999, being identified during the course of development the process described in 'Appendix A: of the Heritage Specialist Study - Protocol for Incidental Finds during the Construction Phase' should be followed Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51(1). It is advisable that an information section on cultural/heritage resources be included in the Environmental Induction training and a chance-find procedure be developed. All contractors involved in surface earthmoving activities must be trained on these procedures. 					
Construction	<p>Aspect: Site clearing.</p> <p>Impact: Potential disturbance of sites of palaeontological significance.</p>	Without	1	4	2	2	-9 Medium
		With	1	1	1	2	-5 Low
		<p>Palaeontological significance is very high as the project falls within a fossiliferous formation – the Karoo Supergroup. (Geology)</p> <p>Mitigation measures:</p> <ul style="list-style-type: none"> Care must be taken during the grading of the road, digging of foundations and removing topsoil, subsoil and overburden or blasting of bedrock. If any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. 					

1.3.11 Socio-economic and Health

Table 1-12: Socio-economic and health impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	Aspect: Construction activities. Impact: Job creation during the construction phase of the project.	Without	2	2	1	2	+7 Medium	
		With	2	2	2	4	+10 High	
	Mitigation measures: <ul style="list-style-type: none"> ▪ All labour (skilled and unskilled) and Contractors should be sourced locally where possible. ▪ A labour and recruitment policy will be developed, displayed and implemented by the contractor. ▪ Recruitment at the construction site will not be allowed. ▪ Where possible, labour intensive practices (as opposed to mechanised) should be practiced. ▪ The principles of equality, BEE, gender equality and non-discrimination will be implemented. 							
	Without	2	2	2	2	2	-8 Medium	
With	2	1	1	1	1	-5 Low		
Mitigation measures: <ul style="list-style-type: none"> ▪ Ensure transparent employment process and regular communication via formal communication platforms (for example, Municipal Public Notice Board). In this way the public is kept informed of the work scenario. ▪ The office that is handling all recruitment matters (off-site) must undertake the necessary monitoring and communication on site, to potential work-seekers. ▪ On site construction camps should not be considered. 								
Construction	Aspect: Construction activities. Impact: Job creation during the construction phase could result in the influx of people to the area.	Without	2	2	2	2	-8 Medium	
		With	2	1	1	1	-5 Low	
	Mitigation measures: <ul style="list-style-type: none"> ▪ The contractor will adhere to local authority by-laws relating to noise control. ▪ Construction activities are to be undertaken during daylight working hours. ▪ Mechanical equipment with lower sound power levels will be selected to ensure that the permissible occupation noise is not exceeded. ▪ Equipment will be fitted with silencers as far as possible to reduce noise. ▪ All equipment will be adequately maintained and kept in good working order to reduce noise. ▪ A grievance procedure will be established, allowing complaints to be received, recorded and responded to appropriately. ▪ The construction area will be cordoned off, thus not causing added safety issues to pedestrian traffic. ▪ All employees, contractors and sub-contractors must comply with the Municipality's Health and Safety Policy. ▪ Appropriate health and safety signage must be displayed on site. ▪ Dust suppression should be used if there is excessive dust from construction activities or from vehicles travelling on any dirt roads. 							
	Without	1	1	1	1	1	+4 Low	
With	1	1	1	1	1	+4 Low		

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
	<p>Aspect: Construction activities.</p> <p>Impact: Increase in informal and formal procurement of goods and services leading to increased local economic activity.</p>	<p>Mitigation measures:</p> <ul style="list-style-type: none"> Small-scale vending ventures are likely to experience an increase in the trade of small everyday goods. This is not a sustained activity as it will probably only service the construction workers for the period they are on site. 	1	2	3	2	-8
			Without	1	2	1	1
	<p>Aspect: Construction activities.</p> <p>Impact: Compromised Contractor health and safety.</p>	<p>Mitigation measures:</p> <ul style="list-style-type: none"> Moving vehicles, suspended loads, loading and unloading of materials all pose risks. The receptor is limited to the construction workforce. The construction site must be fenced off to prohibit unauthorised access and site access must be strictly controlled. All employees, contractors and sub- contractors to wear appropriate PPE. Open excavations must be clearly marked. All employees, contractors and sub- contractors must comply with the Municipality's Health and Safety Policy. Appropriate health and safety signage must be displayed on site. 	1	2	1	1	-5
			With	1	2	1	1
Cumulative	<p>Aspect: Community safety and well-being.</p> <p>Impact: Improvement in the condition of the road and culverts.</p>	<p>Mitigation measures:</p> <ul style="list-style-type: none"> Maintenance on the infrastructure must be on-going. 	2	3	3	2	-10
			Without	2	3	3	4
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Maintenance on the infrastructure must be on-going. 	2	3	3	4	+12
			With	2	3	3	4

1.3.12 Geohydrology

Table 1-13: Geohydrology impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect:</p> <ul style="list-style-type: none"> Water supply and quality Improper storage of fuels, chemical, etc. Construction equipment, vehicles, workshop and wash bay areas Inadequate ablutions. <p>Impact: Groundwater contamination as a result of:</p>	<p>Mitigation measures:</p> <ul style="list-style-type: none"> Potentially hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time. Material safety data sheets (MSDSs) are to be clearly displayed for all hazardous materials. The integrity of the impervious surface and bunded area must be inspected regularly and any maintenance work conducted must be recorded in a maintenance report. Employees should be provided with absorbent spill kits and disposal containers to handle spillages. Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages. 	1	2	3	3	-9
			Without	1	2	1	2
		<p>Mitigation measures:</p> <ul style="list-style-type: none"> Potentially hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time. Material safety data sheets (MSDSs) are to be clearly displayed for all hazardous materials. The integrity of the impervious surface and bunded area must be inspected regularly and any maintenance work conducted must be recorded in a maintenance report. Employees should be provided with absorbent spill kits and disposal containers to handle spillages. Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages. 	1	2	1	2	-6
			With	1	2	1	2

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
	<ul style="list-style-type: none"> Spillage of fuels, lubricants and other chemicals. Construction equipment, vehicles, workshop and wash bay areas will be a likely source of pollution as a non-point source. Lack of provision of ablutions that may lead to the creation of informal ablutions. 	<ul style="list-style-type: none"> All mobile plant and equipment must be regularly maintained to ensure their integrity and reliability. No repairs may be undertaken beyond the contractor laydown area. Immediate reporting and rectification of any incident that might lead to pollution. Implementation of best practice methods to prevent potential incidents from occurring e.g. an Environmental Management System (EMS) reporting and monitoring system. An Emergency Preparedness and Response Plan will be developed and implemented should an incident occur. Access to storage areas on-site must be restricted to authorised employees only. Contractors will be held liable for any environmental damages caused by spillages. The construction workforce must have adequate sanitation facilities. The sanitation facilities should be on-site prior to the extended workforce, to ensure that no unauthorised sanitation practices are implemented on-site. Potential construction practices that might lead to groundwater contamination should be conducted on areas with impervious surfaces to avoid infiltration of contaminated substances into the groundwater aquifer. All contaminated stormwater should be treated before being discharged into the surrounding natural environment. 					

1.3.13 Riverine Habitat

Table 1-14: Riverine habitat impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Construction activities within watercourses / drainage lines.</p> <p>Impact: Altered drainage patterns and associated disturbance / loss of habitat due to increased soil erosion, sedimentation and turbidity.</p>	Without	2	1	2	4	-9
		With	2	1	1	1	-5
		Mitigation measures:					
		<ul style="list-style-type: none"> As a matter of procedure, stormwater management plans are designed by the project Engineer prior to construction commencing. This plan should include any construction phase mitigation measures (Engineering specifications) to reduce sheet run-off and to ensure adequate stormwater management and erosion control during the construction phase, where necessary from the road and at any of the water course crossings. Prevent surface water from being concentrated, and from flowing down trenches without erosion protection measures in place. Sediment-laden stormwater should not flow directly off the construction area during the establishment phase. It should be directed into areas where sediment can settle out and be removed. Preserve as much natural vegetation on site as possible. Rehabilitate areas as soon as possible with indigenous grasses. If necessary and where possible, stockpile topsoil for re-use when planting of indigenous plants in disturbed areas/construction footprints (rehabilitation). Repair any erosion damage as soon as possible. A Water Use License Application with the Department of Water Affairs will be necessary for infrastructure development within 500 m of a wetland, under a possible General Authorisation. An Environmental Management Programme (EMP) is required by the NEMA Basic Assessment regulations and these specifications should be included to manage stormwater and erosion, as well as immediate rehabilitation to reduce soil erosion and sedimentation. Employment of an Environmental Control Officer to ensure compliance with the EMP and Record of Decision/Environmental Authorisation. 					

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Operational	<p>Aspect: Modification of flow dynamics and flow patterns.</p> <p>Impact: Increased velocity of surface water flows – reduction in permeable surfaces (hydrological processes)</p>	Without	2	3	2	2	-9 Medium
		With	1	2	1	1	-5 Low
		Mitigation measures:	<ul style="list-style-type: none"> As a matter of procedure, stormwater management plans are designed by the project Engineer prior to construction commencing, to manage increased water volumes and velocities (hydrological impacts). Storm-water design should follow natural drainage patterns as far as is possible i.e. drainage towards streams, and must ensure surface water flow velocities are reduced before draining into any of the watercourses (wetlands and streams). Surface water flow should be discharged into grassed (indigenous) retention swales or areas with rock rip-rap to decrease water velocity and water volume, which may potentially enter the watercourses (wetlands and streams). Correct siting of these energy dissipation structures should manage flows prior to draining into the streams and wetlands, to prevent erosion and to maintain natural base flows within the streams; and maintaining the hydrological regime (water quantity and quality). Localised groundwater recharge will be encouraged through the grassed swales thereby maintaining the hydrological regime (water quantity and quality). 				
Operational	<p>Aspect: Changes to water quality</p> <p>Impact: Discharges or spills from the road can impact on water quality</p>	Without	2	3	2	2	-9 Medium
		With	1	2	1	1	-5 Low
		Mitigation measures:	<ul style="list-style-type: none"> It is recommended, although not within the scope of this project, that all stormwater and pipeline leaks within the region be attended to, to improve the water quality within the observed water courses. Pertaining to the road, remedial action where spillages occur must be initiated by the relevant emergency personnel. 				

1.3.14 Wetland

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
Construction	<p>Aspect: Impact on the wetlands associated with the culverts.</p> <p>Impact: Loss of wetland habitat (biodiversity loss and hydrological processes)</p>	Without	2	3	2	4	-11 High
		With	2	1	1	1	-5 Low
		Mitigation measures:	<ul style="list-style-type: none"> Adequate stormwater management and erosion control must be implemented to prevent increased flows and velocity of water entering these systems. Ensure 32 m buffers around all streams / drainage lines (apart from road crossing sites). Immediate rehabilitation/planting of disturbed areas once construction is complete, with indigenous plants. If necessary and where possible, stockpile topsoil for re-use when planting of indigenous plants in disturbed areas/construction footprints (rehabilitation). Employment of an Environmental Control Officer to ensure compliance with the EMP and Record of Decision/Environmental Authorisation. 				

2 ENVIRONMENTAL IMPACT STATEMENT

2.1 Introduction

Potential environmental impacts (biophysical and social) associated with the proposed Erf 225 development have been identified and discussed herein.

This Basic Assessment assesses and addresses all potentially significant environmental issues as deemed of relevance for the nature of the specific development and the wider context within which it is placed, in order to provide the EC DEDEAT with sufficient information to make an informed decision regarding the proposed project.

The tables overleaf provide an indication of aspects considered in terms of the potential impacts thereon, and provides a summary of advantages / disadvantages, along with an indication of the potential for mitigation of the negative aspects.

2.2 Comparative Analysis of Alternatives

The following table provides an average of the alternatives against each other, for the construction phase.

Table 2-1: Advantages and disadvantages of the proposed Erf 225 project in relation to the ‘No-Go’ alternative

	Disadvantages and Responding Mitigation		No-Go (Status Quo)
	Advantages	Disadvantages and Responding Mitigation	Advantages
Soils and Agricultural	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Physical degradation due to the removal and compaction of soil during construction activities. ▪ Physical degradation due to soil erosion as a result of exposed soil and topsoil. ▪ All above mitigated against by following recommendations contained within the EMPr. 	No foreseen disadvantages.
Geology and Topography	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Disturbance of surface geology resulting in site instability due to inadequate drainage and/or inappropriate engineering planning and interventions. ▪ Erosion by concentrated, uncontrolled water-flow. ▪ All above mitigated against by following recommendations contained within the EMPr. 	No foreseen disadvantages.
Air Quality and Odour	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Fugitive dust emissions from construction activities and mobile plant / machinery. ▪ Generation of fumes from vehicle emissions may pollute the air. ▪ Release of odours as a result of the chemical toilets on-site. ▪ All above mitigated against by following recommendations contained within the EMPr. 	No foreseen disadvantages.
Noise	No foreseen advantages.	<ul style="list-style-type: none"> ▪ Increase in noise pollution from construction vehicles and construction staff. ▪ Mitigated against by following recommendations contained within the EMPr. 	No foreseen disadvantages.
Visual	No foreseen advantages.	<ul style="list-style-type: none"> ▪ During construction the clearing and grading of the site would create a visual scar in the landscape. ▪ Large construction vehicles and equipment will be visible to receptors within the study area. ▪ Mitigated against by following recommendations contained within the EMPr. 	No foreseen disadvantages.

		No-Go (Status Quo)	
	Advantages	Disadvantages and Responding Mitigation	Advantages
Traffic	No foreseen advantages.	<ul style="list-style-type: none"> Increase in traffic from construction vehicles. Mitigated against by following recommendations contained within the EMPr. 	<p>Disadvantages and Responding Mitigation</p> <ul style="list-style-type: none"> The road will continue to be heavily congested and the road surface will not be upgraded. Stormwater infrastructure is in need of repair and has contributed to the poor state of the existing roads. Flooding of the road during rainfall events will continue.
Stormwater	No foreseen advantages.	<ul style="list-style-type: none"> Increased run-off due to construction activities and bare, exposed ground. Mitigated against by following recommendations contained within the EMPr. 	<p><i>Status quo</i> will remain.</p>
Biodiversity	No foreseen advantages.	<ul style="list-style-type: none"> Disturbance of natural vegetation due to construction activities. Degradation and loss of soil. 	<p><i>Status quo</i> will remain.</p>
Social and Socio-economic	<ul style="list-style-type: none"> New residential property for proponent. Unskilled employment opportunities during construction phase. 	<ul style="list-style-type: none"> As could be expected, the construction phase is characterised by a number of negative social impacts (viz. arrival of construction workers; inflow of job seekers, additional demand on services, crime, etc.) which is mainly due to the nature of the activities that take place during this phase. Although the expected social impacts associated with the construction phase are mostly negative, these impacts are for the most part only temporary in nature and as such are expected to only last over the construction period. Client and Contractor should commit to minimising negative social aspects where possible. 	<p>No foreseen advantages.</p> <ul style="list-style-type: none"> Roads and stormwater infrastructure will continue to deteriorate. Traffic congestion will increase with time. Flooding of the road at the culverts will continue during rainfall events. Community will have to walk if roads are unsuitable for vehicles to travel on them. Loss of an opportunity to provide unskilled employment opportunities.
Geohydrology and Hydrology	<ul style="list-style-type: none"> Upgrade to culverts will improve water flow and decrease existing sedimentation 	<ul style="list-style-type: none"> Potential for shallow groundwater contamination through the spillage of fuels, lubricants, lack of provision of ablutions and other aspects such as construction equipment, vehicles and wash bay areas exist. Run-off from the construction area into groundwater or surface water resources will need to be managed. Mitigated against by following recommendations contained within the EMPr. 	<p><i>Status quo</i> will remain.</p> <ul style="list-style-type: none"> Heavy rainfall may result in further deterioration of the road surface and stormwater infrastructure.
Riverine Habitat / Wetlands	No foreseen advantages.	<ul style="list-style-type: none"> Site clearing, removal of vegetation, and associated disturbances to soils, leading to increased run-off and erosion with consequent sedimentation of drainage lines. Mitigated against by following recommendations contained within the EMPr. 	<ul style="list-style-type: none"> Stormwater infrastructure will further deteriorate which will increase existing sedimentation and flooding of the road.

