



## ENVIRONMENTAL MANAGEMENT GROUP

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### IMPACT ASSESSMENT

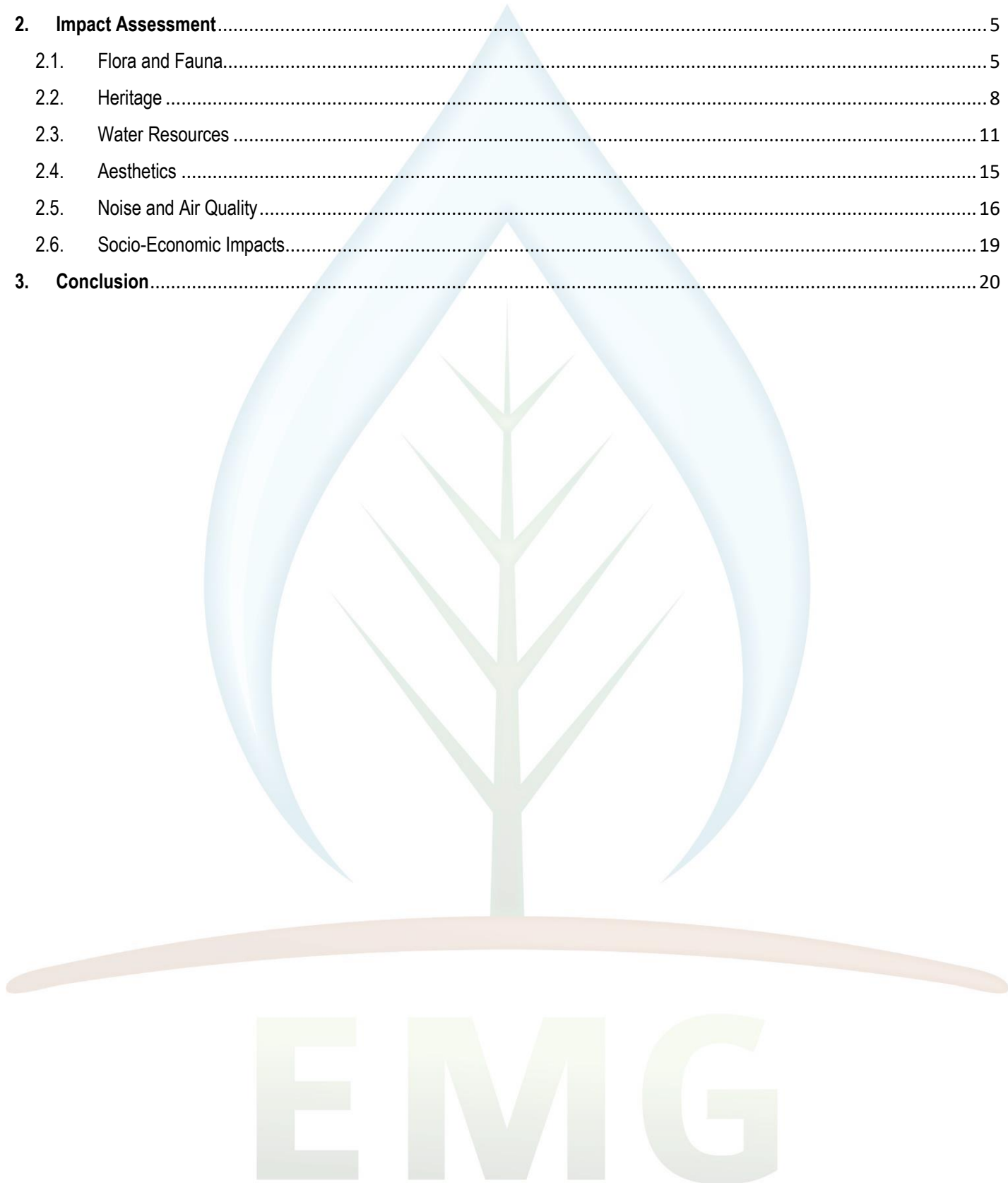
DRAFT BASIC ASSESSMENT FOR ENVIRONMENTAL  
AUTHORISATION FOR THE DEVELOPMENT OF A  
PROPOSED BUS AND TAXI HOLDING AREA;  
INCLUDING A FILLING STATION AND ASSOCIATED  
INFRASTRUCTURE ON ERVEN, 3781, 3780, 710, 602  
AND 600, MAFIKENG, NORTH WEST PROVINCE

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# 1. Assessment Methodology

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood.

## 1.1. Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

### Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment (Table 1).

**Table 1: Rating of severity**

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Medium change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

### Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place (Table 2).

**Table 2: Rating of Duration**

Rating	Description
1: Low	1 Month
2: Low-Medium	1 – 3 Months
3: Medium	More than 3 Months
4: Medium-High	5 – 10 Years
5: High	More than 10 Years

Determination of Extent/Spatial Scale

Extent refers to the spatial influence of an impact, be it contained to the immediate surroundings (site), extending to the surrounding area, regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders) (Table 3).

**Table 3: Rating of Extent / Spatial Scale**

Rating	Description
1: Low	Immediate, fully contained area (site)
2: Low-Medium	Surrounding Area
3: Medium	Regional
4: Medium-High	National
5: High	International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 3 (Table 4).

**Table 4: Example of calculating Overall Consequence**

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
<b>TOTAL CONSEQUENCE:(Subtotal divided by 3(Severity, Duration, Extent))</b>	<b>Example 3.3</b>

**1.2. Determination of Likelihood**

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5 (Tables 5 and 6).

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken (Table 5).

**Table 5: Rating of frequency**

Rating	Description
1: Low	Once a year / once during construction
2: Low-Medium	Once / more in 6 Months
3: Medium	Once / more a Month
4: Medium-High	Once / more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment (Table 6).

**Table 6: Rating of probability**

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2 (Table 7).

**Table 7: Example of calculating the overall likelihood**

Likelihood	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	Example 6
TOTAL LIKELIHOOD (Subtotal divided by 2 (Frequency, Probability))	Example 3

**1.3. Determination of Overall Environmental Significance**

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH (Table 8).

**Table 8: Determination of overall environmental significance**

Significance or Risk	Low	Low-Medium	Medium	Medium-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact (Table 9).

**Table 9: Description of the environmental significance and the related action required.**

Significance	Low	Low-Medium	Medium	Medium-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company and environment. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.



## 2. Impact Assessment

### 2.1. Flora and Fauna

Flora refers to the vegetation found in and around the area that will be assessed. This includes all species of vegetation from protected and indigenous species to alien and exotic plant life. Fauna refers to the animal life, inclusive of birds, mammals, invertebrates and reptiles found in or around the site being assessed. The fauna assessment also includes locating preferred habitats of protected/Endangered fauna species.

1. Clearance of Vegetation								
<b>Impact</b>	Clearance of vegetation							
<b>Description of impact</b>	Vegetation will be cleared for the authorized area only. The area is severely degraded (alien species) and is situated in the center of the central business district (CBD). No protected species was observed, but clearance of vegetation will still impact on ecology and storm water runoff.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	2	1	1.7	5	2	3.5	5.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Only vegetation within the applied area can be removed.</li> <li>Keep vegetation removal to a minimum and only what is required.</li> <li>According to the ecologist, "where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act and National Biodiversity Management: Biodiversity Act."</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	1	1	1	1	4	2	3	3
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	1	2	1	1.3	2	2	2	2.7
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Removal of only alien/weed species</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	1	1	1	1	1	2	1.5	1.5
<b>Cumulative Impact</b>	Major cumulative impacts on the clearance of vegetation has already occurred within the CBD, but the removal of vegetation in the applied for area will have little to no impact on large scale.							
<b>Additional Notes:</b>	Keep in mind that the whole area is highly degraded and no sensitive floral elements were found by the specialist.							

The impact on clearance of vegetation will be **LOW** without mitigation and even **LOWER** when mitigation measures are applied. This risk assessment applies for both construction and operational phases and is described as having a low order impact likely to have little to real effect. This low impact is as a result of the development area that is situated in the Central Business Centre (CBD) surrounded by infrastructure and a railway.

2. Permanent loss of animal life								
<b>Impact</b>	No returning of animal life							
<b>Description of impact</b>	The area is severely degraded but due to the presence of a storm water channel and densely vegetated area, the occurrence of animal life is highly likely. Most of the vegetation will be removed which will result in a permanent loss of animal life on the proposed development area.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	2	1	2	5	2	3.5	7
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>No animals may be captured or killed.</li> <li>Endangered or nesting animals require a specialist to remove.</li> <li>If snakes are encountered a specialist will be required to remove them.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	1	1	1.7	5	2	3.5	4.6
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Mitigation</b>								
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Cumulative Impact</b>	Since the area is in the center of the CBD no animal life will be present in the surrounding area. And the transformation of the development area will have no to little effect on animal life.							
<b>Additional Notes:</b>	None							

This impact is rated as a **LOW-MEDIUM** risk for the constructional phase, as it is the only area in the surrounding environment that doesn't contain infrastructure and it is likely that some animal life will be encountered there. If mitigation measures are followed the impact will be lessened and the risk is lowered to a **LOW-MEDIUM** risk due to the developer ensuring survivability of animal life found on site. The operational phase contains no impact as all the animal life will be removed from site once the operation commences.



Cumulative Totals						
Impact	Construction		Operational		Total	
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation
1. Clearance of Vegetation	5.8	3	2.7	1.5	4.3	2.3
2. Permanent loss of animal life	7	4.6	NO IMPACT	NO IMPACT	7	4.6
				<b>Grand Total:</b>	<b>5.6</b>	<b>3.48</b>

Overall the impact, if no mitigation is implemented, will be a **LOW-MEDIUM** risk. The risk is low as factors such as its location and vegetation type all contributed to its low significance. With mitigations implemented the risk will slightly lower rating it at a score of **LOW**. The site consists primarily of alien and invader species which have no conservation value.

## 2.2. Heritage

Heritage involves culturally significant finds including, but not limited to fossils, artefacts and certain culturally relevant infrastructure. These items will be identified by a Heritage Specialist throughout the construction phase of this project.

1. Artefacts and Fossils								
<b>Impact</b>	Damaging any artefacts or fossils							
<b>Description of impact</b>	During construction activities fossils or artefacts may be found on the surface or during excavations. Ignoring these artefacts or fossils and continuing with activities may result in unrecoverable loss of history. The Heritage specialist indicated that any finds will be paleontological in nature especially in the Rietgat Formation which may contain stromatolite structures.							
<b>Phase</b>	Construction							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	1	1	1.7	5	1	3	5
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Any items found that are under suspicion to be fossils or artefacts must immediately be reported and a specialist be contacted to examine the finds.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	1	1	1	1	4	1	2.5	2.5
<b>Phase</b>	Operational							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Mitigation</b>								
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Cumulative Impact</b>	No cumulative impacts are foreseen							
<b>Additional Notes</b>	Although most of the impact will occur during the construction phase, artefacts and fossils can be discovered throughout the lifetime of the project and special care needs to be taken to ensure the identification of such artefacts and the immediate contacting of a specialist.							

The Heritage Specialist report indicated that the chances of finding any palaeontological or culturally significant artefacts are very low on the proposed site. It is however possible to have chance findings during excavation activities and is rated to be a **LOW-MEDIUM** risk before mitigation. If mitigation is applied and the Heritage specialist consulted if any artefacts are found the risk can be mitigated to a **LOW** risk.

2. Historical features								
<b>Impact</b>	Historical features such as buildings older than 60 years, may be destroyed during the construction of the pipeline							
<b>Description of impact</b>	The Heritage specialist indicated that a small chance exist that culturally significant structures or artefacts may be found on site from the Iron Age.							
<b>Phase</b>								
<b>Construction</b>								
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	2	1	2	1	2	1.5	3
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• Before any structure is removed that was not identified during the heritage impact assessment, a specialist must be consulted as well as the landowner or owner of the structure.</li> <li>• Any significant finds must be left as is and a specialist be contacted to investigate.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	1	1	1.3	1	1	1	1.3
<b>Phase</b>								
<b>Operational</b>								
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Mitigation</b>	NO IMPACT							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO IMPACT							
<b>Cumulative Impact</b>	None							
<b>Additional Notes</b>	Although most of the impact will occur during the construction phase, artefacts and fossils can be discovered throughout the lifetime of the project and special care needs to be taken to ensure the identification of such artefacts and the immediate contacting of a specialist.							

The Heritage specialist assessed the site and found no evidence of culturally significant artefacts. However these finds can be unearthed during the construction activities and is rated to be a **LOW** risk for both with and without mitigation measures.

Cumulative Totals						
Impact	Construction		Operational		Total	
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation
1. Artefacts and Fossils	5	2.5	NO IMPACT	NO IMPACT	5	2.5
2. Historical features	3	1.3	NO IMPACT	NO IMPACT	3	1.3
<b>Grand Total:</b>					<b>4</b>	<b>2</b>

In conclusion the Heritage Impact scores a risk of **LOW** for both before and after mitigation measures have been implemented. The LOW score includes the factors, as per the Heritage report, which states that the chances of finding any artefacts of value are low to none.

### 2.3. Water Resources

Water resources includes every aspect of water including surface and ground water, as well as assessments on their quality and quantity. The Geohydrological Assessment-, as well as Hydrological Assessment reports includes all risks associated with water bodies present on site.

1. Groundwater Quality								
<b>Impact</b>	Surface activities and land contamination may infiltrate into the subsurface and reach the aquifer were contamination of the water resource can occur.							
<b>Description of impact</b>	The taxi holding area as well as the planned filling station may incur accidental spillages which through additional water from rainfall can infiltrate into the aquifer potentially contaminating the water resource with heavy metals and volatile organic compounds.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	3	2	2.7	5	3	4	10.7
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>All hazardous chemicals used during the construction of the development must be stored on an impermeable layer.</li> <li>All spillages on bare ground must be removed correctly with the contaminated soils and disposed of using a sub-contractor.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	2	1	1.7	4	3	3.5	5.8
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	4	4	2	3.33333333	4	4	4	13.3
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>All above petroleum storage tanks needs to be bunded with an area that can store 110% of the tank's capacity.</li> <li>In the storm water management plan oil separators must be constructed to capture runoff from the site.</li> <li>Oil spill kits must be readily available to clean and properly dispose of contaminated soils or areas.</li> <li>The taxi holding areas need to have runoff channels which capture contaminated runoff.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	3	1	2	2	3	2.5	5
<b>Cumulative Impact</b>	Since the area is classified as a CBD the expected groundwater quality can be seen as contaminated and this development's impact will have a small cumulative impact							
<b>Additional Notes:</b>	None							

The nature of the development has an overall effect on both the construction and operational phases as hazardous chemicals will be used. The construction phase is scored as a **MEDIUM** risk before mitigation and **LOW-MEDIUM** after mitigation has been implemented. The lowering in risk is as a result of working more carefully with hazardous chemicals and storing the in secure areas. The operational phases carries a slightly higher risk and scores a **MEDIUM** risk as a result of the underground fuel tanks that pose the highest risk to the groundwater resources in terms of quality. If ground water monitoring and site clean-up is regularly conducted the risk is mitigated to a score of **LOW-MEDIUM**.

2. Groundwater Quantity								
<b>Impact</b>	Abstraction through boreholes can affect the quantity of ground water resources available.							
<b>Description of impact</b>	It was indicated by the developer that groundwater abstraction will be considered during the operational phase which could detrimentally affect the groundwater resource if over abstraction occurs.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
<b>Mitigation</b>	NO IMPACT							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	NO Impact							
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	4	4	2	3.3	4	4	4	13.3
<b>Mitigation</b>	XXXXXXXXXXXXXXXXXX							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	4	1	2.3	2	1	1.5	3.5
<b>Cumulative Impact</b>	A cumulative impact can occur, if nearby groundwater users over abstract, which could permanently damage the aquifer.							
<b>Additional Notes:</b>	None							

This risk has not yet been incorporated into the project as abstracting borehole water will only be considered further down the line. If it is decided to augment the water supply further with borehole water, a separate impact assessment will be done during a full geohydrological study. A preliminary risk assessment was done during the operational phase and it was concluded that without mitigation measures a **MEDIUM** risk is to be expected where as if mitigation is applied only a **LOW** risk can be recorded.



3. Storm water runoff								
<b>Impact</b>	Contaminated runoff from a site or a lack of proper flow could either contaminate an area or cause flood damage.							
<b>Description of impact</b>	The proposed site has a storm water channel running straight through the site. With the addition of a filling station, a large rainfall event could possibly contaminate and flood the area if the storm water channel overflows or a lack of proper storm water controls cause back water to pond on site.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	2	2	2.3	2	3	2.5	5.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Ensure that all hazardous substance used during the construction are stored on impermeable surface.</li> <li>Ensure that construction doesn't obstruct the existing storm water channel.</li> <li>Investigate measures to upgrade the existing storm water channel.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	1	1	1.3	2	1	1.5	2
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	4	2	2	2.7	3	3	3	8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Incorporate the existing storm water channel into the engineering designs.</li> <li>Ensure that the filling station has adequate storm water channels surrounding the area for contaminated water capture.</li> <li>The taxi holding area has adequate storm water channels surrounding it for water capture or guided flow of rainfall.</li> <li>Ensure that all storm water structures are clear of any debris.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	1	1	1.3	2	1	1.5	2
<b>Cumulative Impact</b>	The whole area is already built up which concentrates rainfall and increase flow towards a storm water channel. This development adds to less infiltration and more surface runoff being concentrated.							
<b>Additional Notes:</b>	The existing storm water channel cannot be removed and either has to be upgraded or re-designed to accommodate the new development.							

Note that the storm water channel will become an integral part of this development where the construction and operational phase will have to incorporate it into the designs and activities. During the construction phase without mitigation a **LOW-MEDIUM** risk can be expected as the storm water channel is already severely degraded and blockages can cause flooding of the proposed area. If mitigation measures are applied during the construction phase it is estimated that this storm water channel will pose no risk to the development and is rated as a **LOW** risk. The operational phase scores the same risks as the construction phase with and without mitigation measure being applied. The main mitigation measures need to focus on keeping the storm water channel free from debris and incorporating this structure efficiently into the designs so that it works as it was designed for or even better.

Cumulative Totals						
	Construction		Operational		Total	
Impact	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation
1. Groundwater Quality	10.7	5.8	13.3	5	12	5.4
2. Groundwater Quantity	NO IMPACT	NO IMPACT	13.3	3.5	13.3	3.5
3. Storm water runoff	5.8	2	8	2	6.9	2
<b>Grand Total:</b>					<b>10.8</b>	<b>3.6</b>

The development will use hazardous substances during the construction phase and petrochemical substances will be stored on site during the operational phase. The afore mentioned parameters all contribute to a relatively high risk posed to the ground water resources if not properly managed. These results in a **MEDIUM** risk before mitigation measures have been applied and a **LOW** risk is all mitigation measure have been applied for.





## 2.4. Aesthetics

This risk to the visual character of the environment will be based on a cumulative contribution of all the specialists and physical site visits done by the Environmental Assessment Practitioner.

1. Visual Impact								
<b>Impact</b>	Changing the current aesthetic value through development with could negatively affect the overall value of the area in terms of the environment							
<b>Description of impact</b>	The development will clear and level an already disturbed area (mostly weeds) in the center of Mahikeng's CBD. The site however does contain large trees, but is also situated alongside a railway and the site has building rubble stockpiled randomly throughout the area.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	2	2	2.3	2	3	2.5	5.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• During vegetation clearance commit to site clean-up.</li> <li>• Incorporate some of the trees into the designs.</li> <li>• Using only native plant species for landscaping.</li> <li>• Upgrade or redesign the storm water channel which is highly degraded.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	1	1	1.7	1	2	1.5	2.5
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	4	5	2	3.7	5	2	3.5	12.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• Constantly clean the site of litter and oil spills.</li> <li>• Maintain any infrastructure including the storm water channel.</li> <li>• Commit to being environmentally aware and follow best practice guidelines to site cleanliness.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	5	1	2.7	3	1	2	5.3
<b>Cumulative Impact</b>	The whole area around the proposed development has been developed with infrastructure and this development will have a small but insignificant contribution to urbanization.							
<b>Additional Notes:</b>	Keep in mind that the constructional phase discusses the aesthetic impact concerning the vegetation. The operational phase focusses on the infrastructure and how it is incorporated into the surrounding environment.							

The general condition of the proposed site is already severely degraded and situated in the centre of the CBD, surrounded by infrastructure and a railway. It stands to reason that although certain aspects of the risk rating may score high the overall impact is low when all the factors are considered.

For the development and its aesthetic risk the construction phase rates a **LOW-MEDIUM** before mitigation and a **LOW** risk after mitigation has been applied. The risk is low since the proposed site is already severely degraded with a majority of the site being overgrown with alien or invader species which carry no significant value. The operational phase carries the most important value as this development needs to aesthetically fit into the surrounding environment. The development will be situated in the centre of the CBD and thus the taxi and bus holding station would be area appropriate infrastructure. The operational phase carries a **MEDIUM** risk before mitigation and a **LOW-MEDIUM** risk after all the mitigation measures have been applied.

## 2.5. Noise and Air Quality

Noise and air quality assessments are based upon what equipment will be used during a specific activity and the type of disturbance that will occur.

1. Air Quality								
<b>Impact</b>	The quality of air refers to the amount of particles suspended in the air and how it can affect the surrounding environment.							
<b>Description of impact</b>	This development during the construction and operational phases may produce airborne particles which may detrimentally affect the surrounding air quality. In terms of the construction phase, dust may be a cause for concern. During the operational phase petrochemical gasses will be the major concern.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	3	2	2.7	5	3	4	10.7
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Ensure that clearance of vegetation and levelling of the site doesn't occur during windy months or days.</li> <li>No open fire will be allowed on site.</li> <li>If necessary implement dust suppression through wetting with water.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	1	1	1.3	3	2	2.5	3.3
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	4	2	3	5	4	4.5	13.5
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Ensure that no taxis are excessively emitting noxious gasses.</li> <li>The filling station must also ensure that no gasses are excessively emitted.</li> <li>No burning of waste or open flame is allowed.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	2	1	1.7	2	2	2	3.3
<b>Cumulative Impact</b>	A large cumulative impact has already occurred as the site is located in the center of the CBD which produces its own air pollution. Thus this impact has a cumulative impact but can be considered small to insignificant.							
<b>Additional Notes:</b>	None							

Air quality for this proposed site will score a **MEDIUM** risk before mitigation and a **LOW** risk after mitigation measure have been applied, for the constructional phase. These risks are assigned according to the activities associated with the construction phase and include factors such as dust fallout from clearance of vegetation. The operational phase score the same risks as the construction phase, but are more associated with petrochemical substances which may pollute the air. If all mitigation measures are applied the risks are low to insignificant for the area which this development is situated in.

2. Noise Impact								
<b>Impact</b>	Development, infrastructure, services may either introduce or contribute to an increase in overall noise which may detrimentally affect the surrounding environment or nearby residents.							
<b>Description of impact</b>	Since the development is situated in the center of Mahikeng CBD the chance to affect nearby persons will be high. The impact is expected however, not to be of significance since it is in the center of the CBD, close to a railway and experiences large amounts of traffic.							
<b>Phase</b>	<b>Construction</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	2	2	2.3	2	3	2.5	5.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>Ensure that all construction vehicles are properly maintained.</li> <li>Restrict construction to working hours only between 07:00 and 17:00.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	3	1	1	1.7	1	2	1.5	2.5
<b>Phase</b>	<b>Operational</b>							
<b>Before Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	4	5	2	3.7	5	2	3.5	12.8
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>The taxi holding area should impose noise restrictions to prevent excessive use of motor horns and revving the engines.</li> <li>Operational activities should also obey authorized noise levels.</li> </ul>							
<b>After Mitigation</b>	<b>Severity</b>	<b>Duration</b>	<b>Extent</b>	<b>Consequence</b>	<b>Frequency</b>	<b>Probability</b>	<b>Likelihood</b>	<b>Significance</b>
	2	5	1	2.7	3	1	2	5.3
<b>Cumulative Impact</b>	The area is already subjected to large volumes of vehicles and related noise expected from a CBD. This cumulative impact of the proposed development is expected to be small to insignificant							
<b>Additional Notes:</b>	None							

The major concerns for noise originates for both the construction phase, which is the clearance and levelling of the site using heavy machinery, and the operational phase which is the high amounts of traffic the site will experience. The construction phase scores a **LOW-MEDIUM** risk before mitigation and **LOW** after mitigation. The risk during the construction is rated low since the duration of construction phase will be temporary and short. The operational phase carries a higher impact before mitigation at a **MEDIUM** risk and a **LOW-MEDIUM** risk after mitigation, which involves the implementation of noise restrictions of moving and stationary vehicles on-site.

Cumulative Totals						
	Construction		Operational		Total	
Impact	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation
1. Air Quality	10.7	3.3	13.5	3.3	12.1	3.3
2. Noise Impact	5.8	2.5	12.8	5.3	9.3	3.9
<b>Grand Total</b>					<b>10.7</b>	<b>3.6</b>

The air and noise quality cumulative scores a **MEDIUM** risk before mitigation measure are applied. The mitigation measure will involve activities such as best practice guidelines and how efficiently and diligently these practices are implemented. With mitigation measures implemented the impact is lowered to a **LOW** risk for the development.

## 2.6. Socio-Economic Impacts

Quantifying the socio-economic impacts of building the taxi and bus holding area in the Mahikeng Central Business District is challenging due to the multitude of factors to consider. Nevertheless, some impacts, both positive and negative, are evident. The following is a summary of these impacts, recognizing that the difficulty of evaluating the impact makes it open to interpretation. Nevertheless, it can be argued that the positive impacts, such as improved local economic activity, enhanced transportation infrastructure, and increased employment opportunities, outweigh the negatives, such as traffic congestion, noise pollution, potential decreases in property values, and increased risk of crime.

### Positive impacts:

1. Job creation: The construction of the holding area and associated infrastructure can create jobs for both skilled and unskilled workers in the area. This can help to reduce unemployment rates and improve economic stability.
2. Local economic growth: The development of the holding area and infrastructure can attract more businesses and investors to the area, which in turn can lead to local economic growth.
3. Skills development: The development project can provide opportunities for skills development, particularly in the construction industry. This can help to build the capacity of the local workforce and improve their job prospects.
4. Improved public transportation: The holding area will provide a more efficient and convenient public transportation system, which can benefit commuters and reduce traffic congestion in the area.
5. Increased revenue generation: The development project can contribute to the local economy through increased revenue generation from taxes, rates, and other related sources.

### Negative impacts:

1. Traffic congestion - the influx of taxis and passengers in the area can lead to increased traffic congestion.
2. Noise pollution – taxi and bus drivers may honk their horns and cause noise pollution in the area.
3. Decreased property values – a taxi and bus holding area can be seen as an eyesore or a source of noise and pollution, which can negatively impact nearby property values.
4. Crime - a taxi and bus holding area will attract many people, and also potentially attract criminal activity, such as theft or violence, especially if it is not properly secured.

### 3. Conclusion

Total Risk Impact Assessment		
Impacts	Before Mitigation	After Mitigation
2.1 Flora and Fauna	5.6	4.1
2.2 Heritage Resources	4	1.9
2.3 Water Resources	10.8	3.6
2.4 Aesthetic Value	9.3	3.9
2.5. Noise and Air Quality	10.7	3.6
<b>Average Risk Total</b>	<b>8.1</b>	<b>3.4</b>

In conclusion it is foreseen that the project will not have a significant effect on the environment as a whole and scores an impact rating of **LOW-MEDIUM (8.1)** before mitigation and **LOW (3.4)** after mitigation measures. It must be kept in mind that the site is already significantly degraded and although the risks were individually assessed, it can be easily justified that the risks before and after mitigation, can be even lower. The location of the development is perfectly suited for this type of development where the surrounding area has already been highly degraded through development.

It was identified during the risk impact assessment that the developer focusses on the higher risk areas which area as follows:

- Protection of ground water quality through proper management of hazardous substances and monitoring, and
- Monitoring the air- and noise quality by implementing restrictions on noise levels and excessive air pollutants.

