



## agriculture & environmental affairs

Department:  
Agriculture  
& Environmental Affairs  
**PROVINCE OF KWAZULU-NATAL**

(For official use only)

EIA File Reference Number:  
NEAS Reference Number:  
Waste Management Licence Number:  
(if applicable)  
Date Received:

DC/
KZN/EIA/

## BASIC ASSESSMENT REPORT

Submitted in terms of the Environmental Impact Assessment Regulations, 2010 promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

This template may be used for the following applications:

- **Environmental Authorization** subject to basic assessment for an activity that is listed in Listing Notices 1 or 3, 2010 (Government Notices No. R 544 or No. R 546 dated 18 June 2010); or
- **Waste Management Licence** for an activity that is listed in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) for which a basic assessment process as stipulated in the EIA Regulations must be conducted as part of the application (refer to the schedule of waste management activities in Category A of Government Notice No. 718 dated 03 July 2009).

**Kindly note that:**

1. This **basic assessment report** meets the requirements of the EIA Regulations, 2010 and is meant to streamline applications. This report is the format prescribed by the KZN Department of Agriculture & Environmental Affairs. Please make sure that this is the latest version.
2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with text.
3. Where required, place a cross in the box you select.
4. An incomplete report will be returned to the applicant for revision.
5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it will result in the rejection of the application as provided for in the regulations.
6. No faxed or e-mailed reports will be accepted.
7. The report must be compiled by an independent environmental assessment practitioner ("EAP").

## Basic Assessment Report

8. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
9. The KZN Department of Agriculture & Environmental Affairs may require that for specified types of activities in defined situations only parts of this report need to be completed.
10. The EAP must submit this basic assessment report for comment to all relevant State departments that administer a law relating to a matter affecting the environment. This provision is in accordance with Section 24 O (2) of the National Environmental Management Act 1998 (Act 107 of 1998) and such comments must be submitted within 40 days of such a request.
11. **Please note that this report must be handed in or posted to the District Office of the KZN Department of Agriculture & Environmental Affairs to which the application has been allocated (please refer to the details provided in the letter of acknowledgement for this application).**

## DEPARTMENTAL REFERENCE NUMBER(S)

File reference number (EIA):	
File reference number (Waste Management Licence):	

## SECTION A: DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER AND SPECIALISTS

### 1. NAME AND CONTACT DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Name and contact details of the EAP who prepared this report:

Business name of EAP:	Terratest (Pty) Ltd		
Physical address:	John Jeffares House, 6 Pin Oak Avenue, Hilton, 3201		
Postal address:	P. O. Box 794, Hilton		
Postal code:	3245	Cell:	
Telephone:	033 343 6789	Fax:	033 343 6788
E-mail:	wickst@terratest.co.za		

### 2. NAMES AND EXPERTISE OF REPRESENTATIVES OF THE EAP

Names and details of the expertise of each representative of the EAP involved in the preparation of this report:

Name of representative of the EAP	Education qualifications	Professional affiliations	Experience at environmental assessments (yrs)
Magnus van Rooyen	BSc Hons; MPhil (Env. Man.)	IAIA sa	9 Years
Theo Wicks	BSc Hons; MPhil (Env. Man.)	IAIA sa	7 Years
Tarin Strydom	BSocSc (Geog. and Env. Man.)	IAIA sa	3.5 years

### 3. NAMES AND EXPERTISE OF SPECIALISTS

Names and details of the expertise of each specialist that has contributed to this report:

Name of specialist	Education qualifications	Field of expertise	Section/ s contributed to in this basic assessment report	Title of specialist report/ s as attached in Appendix D
Frans Prins	MA	Archaeology	Section 6	CULTURAL HERITAGE IMPACT ASSESSMENT OF THE PROPOSED P443, D1886, AND

				L1380 ROAD UPGRADE NEAR INGWAVUMA, NORTHERN KWAZULU-NATAL
Magnus van Rooyen	BSc (Hons) Botany)	Botany, Zoology, Ecology	Section 4	NA

## SECTION B: ACTIVITY INFORMATION

### 1. PROJECT TITLE

Describe the project title as provided on the application form for environmental authorization:

**The proposed upgrading of Road P443, D1886 and L1380 in northern KwaZulu-Natal.**

### 2. PROJECT DESCRIPTION

Provide a detailed description of the project:

Provincial Road P443 extends from a T junction with the road from Ndumo, to Ingwavuma and is due to be rehabilitated as the black top is showing signs of wear, including potholes.

The P443 crosses a tributary of the Phongolo river at chainage 6.845. The road crosses the tributary by means of a 6 cell box culvert.

In order to improve the road safety at the site, the road is requiring realignment toward the north of the existing alignment. The realignment straightens out the road making for an easier approach and departure along the road

In addition, the hydraulic analysis of the existing structure indicated that it needs to be considerably upsized to comply with KZN DOT's current drainage criteria. Therefore a new, larger culvert is required.

This option will comprise a 3.6m box culvert of 2 units; a 2 cell unit and a 3 cell unit. The length of this structure (in the direction of flow) will be 18.5 m, with one a perpendicular joint in each unit. The structure will be 30° skew from the perpendicular to road centre. Excavation and sub-structure earthworks are to include a one metre rockfill layer, of crushed rock (max size 300mm).

The alignment of the P443 presents a risk of accidents to road users and as a result the KZN Department of Transport has proposed the realignment of the road to make it safer for road users.

### 3. ACTIVITY DESCRIPTION



Describe each listed activity in Listing Notice 1 (GNR 544, 18 June 2010), Listing Notice 3 (GNR 546, 18 June 2010) or Category A of GN 718, 3 July 2009 (Waste Management Activities) which is being applied for as per the project description:

**GNR 544, 18 June 2010**

**11. The construction of:**

**(iii) bridges**

**(xi) infrastructure**

**Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.**

**The widening of the road and culverts may exceed 50 m<sup>2</sup> within 32m of a watercourse.**

**GNR 544, 18 June 2010**

**18. The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic meters from:**

**(i) A watercourse;**

**But excluding where such infilling, depositing, dredging excavation, removal or moving:**

**(a) Is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant authority; or**

**(b) Occurs behind the development setback line.**

**The excavation of earth works required for upgrading the culverts may require the excavation and deposition of more than 5m<sup>3</sup> of material into a watercourse.**

#### **4. FEASIBLE AND REASONABLE ALTERNATIVES**

**“alternatives”**, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this report. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Sections B 5 – 15 below should be completed for each alternative.

## 5. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees, minutes and seconds. List alternative sites were applicable.

**Alternative:**

Alternative S1<sup>1</sup> (preferred or only site alternative)

Alternative S2 (if any)

Alternative S3 (if any)

**Latitude (S):**

**Longitude (E):**

27°	07'	1.97"	32°	6'	10.23"
27°	06'	14.6"	32°	06'	14.64"
0	'	"	0	'	"

**In the case of linear activities:**

**Alternative:**

Alternative S1 (preferred or only route alternative)

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Alternative S2 (if any)

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Alternative S3 (if any)

- Starting point of the activity
- Middle point of the activity
- End point of the activity

**Latitude (S):**

**Longitude (E):**

0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"
0	'	"	0	'	"

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 500m along the route for each alternative alignment.

<sup>1</sup> "Alternative S.." refer to site alternatives.

## 6. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

**Alternative:**

Alternative A1<sup>2</sup> (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

**Size of the activity:**

	170m <sup>2</sup>
	170m <sup>2</sup>
	m <sup>2</sup>

or, for linear activities:

**Alternative:**

Alternative A1 (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

**Length of the activity:**

	m
	m
	m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

**Alternative:**

Alternative A1 (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

**Size of the site/servitude:**

	22m <sup>2</sup>
	22m <sup>2</sup>
	m <sup>2</sup>

## 7. SITE ACCESS

Does ready access to the site exist?

YES	NO
	m

If NO, what is the distance over which a new access road will be built

Describe the type of access road planned:

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

## 8. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this report.

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<sup>2</sup> "Alternative A.." refer to activity, process, technology or other alternatives.

The site or route plans must indicate the following:

- 8.1. the scale of the plan which must be at least a scale of 1:500;
- 8.2. the property boundaries and numbers/ erf/ farm numbers of all adjoining properties of the site;
- 8.3. the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 8.4. the exact position of each element of the application as well as any other structures on the site;
- 8.5. the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 8.6. walls and fencing including details of the height and construction material;
- 8.7. servitudes indicating the purpose of the servitude;
- 8.8. sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
  - rivers, streams, drainage lines or wetlands;
  - the 1:100 year flood line (where available or where it is required by DWA);
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation including protected plant species (even if it is degraded or infested with alien species);
- 8.9. for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 8.10. the positions from where photographs of the site were taken.

## 9. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Please see [Appendix B](#).

## 10. FACILITY ILLUSTRATION

A detailed illustration of the facility must be provided at a scale of 1:200 and attached to this report as Appendix C. The illustrations must be to scale and must represent a realistic image of the planned activity/ies.

Please see [Appendix C](#).

## 11. ACTIVITY MOTIVATION

- 11.1. **Socio-economic value of the activity**

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What is the expected capital value of the activity on completion?	R 60 000 000
What is the expected yearly income that will be generated by or as a result of the activity?	R NA
Will the activity contribute to service infrastructure?	YES NO
Is the activity a public amenity?	YES NO
How many new employment opportunities will be created in the development phase of the activity?	20 Temporary
What is the expected value of the employment opportunities during the development phase?	R To be confirmed
What percentage of this will accrue to previously disadvantaged individuals?	To be confirmed %
How many permanent new employment opportunities will be created during the operational phase of the activity?	To be confirmed
What is the expected current value of the employment opportunities during the first 10 years?	R To be confirmed
What percentage of this will accrue to previously disadvantaged individuals?	To be confirmed %

### 11.2. Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

<p><b>Need</b></p> <p>The Need for a development is not disputable, however there is the need to motivate to convince the competent authority that there is a necessity for what is being proposed and why.</p> <p>In providing for the Need for a project, the applicant has to explain how a development would benefit the local/regional/national community. By emphasising how communities would benefit from the development, the Need for a project is emphasized.</p> <p>The following questions are outlined in the Guideline Document as a guide that in answering them addresses the requirements of considering the Need and Desirability of a proposed project.</p> <p><u>Question:</u> Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).</p> <p><u>Response:</u> The SDF lists the aim to “Improve existing road system to open up rural areas for development and facilitate peoples access to a variety of services at identified nodes”.</p>
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**Question:** Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?

**Response:** The realignment of the road is necessitated by the need to provide safer road infrastructure. By delaying the implementation it would imply that road users are forced to use infrastructure that could be made safer.

**Question:** Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)

**Response:** The road to be realigned is the main access road to the town of Ingwavuma. Road users from a local level will be afforded the safety of being able to use the realigned road.

At a strategic level, one of the four main spatial objectives informing the Provincial Spatial Development Framework, stated in the KZN Provincial Growth and Development Strategy (PGDS) (August 2011), is that of Social Need. The proposed realignment is to improve road safety over a portion of road that is known to have an elevated incidence of road accidents. It is asserted that the safety of commuters on national roads within the province falls within the ambit of the term "Social Need".

**Question:** Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?

**Response:** Yes, at present road upgrades are occurring along the alignment of the P443.

**Question:** Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?

**Response:** The project falls within the mandate of the KwaZulu-Natal Department of Transport and as such does not directly form part of the Jozini Municipality's infrastructure planning. However the Municipality acknowledges the reliance upon road infrastructure as a socio-economic driver.

**Question:** Is this project part of a national programme to address an issue of national concern or importance?

**Response:** Yes. In Chapter 4: Economic Infrastructure of the National Development Plan for 2030, the vision statement concerning the Transport sector states the following: "Improved access to economic opportunities, social spaces and services by bridging geographic distances affordably, reliably and safely"

The proposed development seeks to pursue this vision by improving safety on P443 while facilitating for the socio-economic as discussed in the Jozini Municipality 2012/13 IDP.

### Desirability

According to the Guideline document, desirability relates to the placement of an activity. The motivation must indicate why the location of a development in this particular area would be more desirable than establishing in another area.

Question: Is the development the best practicable environmental option (BPEO) for this land/site?

Response: The “best practicable environmental option” implies that the proposal provides the most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as the short term. In determining the BPEO adequate consideration must be given to opportunity costs.

The realignment, completely straightening out the road curve would have implied a relocation of a settlement. Whilst this would have a limited footprint in comparison to the Preferred Alternative, it would have the most significant negative impact in comparison to the No-go and the Preferred Alternative.

The No-go would imply a limited, if any impact on the natural environment, whilst a risk to society in general will remain. By not undertaking the proposed realignment, society remain at risk.

The preferred Alternative implies the least damage as it is largely associated with the existing infrastructure (as one moves away from the existing infrastructure, so one sees an improvement in natural environmental conditions). The costs are considered acceptable both in the long term and the short.

Question: Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?

Response: No, the IDP acknowledges the reliance of the Jozini Municipality on good road infrastructure as a driver of socio-economic development. The proposed project would enhance the IDP.

Question: Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?

Response: The Environmental Management Framework has yet to be gazetted, however for the purposes of this assessment the Draft Environmental Management Framework is to be utilized.



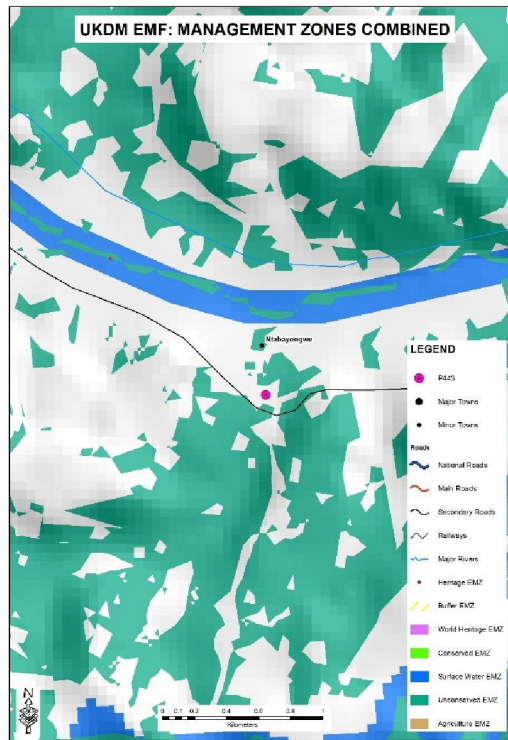


Figure 1. View of the Environmental Management Framework Environmental Management Zoning As, illustrated by Figure 1, the proposed site does not fall within any of the Environmental Management Zones

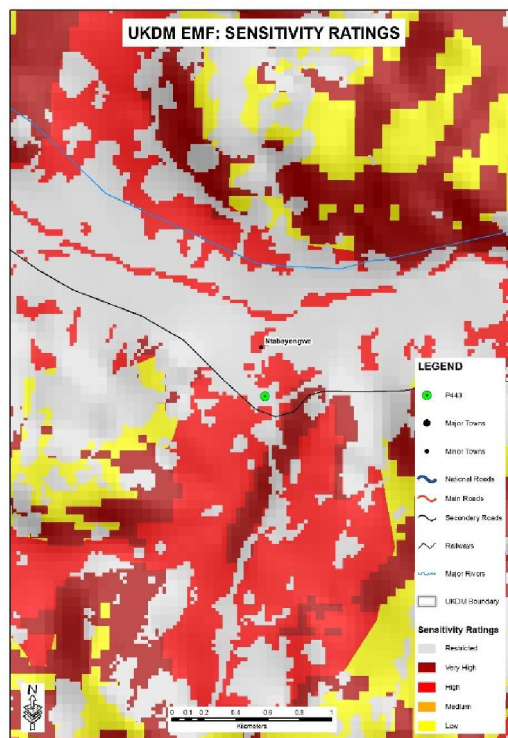


Figure 2. Sensitivity Rating

Figure 2, illustrates that the Preferred Site falls within an area “Restricted” for development, while the Alternative Site would be located within an area of “High” sensitivity.



The proposed Preferred Alternative would therefore not compromise the Environmental Management Framework.

Question: Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).

Response: Yes the locality is strongly associated with the existing alignment

Question: How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

Response: A river or stream is an inherently sensitive environment. Without appropriate management, the proposed project may create a negative impact however through the implementation of the correct planning, infrastructure and monitoring, this impact may be significantly reduced.

Question: How will the development impact on people's health and wellbeing (e.g. i.t.o. noise, odours, visual character and sense of place, etc)?

Response: The proposed project has the potential to introduce additional noise impacts, however these will be limited and managed according to an Environmental Management Programme which will include that operations may only occur during working hours (07:00-17:00).

Question: Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?

Response: In microeconomic theory, the opportunity cost of a choice is the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources. Assuming the best choice is made, it is the "cost" incurred by not enjoying the benefit that would be had by taking the second best choice available.

There would be limited, if any, opportunity costs in implementing the Preferred Alternative.

Question: Will the proposed land use result in unacceptable cumulative impacts?

Response: Without mitigation and management, the construction phase may lead to a degradation of the natural environment through erosion, turbidity and sedimentation. However with the appropriate planning, infrastructure and monitoring, these impact may be significantly reduced.

Indicate any benefits that the activity will have for society in general:

**The project will afford society in general safer road infrastructure.**

Indicate any benefits that the activity will have for the local communities where the activity will be located:

**Localized job creation – the project proponent is the KwaZulu-Natal Department of Transport whose procurement policies promote the employment of labour intensive construction methodologies.**

## 12. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are relevant to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
National Water Act (Act No 36 of 1998)	Department of Water Affairs (DWA)	1998
National Environmental Management Act (Act No 107 of 1998 [NEMA]) as amended	DEA	1998
National Heritage Resources Act (Act No 25 OF 1999)	South African Heritage Resources Agency (SAHRA)/ Amafa AkwaZulu-Natali (Amafa)	1999
National Environmental Management – Waste Act (Act 59 of 2008)	Department of Agriculture, Environmental Affairs (DAEA) / DEA	2008
KwaZulu-Natal / National Road Traffic Act (Act 93 of 1996 )	KZN Department of Transport	1996

### 13. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

#### 13.1. Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? 

YES	NO
-----	----

If yes, what estimated quantity will be produced per month? 

30m <sup>3</sup>
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How will the construction solid waste be disposed of? (describe)

**Where possible it will be disposed of within the construction fill. Where not possible, the waste will be disposed of at the nearest municipal landfill facility.**

Where will the construction solid waste be disposed of? (provide details of landfill site)

**Ingwavuma**

Will the activity produce solid waste during its operational phase? 

YES	NO
-----	----

If yes, what estimated quantity will be produced per month? 

m <sup>3</sup>
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How will the solid waste be disposed of? (provide details of landfill site)

**[Redacted]**

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

**[Redacted]**

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine the further requirements of the application.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? 

YES	NO
-----	----

**If yes, contact the KZN Department of Agriculture & Environmental Affairs to obtain clarity regarding the process requirements for your application.**

Is the activity that is being applied for a solid waste handling or treatment facility? 

YES	NO
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**If yes, contact the KZN Department of Agriculture & Environmental Affairs to obtain clarity regarding the process requirements for your application.**

**13.2. Liquid effluent**

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

YES	NO
-----	----

If yes, what estimated quantity will be produced per month?

m <sup>3</sup>	
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Will the activity produce any effluent that will be treated and/or disposed of on site?

YES	NO
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**If yes, contact the KZN Department of Agriculture & Environmental Affairs to obtain clarity regarding the process requirements for your application.**

Will the activity produce effluent that will be treated and/or disposed of at another facility?

YES	NO
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If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

No measures are available
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**13.3. Emissions into the atmosphere**

Will the activity release emissions into the atmosphere?

YES	NO
-----	----

If yes, is it controlled by any legislation of any sphere of government?

YES	NO
-----	----

**If yes, contact the KZN Department of Agriculture & Environmental Affairs to obtain clarity regarding the process requirements for your application.**

If no, describe the emissions in terms of type and concentration:

Emissions will take the form of dust and engine emissions that will result from the operation of vehicles and construction equipment on site. This will be limited to the construction phase of the project and will not continue during the operational phase. Mitigation measures for such emissions are included in the site specific Environmental Management Programme (EMPr).
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**13.4. Generation of noise**

Will the activity generate noise?

YES	NO
-----	----

If yes, is it controlled by any legislation of any sphere of government?

YES	NO
-----	----

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

Noise produced will be from vehicles and equipment and will be limited to the construction phase. No noise will be generated during the operational phase.
--

#### 14. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

municipal	water board	groundwater	river, stream, dam or lake	other	the activity will not use water
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

Approx 150 000litres

Does the activity require a water use permit from the Department of Water Affairs?

YES	NO
-----	----

If YES, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this report.

#### 15. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

No specific energy efficient measures have been implemented in the design phase, as the proposed development does not lend itself to energy efficient methods.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Once operational the road system will use no energy. As such, no alternative energy sources have been considered in the design phase. The long term energy requirements of the development will be limited to energy required for routine maintenance.

### SECTION C: SITE/ AREA/ PROPERTY DESCRIPTION

#### Important notes:

- For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No.   
(e.g. A):

- Subsections 1 - 6 below must be completed for each alternative.

#### 1. GRADIENT OF THE SITE

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Indicate the general gradient of the site.

**Alternative S1:**

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 1:7,5	–	1:7,5 – 1:5	Steeper than 1:5
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**Alternative S2 (if any):**

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 1:7,5	–	1:7,5 – 1:5	Steeper than 1:5
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**Alternative S3 (if any):**

Flat	1:50 1:20	–	1:20 1:15	–	1:15 – 1:10	1:10 1:7,5	–	1:7,5 – 1:5	Steeper than 1:5
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## 2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site (Please cross the appropriate box).

**Alternative S1 (preferred site):**

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	Dune	Sea- front
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**Alternative S2 (if any):**

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	Dune	Sea- front
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**Alternative S3 (if any):**

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	Dune	Sea- front
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## 3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Has a specialist been consulted for the completion of this section?

YES NO

If YES, please complete the following:

Name of the specialist:			
Qualification(s) of the specialist:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	
Are there any rare or endangered flora or fauna species (including red data species) present on any of the alternative sites?	YES	NO	
If YES, specify and explain:			
Are there any special or sensitive habitats or other natural features present on any of the alternative sites?	YES	NO	
If YES, specify and explain:			
Are any further specialist studies recommended by the specialist?	YES	NO	
If YES, specify:			
If YES, is such a report(s) attached in Appendix D?	YES	NO	
Signature of specialist:		Date:	

Is the site(s) located on any of the following (cross the appropriate boxes)?

**GIBELA UMKHUMBI OLWA NOBUBHA**

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	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

#### 4. GROUND COVER

Has a specialist been consulted for the completion of this section? YES  NO

If YES, please complete the following:

Name of the specialist:	Magnus van Rooyen		
Qualification(s) of the specialist:	BSc (Botany)		
Postal address:	PO Box 794, Hilton		
Postal code:	3245		
Telephone:	033 343 6789	Cell:	
E-mail:	vanrooyenm@terratest.co.za	Fax:	033 343 6788

Are there any rare or endangered flora or fauna species (including red data species) present on any of the alternative sites? YES  NO

If YES, specify and explain:

**A biodiversity screening assessment to confirm whether there were any biological fatal flaws with the proposed alignments.**

**Both alignments traverse areas inhabited by *Sclerocarya birrea* (subspecies). The specimens are in a healthy condition with no visual sign of impact by either humans or animals.**

**Authorization from the Department of Agriculture, Forestry and Fisheries will be required prior to impacting (cutting, pruning, destroying) on any of these specimens.**

**The development of the Preferred Alignment would require less trees to be removed and pruned compared to the alternative.**

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Are there any special or sensitive habitats or other natural features present on any of the alternative sites?	YES	NO
If YES, specify and explain:		
Are any further specialist studies recommended by the specialist?	YES	NO
If YES, specify:		
If YES, is such a report(s) attached in <u>Appendix D</u> ?	YES	NO

Signature of specialist: \_\_\_\_\_ Date: \_\_\_\_\_

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

<b>Natural veld - good condition<sup>E</sup></b>	<b>Natural veld with scattered aliens<sup>E</sup></b>	Natural veld with heavy alien infestation <sup>E</sup>	Veld dominated by alien species <sup>E</sup>	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an “<sup>E</sup>” is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn’t have the necessary expertise.

### 5. LAND USE CHARACTER OF SURROUNDING AREA

Cross the land uses and/or prominent features that currently occur within a 500m radius of the site and give a description of how this influences the application or may be impacted upon by the application:

Land use character	YES	NO	Description
Natural area	YES	NO	<p>The site falls within a region classified as Western Maputaland Clay Bushveld.</p> <p>The proposal has a limited impact on the terrestrial environment.</p>
Low density residential	YES	NO	
Medium density residential	YES	NO	
High density residential	YES	NO	
Informal residential	YES	NO	<p>There are a number of semi/informal residences within 500m of the proposed site.</p> <p>The alternative alignment would imply the relocation of a homestead and the demolition of the residence.</p>

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Retail commercial & warehousing	YES	NO	
Light industrial	YES	NO	
Medium industrial	YES	NO	
Heavy industrial	YES	NO	
Power station	YES	NO	
Office/consulting room	YES	NO	
Military or police base/station/compound	YES	NO	
Spoil heap or slimes dam	YES	NO	
Quarry, sand or borrow pit	YES	NO	
Dam or reservoir	YES	NO	
Hospital/medical centre	YES	NO	
School/ creche	YES	NO	
Tertiary education facility	YES	NO	
Church	YES	NO	
Old age home	YES	NO	
Sewage treatment plant	YES	NO	
Train station or shunting yard	YES	NO	
Railway line	YES	NO	
Major road (4 lanes or more)	YES	NO	
Airport	YES	NO	
Harbour	YES	NO	
Sport facilities	YES	NO	
Golf course	YES	NO	
Polo fields	YES	NO	
Filling station	YES	NO	
Landfill or waste treatment site	YES	NO	
Plantation	YES	NO	
Agriculture	YES	NO	<p>There are a number of noted instances of subsistence agriculture taking place.</p> <p>The preferred alignment will not traverse any agricultural land and is sufficiently far enough from any lands so as to not have an impact.</p>
River, stream or wetland	YES	NO	<p>The culverts are proposed in order to cross a seasonal/episodic tributary of the Ngwavuma River, a perennial river that drains into the Pongola River which flow into the Usutho/Rio Maputo.</p> <p>Provided that the construction of the in situ cast culverts occurs during the dry season, there will be limited risk to the watercourse.</p> <p>Construction during the rainy season would imply an increased risk as the system is highly responsive to rainfalls and there would be a risk from flash flooding given the size of the macro catchment.</p>



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Nature conservation area	YES	NO	
Mountain, hill or ridge	YES	NO	
Museum	YES	NO	
Historical building	YES	NO	
Protected Area	YES	NO	
Graveyard	YES	NO	
Archaeological site	YES	NO	
Other land uses (describe)	YES	NO	

### 6. CULTURAL/ HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or within 20m of the site?

YES	NO
-----	----

If YES, contact a specialist recommended by AMAFA to conduct a heritage impact assessment. The heritage impact assessment must be attached as an appendix to this report.

Briefly explain the recommendations of the specialist:

The proposed upgrading of roads P443, D1886 and L1380 may proceed in terms of heritage values as no heritage sites are in any danger of being destroyed or altered. However, it should also be pointed out that the KwaZulu-Natal Heritage Act requires that operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities

Will any building or structure older than 60 years be affected in any way?

YES	NO
-----	----

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

YES	NO
-----	----

If YES, please submit the necessary application to AMAFA and attach proof thereof to this report.

## SECTION D: PUBLIC PARTICIPATION

### 1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—

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- (i) the site where the activity to which the application relates is or is to be undertaken; and
- (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (v) the local and district municipality which has jurisdiction in the area;
  - (vi) any organ of state having jurisdiction in respect of any aspect of the activity (as identified in the application form for the environmental authorization of this project); and
  - (vii) any other party as required by the competent authority;
- (c) placing an advertisement in—
  - (i) one local newspaper; or
  - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
  - (i) illiteracy;
  - (ii) disability; or
  - (iii) any other disadvantage.

## 2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
  - (i) that an application for environmental authorization has been submitted to the KZN Department of Agriculture & Environmental Affairs in terms of the EIA Regulations, 2010;(ii)
  - (iii) a brief project description that includes the nature and location of the activity to which the application relates;
  - (iv) where further information on the application can be obtained; and
  - (iv) the manner in which and the person to whom representations in respect of the application may be made.

### 3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

### 4. DETERMINATION OF APPROPRIATE PROCESS

The EAP must ensure that the public participation process is according to that prescribed in regulation 54 of the EIA Regulations, 2010, but may deviate from the requirements of subregulation 54(2) in the manner agreed by the KZN Department of Agriculture & Environmental Affairs as appropriate for this application. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate.

Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

**Advertisements announcing the project and the environmental process to be followed were placed in The Mercury and Isolwe newspapers on 16 April 2014.**

**Site Notices were erected on 10 October 2014.**

**Written Notices were circulated on 16 April 2014**

**Appendix B Photographs illustrate the on-site Notices placed.**

**Appendix E contains the Comments and Response Report detailing all Interested and Affected Parties (IAP) contact and correspondence, as well as the advertisements.**

### 5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before this application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations (regulation 57 in the EIA Regulations, 2010) and be attached as Appendix E to this report.

### 6. PARTICIPATION BY DISTRICT, LOCAL AND TRADITIONAL AUTHORITIES

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District, local and traditional authorities (where applicable) are all key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of this application and provided with an opportunity to comment.

Has any comment been received from the district municipality?

YES  NO

If "YES", briefly describe the feedback below (also attach any correspondence to and from this authority with regard to this application):

**A copy of this document has been sent to the Umkhanyakude District Municipality**

Has any comment been received from the local municipality?

YES  NO

If "YES", briefly describe the feedback below (also attach any correspondence to and from this authority with regard to this application):

**A copy of this document has been sent to the Jozini Local Municipality**

Has any comment been received from a traditional authority?

YES  NO

If "YES", briefly describe the feedback below (also attach any correspondence to and from this authority with regard to this application):

**A copy of this document is to be delivered to the local tribal authority as well as to the Ingonyama Trust Board**

## 7. CONSULTATION WITH OTHER STAKEHOLDERS

Any stakeholder that has a direct interest in the site or property, such as servitude holders and service providers, should be informed of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?

YES  NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

**At the time of report compilation, no comments had been received**

## SECTION E: IMPACT ASSESSMENT

The assessment of impacts must adhere to the requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

### 1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

**At the time of report compilation, no issues had been received**

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached as Appendix E to this report):

--

## 2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

### 2.1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN PHASE

#### a. Site alternatives

List the potential impacts associated with site alternatives that are likely to occur during the planning and design phase:

The type of site activities, associated with the Planning and Design Phase, would be the surveying of the site.

#### Alternative S1 (preferred alternative)

*Direct impacts:*

No direct impacts were identified.

*Indirect impacts:*

No indirect impacts were identified.

*Cumulative impacts:*

No cumulative impacts were identified.

#### Alternative S2 (if any)

*Direct impacts:*

No direct impacts were identified.

*Indirect impacts:*

No indirect impacts were identified.

*Cumulative impacts:*

No cumulative impacts were identified.

#### No-go alternative (compulsory)

*Direct impacts:*

--

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The motivation behind the project is the provision of road infrastructure that complies with a higher safety standard. The direct impact of implementing the No-go alternative is that the project would not be able to proceed as the project, from an engineering concept perspective would be fatally flawed.

**Indirect impacts:**

Society would retain a higher risk of road accidents.

**Cumulative impacts:**

No cumulative impacts were identified.

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
No impacts have been identified therefore mitigation measures are not required.	

### b. Process, technology, layout or other alternatives

List the impacts associated with any process, technology, layout or other alternatives that are likely to occur during the planning and design phase (please list impacts associated with each alternative separately):

No Process, technology, layout or other alternatives were considered

**Alternative A1 (preferred alternative)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

**Alternative A2 (if any)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

**No-go alternative (compulsory)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

Indicate mitigation measures to manage the potential impacts listed above:

Alternative A1:	Alternative A2:

## 2.2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION PHASE

**a. Site alternatives**

List the potential impacts associated with site alternatives that are likely to occur during the construction phase:

**Alternative S1 (preferred site)**

**Direct impacts:**

**Negative:**

1. Loss of existing indigenous vegetation
2. Accumulation of construction and general waste.
3. Traffic Impacts - Possible lane closures, traffic delays and congestion during the construction phase. Increase in heavy vehicle (construction vehicles) traffic.
4. Air Quality impacts - Potential air pollution due to vehicle emissions and dust.
5. Risk of alien invasive plant encroachment.
6. Noise Impact - Increased noise pollution due to increased traffic (construction vehicles).
7. Soil Erosion - Potential for erosion of exposed soils in non vegetated areas, during heavy rain events, strong winds, and through the movement of construction vehicles.
8. Potential loss of stockpiled topsoil and other materials if not protected properly.

**Positive:**

1. Increased employment for the surrounding communities as well as for the skilled and unskilled labour force.
2. Skills development within the communities.
3. Improved service delivery for the surrounding communities.
4. Improved access to the surrounding communities.
5. Potential for improved infrastructure for the local community which could unlock the opportunity for more services to access the area.

**Indirect impacts:**

No indirect impacts identified.

**Cumulative impacts:**

1. Potential pollution of riparian areas as a result of accidental spillages of petrochemicals or bituminous substances.
2. Vegetation degradation due to dust accumulation and deposition on plants along the roadside.

**Alternative S2 (if any)**

**Direct impacts:**

**Negative:**

1. Loss of existing indigenous vegetation
2. Accumulation of construction and general waste.
3. Traffic Impacts - Possible lane closures, traffic delays and congestion during the construction phase. Increase in heavy vehicle (construction vehicles) traffic.
4. Air Quality impacts - Potential air pollution due to vehicle emissions and dust.
5. Risk of alien invasive plant encroachment.
6. Noise Impact - Increased noise pollution due to increased traffic (construction vehicles).
7. Soil Erosion - Potential for erosion of exposed soils in non vegetated areas, during heavy rain events, strong winds, and through the movement of construction vehicles.

8. Potential loss of stockpiled topsoil and other materials if not protected properly.

**Positive:**

1. Increased employment for the surrounding communities as well as for the skilled and unskilled labour force.
2. Skills development within the communities.
3. Improved service delivery for the surrounding communities.
4. Improved access to the surrounding communities.
5. Potential for improved infrastructure for the local community which could unlock the opportunity for more services to access the area.

**Indirect impacts:**

No indirect impacts identified.

**Cumulative impacts:**

1. Potential pollution of riparian areas as a result of accidental spillages of petrochemicals or bituminous substances.
2. Vegetation degradation due to dust accumulation and deposition on plants along the roadside.

**No-go alternative (compulsory)**

**Direct impacts:**

1. Traffic safety issues will persist on the road.
2. Loss of income/skills/jobs for the local community.
3. Possible tourism and agricultural opportunities will not be realised.
4. Persistent poverty due to lack of jobs and access to the area.
5. Infrastructure will not be upgraded.

**Indirect impacts:**

No indirect impacts identified.

**Cumulative impacts:**

Any impacts associated with the general increase in mobility of society will not be realised if the development takes place. This will include access to education and training opportunities; health care accessibility; commercial accessibility; exposure to tourism, agriculture and crime. Potential loss of further development in the area.

Indicate mitigation measures to manage the potential impacts listed above:

**Alternative S1**

A construction EMPr (see Appendix F) shall be developed to mitigate measures including waste, dust, noise, spillages, erosion, vegetation removal and alien vegetation encroachment. Associated impacts such as traffic and the safety of children, pedestrians and cattle shall have to be mitigated through traffic

**Alternative S2**

A construction EMPr (see Appendix F) shall be developed to mitigate measures including waste, dust, noise, spillages, erosion, vegetation removal and alien vegetation encroachment. Associated impacts such as traffic and the safety of children, pedestrians and cattle shall have to be mitigated through traffic



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calming measures and visible signage laid out by the contractor.

calming measures and visible signage laid out by the contractor.

### b. Process, technology, layout or other alternatives

List the impacts associated with process, technology, layout or other alternatives that are likely to occur during the construction phase (please list impacts associated with each alternative separately):

#### Alternative A1 (preferred alternative)

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

#### Alternative A2

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

#### No-go alternative (compulsory)

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

Indicate mitigation measures to manage the potential impacts listed above:

**Alternative A1:**

**Alternative A2:**

## 2.3. IMPACTS THAT MAY RESULT FROM THE OPERATIONAL PHASE

### a. Site alternatives

List the potential impacts associated with site alternatives that are likely to occur during the operational phase:

#### Alternative S1 (preferred alternative)

*Direct impacts:*

Possible increased speeding by motorists

*Indirect impacts:*

Possible oil and hydraulic fluid spills leaking on to the tar and washing of into river systems.  
Potential for economic opportunities, depending on safe and uninterrupted road transport.

*Cumulative impacts:*

Long term sustainability of the route to Ingwavuma

#### Alternative S2 (if any)

*Direct impacts:*

**Possible increased speeding by motorists**

*Indirect impacts:*

Possible oil and hydraulic fluid spills leaking on to the tar and washing of into river systems. Potential for economic opportunities, depending on safe and uninterrupted road transport.

*Cumulative impacts:*

Long term sustainability of the route to Ingwavuma

**No-go alternative (compulsory)**

*Direct impacts:*

Traffic safety issues will persist on the road.

*Indirect impacts:*

Limited potential opportunities for local and regional economic growth development.

*Cumulative impacts:*

The risk to road user will remain.

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
<p>It must be ensured that correct signage and traffic calming measures are implemented and maintained throughout the construction and operational phases. The correct drainage structures that are built in the construction phase need to be maintained in the operational phase to prevent erosion and degradation.</p> <p>Oil and hydraulic spills are impacts which can only be mitigated by the vehicular owners.</p>	<p>It must be ensured that correct signage and traffic calming measures are implemented and maintained throughout the construction and operational phases. The correct drainage structures that are built in the construction phase need to be maintained in the operational phase to prevent erosion and degradation.</p> <p>Oil and hydraulic spills are impacts which can only be mitigated by the vehicular owners.</p>

**b. Process, technology, layout or other alternatives**

List the impacts associated with process, technology, layout or other alternatives that are likely to occur during the operational phase (please list impacts associated with each alternative separately):

**Alternative A1 (preferred alternative)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

**Alternative A2**

*Direct impacts:*

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*Indirect impacts:*

*Cumulative impacts:*

**No-go alternative (compulsory)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

Indicate mitigation measures to manage the potential impacts listed above:

**Alternative A1**

**Alternative A2**

### 2.4. IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING OR CLOSURE PHASE

The project proposes the realignment of infrastructure. The infrastructure will not be decommissioned.

#### a. Site alternatives

List the potential impacts associated with site alternatives that are likely to occur during the decommissioning or closure phase:

**Alternative S1 (preferred alternative)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

**Alternative S2**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

**No-go alternative (compulsory)**

*Direct impacts:*

*Indirect impacts:*

*Cumulative impacts:*

Indicate mitigation measures to manage the potential impacts listed above:

**Alternative S1**

**Alternative S2**

#### b. Process, technology, layout or other alternatives

List the impacts associated with process, technology, layout or other alternatives that are likely to occur during the decommissioning or closure phase (please list impacts associated with each alternative separately):

**Alternative A1 (preferred alternative)**

*Direct impacts:*

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*Indirect impacts:*  
*Cumulative impacts:*

**Alternative A2**  
*Direct impacts:*  
*Indirect impacts:*  
*Cumulative impacts:*

**No-go alternative (compulsory)**  
*Direct impacts:*  
*Indirect impacts:*  
*Cumulative impacts:*

Indicate mitigation measures to manage the potential impacts listed above:

Alternative A1	Alternative A2

### 2.5. PROPOSED MONITORING AND AUDITING

For each phase of the project and for each alternative, please indicate how identified impacts and mitigation will be monitored and/or audited.

Alternative S1 (preferred site)	Alternative S2
<p>An onsite Environmental Liaison Officer (ELO) must be appointed to oversee and ensure that the Environmental Management Programme (EMPr) is correctly and stringently implemented and maintained for the duration of the construction phase of the activity. The ELO will be responsible for the day to day environmental monitoring of the construction of the road.</p> <p>An independent Environmental Control Officer (ECO) will be employed to conduct monthly audits of the activity for the duration of the construction phase. The ECO will audit the compliance of the EMPr and specify any corrective measures that may be required. The ECO will also be in the position to issue penalties if any gross non-compliance with the EMPr occurs.</p>	<p>An onsite Environmental Liaison Officer (ELO) must be appointed to oversee and ensure that the Environmental Management Programme (EMPr) is correctly and stringently implemented and maintained for the duration of the construction phase of the activity. The ELO will be responsible for the day to day environmental monitoring of the construction of the road.</p> <p>An independent Environmental Control Officer (ECO) will be employed to conduct monthly audits of the activity for the duration of the construction phase. The ECO will audit the compliance of the EMPr and specify any corrective measures that may be required. The ECO will also be in the position to issue penalties if any gross non-compliance with the EMPr occurs.</p>

Alternative A1 (preferred alternative)

Alternative A2

### 3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

#### Alternative S1 (preferred site)

Impacts associated with the proposed project are expected primarily during the construction phase of the project, which a number of risks carrying on into the Operational Phase

#### Type of Impacts

The type of impacts expected during the construction phase include:

- Loss of existing indigenous vegetation -
- Accumulation of construction and general waste.
- Traffic Impacts
- Air Quality Impacts
- Invasive Plant Encroachment
- Noise Impact
- Soil Erosion
- Loss of topsoil

The type of impacts expected during the Operational Phase include:

- Soil Erosion
- Sedimentation
- Risk of invasive alien plants being established

#### Duration of impacts

The duration of the Construction and Operational Phase impacts, with mitigation, are short term impacts with the exception of the Loss of Indigenous vegetation, which is a permanent loss.

#### Likelihood of potential impacts actually occurring

The likelihood of Construction and Operational Phase impacts occurring after mitigation are either “seriously anticipated” or “possible” with the Loss of Indigenous Vegetation being a “Certainty”.

#### Significance of impacts

The majority of the impacts have a Low significance which implies that “(t)he impact is of little importance, but may require limited mitigation; or it may be rendered acceptable in light of proposed mitigation.”

The Loss of Indigenous Vegetation is the only identified impact that has a medium significance. This is primarily as a result of the required removal of the *Sclerocarya birrea*. The impact is of importance as the species is a protected species.

**Alternative S2**

Impacts associated with the proposed project are expected primarily during the construction phase of the project, which a number of risks carrying on into the Operational Phase

Type of Impacts

The type of impacts expected during the construction phase include:

- Loss of existing indigenous vegetation -
- Accumulation of construction and general waste.
- Traffic Impacts
- Air Quality Impacts
- Invasive Plant Encroachment
- Noise Impact
- Soil Erosion
- Loss of topsoil

The type of impacts expected during the Operational Phase include:

- Soil Erosion
- Sedimentation
- Risk of invasive alien plants being established

Duration of impacts

The duration of the Construction and Operational Phase impacts, with mitigation, are short term impacts with the exception of the Loss of Indigenous vegetation, which is a permanent loss.

Likelihood of potential impacts actually occurring

The likelihood of Construction and Operational Phase impacts occurring after mitigation are either “seriously anticipated” or “possible” with the Loss of Indigenous Vegetation being a “Certainty”.

Significance of impacts

The majority of the impacts have a Low significance which implies that *“(t)he impact is of little importance, but may require limited mitigation; or it may be rendered acceptable in light of proposed mitigation.”*

The Loss of Indigenous Vegetation is the only identified impact that has a medium significance. This is primarily as a result of the required removal of the *Sclerocarya birrea*. The impact is of importance as the species is a protected species.

**Alternative A1 (preferred alternative)**

**Alternative A2**

**No-go alternative (compulsory)**

The No-go alternative implies that the status quo will remain the same with the section of road remaining a risk to road users.

None of the construction and operational phase impacts discussed above will be experienced

## SECTION F. RECOMMENDATION OF EAP

Is the information contained in this report and the documentation attached hereto in the view of the EAPr sufficient to make a decision in respect of this report?

YES	NO

If "NO", please contact the KZN Department of Agriculture & Environmental Affairs regarding the further requirements for your report.

If "YES", please attach the draft EMPr as Appendix F to this report and list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

**The authorization should include the following provisions:**

- An Environmental Management Programme must be implemented during the Establishment and Construction phases, and must be approved prior to the contractor moving on site.
- An Environmental Liaison Officer (ELO) must be appointed for day to day environmental management and an independent Environmental Control Officer (ECO) to complete monthly compliance audits of the EMPr for the duration of the construction phase.

With regards to the following:

**Noise Pollution:**

- Maintain machinery regularly, as per the manufacturers specifications.
- Limit working hours from 7:00 to 17:00.

**Air Pollution:**

- Operational areas on the road should be water sprayed during dry/windy period.
- Stockpiles should be covered with tarpaulins/plastic sheeting.
- Maintain vehicles and machinery to control exhaust emissions.
- Topsoil stockpiles to be vegetated.

**Water Pollution:**

- Machinery is to be maintained so that it does not leak or spill fluids.
- All measures shall be taken to prevent any pollution from entering any watercourse or any wet area.
- No servicing of vehicles is to occur near the proposed project site.
- Stabilising vegetation must only be removed where necessary, and must be replaced with indigenous, non-invasive vegetation as soon after development as possible.
- Storm water management must approximate pre-development conditions.
- The development of the bridge structures over the water courses must not affect stream flow.

**Erosion Measures:**

- Prevent runoff by constructing diversion berms and/or placing straw bales on denuded areas and as filters across run-off pathways.

**Accidental Spillages:**

- Any spillage shall be cleared up immediately, with the substances being taken to the nearest registered landfill site capable of treating such materials.
- A register shall be kept of all incidents on site, showing measures taken to clear up the spillages.

Heritage Issues:

- If, under any circumstance an artefact of cultural or historical significance is unearthed, AMAFA must be contacted immediately and all work must cease.

Health and Safety:

- Traffic signage should be erected to advise people of roadworks and heavy machinery and in the area.
- A maximum speed limit of 40km/h, or as per the traffic engineers' advice, should be imposed on all construction vehicles.
- Pollution that could be detrimental to humans, flora, fauna shall be prevented as much as possible (dust control methods must be implemented, avoid using the surrounding environment as a toilet, avoid pollution of any kind entering the soil and water systems).

Waste Management:

- All solid waste shall be collected and separated into recyclable and non-recyclable waste in on site waste bins and regularly disposed of in the nearest registered landfill site.
- Hazardous waste shall be disposed of at a registered DEA landfill site.

Environmental Control:

- The employment of an on site Environmental Liaison Officer (ELO) who would be responsible for the day to day management of the construction phase of the activity, is essential.
- An independent Environmental Control Officer must be employed to undertake monthly audits of the compliance with the Environmental Management Programme (EMPr).
- Where necessary, external audits should be carried out yearly by an independent environmental practitioner.

Rehabilitation:

- The rehabilitation of all indigenous vegetation must be undertaken as soon as possible after the completion of the construction phase.

Alien Invasive:

- All alien invasive species must be cleared from the construction site and measures must be put in place to inhibit the relocation of these species into disturbed area during the rehabilitation phase of the project.



## SECTION G: APPENDIXES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports

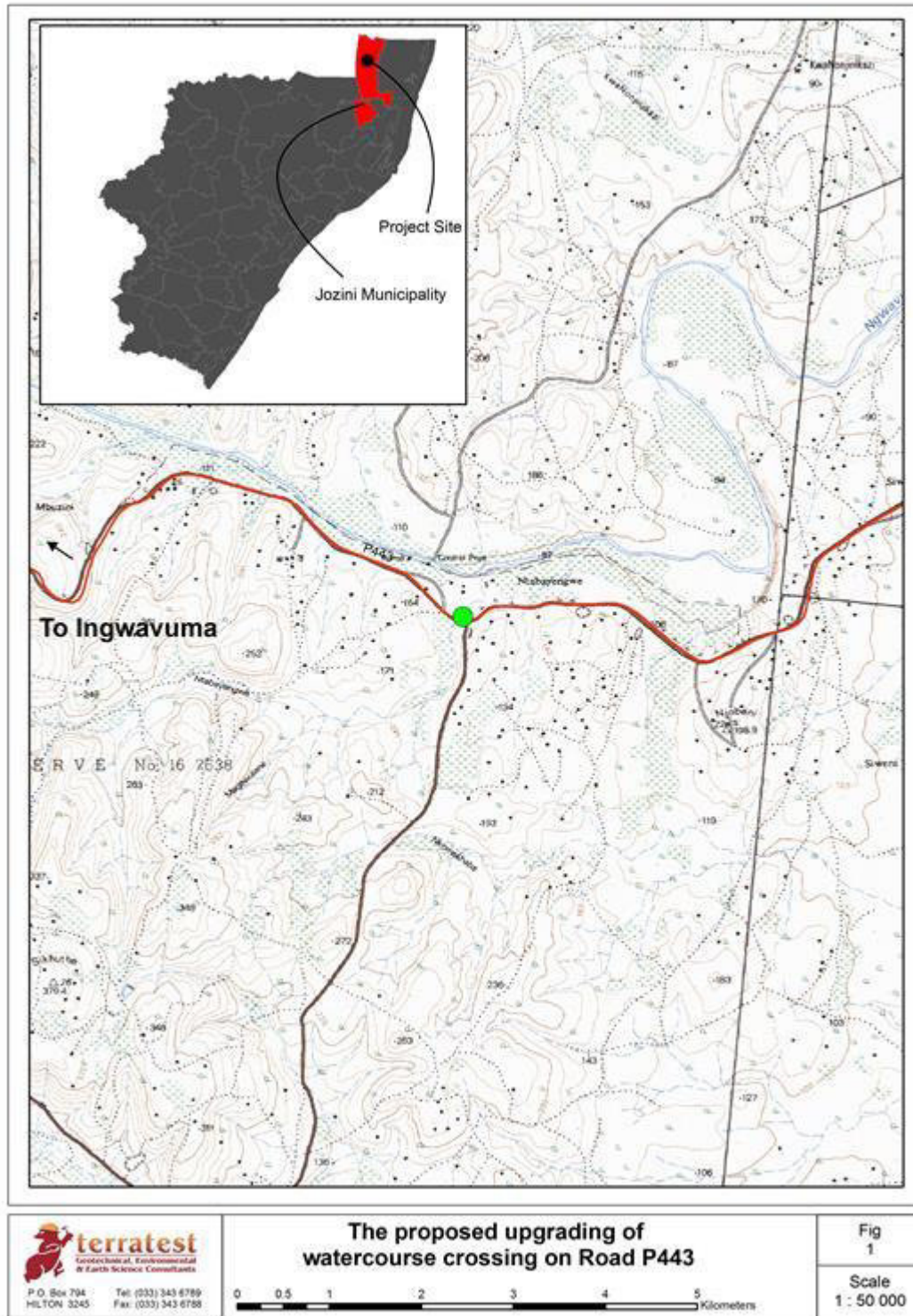
Appendix E: Comments and responses report

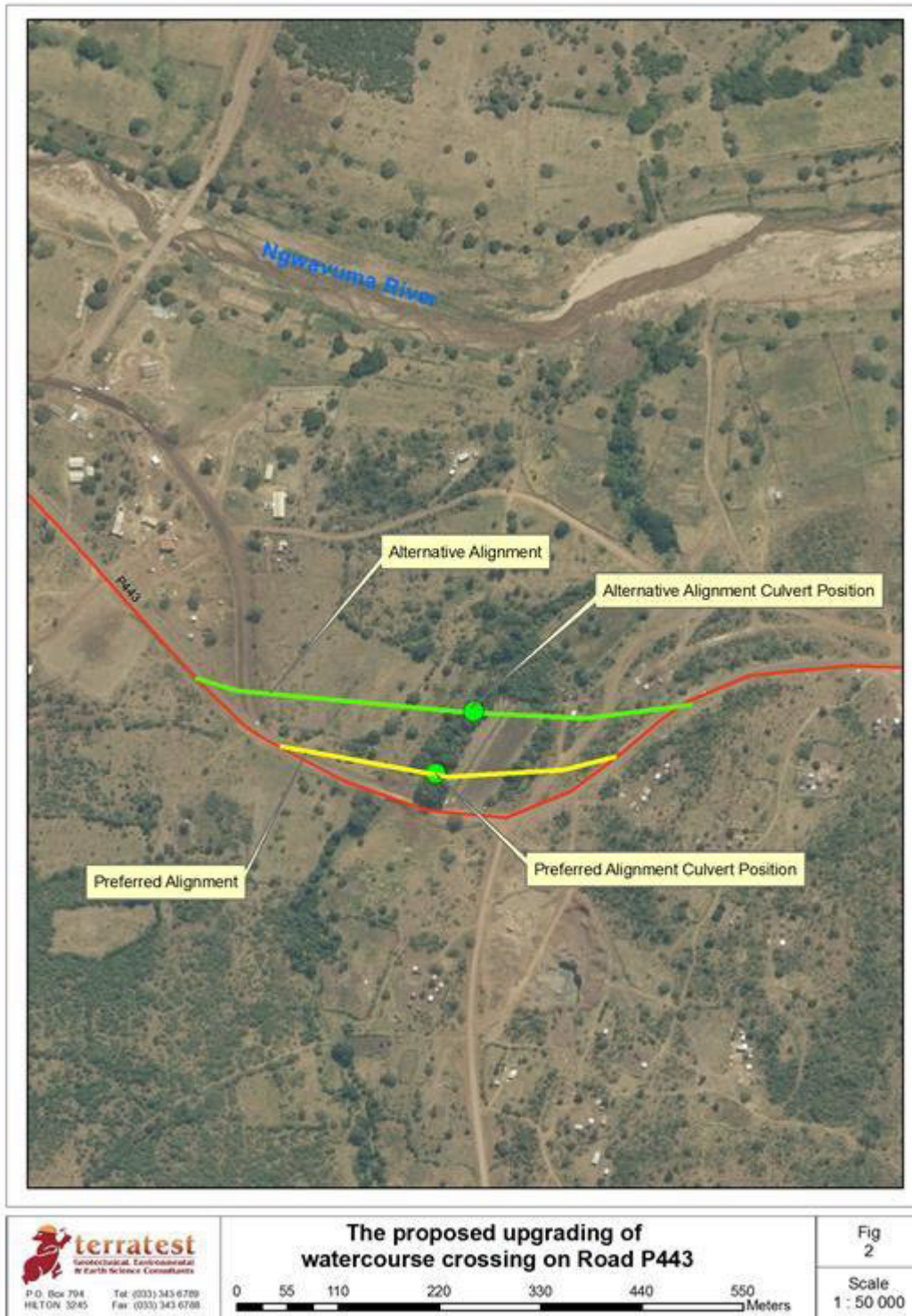
Appendix F: Draft Environmental Management Programme (EMPr)

Appendix G: Other information

Basic Assessment Report

Appendix A: Site plan(s)





Basic Assessment Report

Appendix B: Photographs





Figure 3. View of the existing culvert



Figure 4. View of a *Sclerocarya birrea* which will require removal





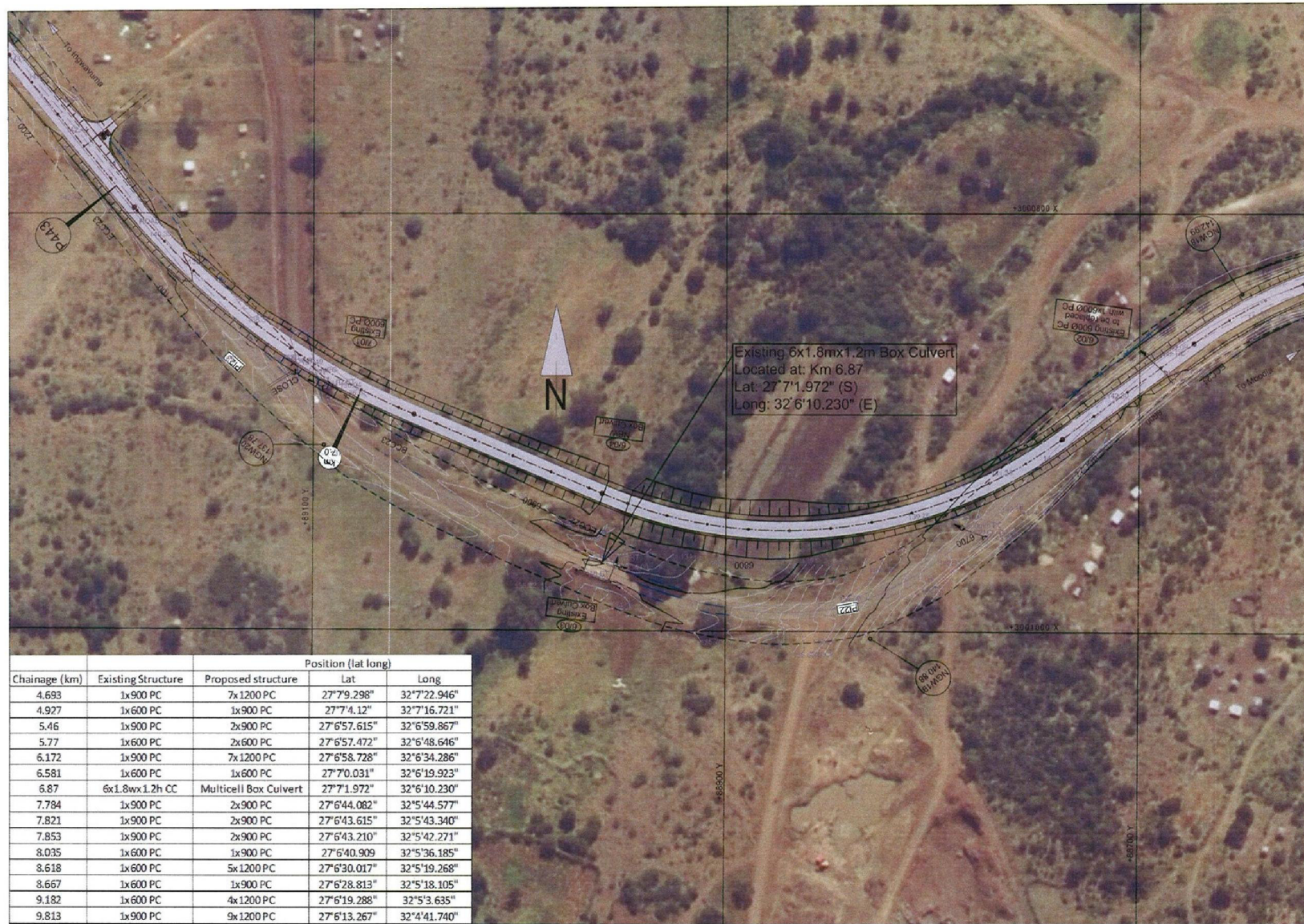
Figure 5. Panoramic view of the existing site. note the alignment of the road

Basic Assessment Report

Appendix C: Facility illustration(s)



# Basic Assessment Report



Basic Assessment Report

Appendix D: Specialist reports

**CULTURAL HERITAGE IMPACT ASSESSMENT  
OF THE PROPOSED P443, D1886, AND L1380  
ROAD UPGRADE NEAR INGWAVUMA,  
NORTHERN KWAZULU-NATAL**



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**27 October 2013**

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## LIST OF ABBREVIATIONS AND ACRONYMS

EIA	Early Iron Age
ESA	Early Stone Age
HISTORIC PERIOD	Since the arrival of the white settlers - c. AD 1820 in this part of the country
IRON AGE	Early Iron Age AD 200 - AD 1000 Late Iron Age AD 1000 - AD 1830
IIA	Intermediate Iron Age
ISA	Intermediate Stone Age
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998 and associated regulations (2006).
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations (2000)
SAHRA	South African Heritage Resources Agency
STONE AGE	Early Stone Age 2 000 000 - 250 000 BP Middle Stone Age 250 000 - 25 000 BP Late Stone Age 30 000 - until c. AD 200



## EXECUTIVE SUMMARY

A cultural heritage survey of a proposed upgrade of the P443, D1886 and L1380 roads at Ingwavuma located only one heritage site. However, this Middle Stone Age surface occurrence is situated more than 100m from Road P443. It is therefore not threatened by the proposed roads upgrade. There is no known archaeological reason why the development may not proceed as planned. However, it should be noted that the general area is rich in archaeological and contemporary grave sites. Construction work may expose material and attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

## BACKGROUND INFORMATION ON THE PROJECT

Table 1. Background information

Consultant:	Frans Prins (Active Heritage) for Jeffares & Green
Type of development:	<p>The upgrading of Provincial Road P443, District Road D1886 and Local Road L1380.</p> <p>The existing P443 road will be widened from approximately 6m to 8.5m. Sidewalks may be incorporated where appropriate, and will generally be located remotely from the road prism. The existing P443 road is surfaced with a S2 double seal. The surfaced sections of road are in poor condition and will be rehabilitated or reconstructed and widened in the upgrade project. The total length of the P443 upgrade is approximately 23.2km. It is anticipated that five existing pipe culverts will be replaced with concrete box culverts for increased hydraulic capacity, and to accommodate the wider road formation. One existing multi cell box culvert shall be demolished due to insufficient hydraulic capacity and road width. A new larger multi cell box culvert shall be constructed on this river course, on a new road alignment downstream of the existing culvert. Existing drainage pipe culverts and minor portal culverts will either be lengthened or, if sub-standard, replaced.</p> <p>District Road D1886 is an existing approximately 6m wide gravel road, which will be upgraded and widened to a surfaced 7m wide road.</p>

	Existing drainage pipe culverts and minor portal culverts will either be lengthened or, if sub-standard, replaced.  Local Road L1380 is an existing approximately 5m wide gravel road, which will be upgraded and widened to a surfaced 6m wide road. Existing drainage pipe culverts and minor portal culverts will either be lengthened or, if sub-standard, replaced
Rezoning or subdivision:	Not applicable
Terms of reference	To carry out a Heritage Impact Assessment as subcontracted by Jeffares & Green.
Legislative requirements:	The Heritage Impact Assessment was carried out in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and following the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 1997 (Act No. 4 of 2008)

### 1.1. Details of the area surveyed:

The proposed development is situated near the small town of Ingwavuma in northern KwaZulu-Natal. The footprint includes Provincial Road P443, District Road D1886 and Local Road L1380. The proposed upgrade of P443 extends for approximately 23.2km, from Km 0.0 at the P522-1 intersection at Bambanana through to the end of P443 at the D1886 Intersection at Ingwavuma. The proposed upgrade of D1886 is approximately 3.2km in length, between the P443 Intersection and the start of L1380, which represents the entire length of D1886. The L1380 is 1.8 km long (Fig 1).

## BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA

The greater Maputaland is endowed with heritage sites of various traditions and periods spanning the Stone Ages, Iron Ages and the historical period. However, the majority of these occur to the west of the Phongola river in the foothills of the Lebombo Mountains. A second large concentration occurs adjacent to and on the

dune gordon along the coastline. The coastal plain, by contrast to the rest of Maputaland, is devoid of known archaeological sites. Oliver Davies, an archaeologist who conducted pioneer research and surveys in northern KwaZulu Natal in the 1960's and 1970's, commented that the coastal plain was unpromising for archaeological research due to its being covered by superficial sands and bush coverage which affect preservation and visibility (Avery 1980). By contrast, the foothills of the Lebombo in the vicinity of Ingwavuma is well endowed with archaeological sites. The provincial heritage data base of the KwaZulu-Natal Museum lists twenty nine sites in the Ingwavuma magisterial district. These include Early Stone Age, Middle Stone Age, Later Stone Age and Later Iron Age sites.

Based on typological criteria it can be speculated that the known Early Stone Age sites in the greater Ingwavuma area most probably dates back to between 300 000 and 1.7 million years ago. Some of the stone tools have been identified as belonging to the Acheulian tradition and it is therefore possible that these sites were occupied by an early hominin such as *Homo erectus* or *Homo ergaster*. Middle Stone Age Sites dates back to ca. 40 000 - 200 000 BP. These sites relate to the first anatomically modern people in the world namely *Homo sapiens sapiens*. Most of the Middle Stone Age sites in the greater Maputaland are open air stone tool scatters with little archaeological context. However, some notable cave deposits do occur. The world renowned Border Cave Site, situated approximately 65km to the north of the town of Ingwavuma, is a good example. Humans lived at Border Cave over a period of 200 000 years. The human skeletal remains found in the cave are believed to be some of the oldest evidence of anatomically modern human beings. Various radiometric-dating techniques suggest that Middle Stone Age people were living at Border Cave more than 110 000 years ago. More than a million stone artefacts have been excavated in the cave and an enormous amount of animal material has been recovered from the site as well (Derwent 2006).

Only a handful of Later Stone Age sites have been recorded in the greater Maputaland. These relate to San hunter-gatherers or their immediate ancestors. The stone tool technology are smaller and more diverse and specialised than those made during the Middle Stone Age.



The Early Iron Age of the coastal zone in Maputaland contains ceramic fragments identified as belonging to the Matola phase. The Matola phase sites can be identified with the very first Bantu-speaking agriculturists that entered KwaZulu-Natal approximately 1 600 years ago from Eastern Africa (Maggs 1989). Although oral history indicate that the area was occupied in more recent centuries times by the Thembe-Thonga or their immediate ancestors archaeological sites belonging to this period have not yet been identified. Nevertheless the present African inhabitants of the area, the Thembe-Thonga and the Swazi, have a rich oral history and culture relating to their intimate relationship with the environment spanning many centuries. Aspects of their cultural heritage identified by community representatives as being important include the following:

- Relationship of the local community with the physical environment
- Traditional fishing practises (fonya basket fishing)
- The indawo spirit possession cult
- Wild fruit utilisation
- The significance of the mothers brother in Thembe-Thonga social organisation
- Settlement rules and history
- Thonga language
- Issues relating to cross border identities
- Trade across the border
- History of various traditional authorities in the area
- Occupation of some areas by refugees of the Zulu wars
- Influence on local customs by refugees of the Mozambican War of 1975-1990

The conventional view is that that the historical occupants of Maputaland, the Tembe-Thonga, migrated from Karanga in the present day Zimbabwe in the middle of the seventeenth century Junod (1962:23). However, the theory that the African societies of south-east Africa migrated there in fixed ethnic units, as in the case of the Tembe-Thonga, has been questioned by archaeological research and recent research on oral traditions of Zululand and Natal (Maggs 1989). Instead of migrating there in fixed ethnic groups, it is now argued that the African societies of south-east Africa emerged locally from long established communities of diverse origins and diverse cultures and

languages. Nevertheless, whether the Tembe came from Karanga to establish their authority over the people of south-east Africa, or whether they emerged locally, reports from Portuguese sailors indicate that a chief Tembe was in control of the ruling chiefdom in the Delagoa Bay hinterland in the mid-1600s (Wright & C. Hamilton 1989:46-64 and Kuper 1997:74). Tembe and his followers gradually established their authority over the people who lived in this hinterland including the area to the immediate east of the study area. Due to the abilities of their strong and charismatic leaders, the Tembe-Thonga remained a unified chiefdom and gradually extended their influence. This unity was upset in the middle of the eighteenth century when a split in the ruling lineage led to the fragmentation of the chiefdom. The division came after the death of Silamboya in 1746. The descendants of Silamboya's oldest son, Muhali, settled west of the Maputo River and north of the Usuthu River. This group, the senior branch of the Tembe-Thonga, became known as the Mututwen-Tembe. The other part of the Tembe-Thonga followed a junior son of Silamboya, Mangobe, and settled east of the Maputo River. This branch would later become known as the Mabudu or Maputo (Bryant 1965:290). The imposed international border of 1875 bisected the area where the Mabudu branch settled. Being unable to control the vast area under his control, the chief of the junior branch, Mangobe, placed his sons in strategic positions so as to ensure his control. When Mangobe died, his first son, Nkupo, was named chief. However, his younger son, Mabudu, soon established himself as the stronger leader and took the chieftainship from his older brother (Hedges 1978:137). With the army now at his disposal Mabudu was able to dominate all trade between Europeans who landed at Delagoa Bay and local people living in the hinterland. Through this domination the Mabudu became, by the middle of the eighteenth century, the strongest political and economic unit in south-east Africa (Smith 1972:178-184). The people under his authority, which gradually increased, became known as the *abakwaMabudu* or the people of Mabudu's land (Webb and Wright 1979:157). By the early 1800s the Mabudu chiefdom stretched from the Maputo River in the west to the Indian Ocean in the east, and from Delagoa (Maputo) Bay in the north to as far south as Lake St. Lucia (Felgate 1982:1). This extensive area included the present-day Ingwavuma..

During the early 1800s similar processes of political centralisation were taking place amongst the Mthetwa, Ndwandwe and later the Zulu chiefdoms to the immediate

south east of Ingwavuma. The Zulu eventually defeated the other groups and established themselves as the dominant power in south-east Africa (Wright & Hamilton 1989:67 and Laband 1995). The Mabudu were never attacked by, nor directly involved in any war with the Zulu. They were, however indirectly affected by wars of conquest the Zulu waged in the northern part of Zululand in the first half of the nineteenth century (Omer-Cooper 1975:57). Various groups of refugees passed through the Mabudu chiefdom during the reign of Shaka. Many of them settled among the Mabudu. The people who crossed the southern boundary of the Mabudu chiefdom brought with them languages and customs foreign to the Mabudu. Over time, Mabudu identity became less distinctive as people adopted many customs of those living south of them (Bryant 1964:292). As more and more people from the southern chiefdoms crossed into the Mabudu chiefdom, an increasing amount of prestige was attached to being Zulu and speaking isiZulu, since the Zulu were the dominant political force. The Zulu cultural influence in the greater Ingwavuma area was however not complete. People who fled the onslaught of the Zulu only stayed in the area for a short period before they moved on (Felgate 1982:11). Furthermore, in exchange for tribute paid, the Zulu recognised the Mabudu as leaders of a vast territory. This, to an extent, secured their sovereignty (Bradley 1974). The relationship between the Mabudu and the Zulu differed markedly from that which the Zulu instituted with other chiefdoms. Ballard (1978) states that although the Mabudu 'paid tribute to the Zulu kings and cooperated on a military and economic level, they enjoyed much greater independence than the chiefdoms south of St. Lucia. Despite the Zulu influence, Maputaland, remained politically and culturally distinct from areas to the north, south and west. The people of the area spoke a unified language – xiRonga (Thonga). With some exceptions, notably the Ngubane and Khumalo, they accepted the rule of Mabudu chiefs (Felgate 1982:11). They practised customs that were unique to the area and differed from those of their Zulu, Swazi and Tsonga neighbours (Webster 1991:250). Nevertheless, many siSwati-speaking people crossed the nearby border and settled at Ingwavuma. Today a large percentage of the inhabitants in the immediate vicinity of Ingwavuma are Swazi people with social and political ties to Swaziland in the west.

During the colonial period the area was frequented by hunters, traders, and later missionaries (Bruton et al 1980). However, sites and structures associated with these

activities need to be identified and placed in an inventory. Likewise during the more recent past many refugees of Mozambique crossed the international border and settled in the area (Klopper 2004). Sites belonging to this more recent “struggle era history” are also protected by national heritage legislation and needs to be surveyed and placed in an inventory.

Apart from human history the greater Maputaland also has extensive fossil deposits and geomorphology dating back to the Cretaceous, Tertiary and Quaternary periods. The Cretaceous fauna yielded by sequences includes ammonites, bivalves, gastropods, and nautiloids in abundance. Vertebrates are uncommon, only fish and reptiles being noted so far. Plant remains are relatively abundant in the form of logs and lignite chips. The Tertiary limestone deposits contain marine macro-fossils, calcareous nanno-fossils and planktic foraminifers (Avery 1980). Shell imprints have been found imprinted in concretions to the immediate south of Thembe Elephant Park and may therefore palaeontological significance (Anderson 2008).

## BACKGROUND INFORMATION OF THE SURVEY

### Methodology

A desktop study was conducted of the archaeological databases housed in the KwaZulu-Natal Museum. The SAHRIS website was consulted to obtain information on past heritage surveys in the area and on heritage site particulars. In addition, the available archaeological literature covering the greater Ingwavuma area was also consulted. A ground survey of the footprint, following standard and accepted archaeological procedures, was conducted. An area of 20m was surveyed on either side of roads P443, D1886, and L 1380.

### Restrictions encountered during the survey

### Visibility

Visibility was good although the vegetation was dense at places. It must also be mentioned that Anderson (2008) found various heritage sites buried below sand in the greater Maputaland area. He noted that these sites would have been archaeologically invisible had it not been that the developers excavated a long and deep trench that exposed some of these deposits. It is therefore entirely possible those archaeological sites may also be covered in sand in the study area and that they are invisible due to geomorphological factors.

#### Disturbance

No disturbance of any potential heritage features was noted.

#### Details of equipment used in the survey

GPS: Garmin Etrek

Digital cameras: Canon Powershot A460

All readings were taken using the GPS. Accuracy was to a level of 5 m.

## Description of sites and material observed

#### Locational data

Province: KwaZulu-Natal

Town: Ingwavuma

#### Description of the general area surveyed

The existing P443 road is surfaced with a S2 double seal. The surfaced sections of the road are in poor condition. This road enters the village of Ingwavuma from the east. District Road D1886 is an existing approximately 6m wide gravel road whereas local road L1380 is also an existing, approximately 5m wide, gravel road. Both these gravel roads connect to P443 to the north of Ingwavuma. All these roads run through communal areas dotted with African homesteads and more peri-urban settlements in the immediate vicinity of Ingwavuma.

Although some African homesteads are situated directly adjacent to the existing roads no graves were observed within 60m from the proposed road development. Those graves that were observed by the consultant were all situated well beyond the road development zone. The proposed development will have no impact these graves.

One Middle Stone Age site occurs within 100m from the P443 approximately 10km to the east of Ingwavuma (Figs 2 & 3) (see below). A second Middle Stone Age site was recorded by Oliver Davies in the 1970s and said to be situated adjacent to the Ingwavuma River (Figs 4). However, this second locality was visited by the consultant and no Middle Stone Age material is presently visible on the surface. It is possible that the original GPS coordinates provided by Dr Oliver Davies is incorrect but this point could not be verified.

The study area is not part of any known cultural landscape.

## STATEMENT OF SIGNIFICANCE (HERITAGE VALUE)

Only one heritage site of any significance was located during this survey. However, this site, a Middle Stone Age Site, is located more than 100m from the P433 (Figs 2 & 3). As such it is not threatened by the proposed development. The GPS coordinates for this site is: S 27° 6'24.25" E 32° 5'6.02 E" (Figs 2 & 3).

This site is not rated as significant as it is an open air site with a few stone tools visible on an eroded sandy surface. These included a few blades and flakes made from chert (Fig 5 & 6). There is no archaeological deposit associated with the site and the archaeological artefacts are all situated out of contexts.

### Field Rating

The Middle Stone Age Site is rated as Generally Protected C with a low significance.

Table 2. Field rating and recommended grading of sites (SAHRA 2005)

Level	Details	Action
National (Grade I)	The site is considered to be of National Significance	Nominated to be declared by SAHRA
Provincial (Grade II)	This site is considered to be of Provincial significance	Nominated to be declared by Provincial Heritage Authority
Local Grade IIIA	This site is considered to be of HIGH significance locally	The site should be retained as a heritage site
Local Grade IIIB	This site is considered to be of HIGH significance locally	The site should be mitigated, and part retained as a heritage site
Generally Protected A	High to medium significance	Mitigation necessary before destruction
Generally Protected B	Medium significance	The site needs to be recorded before destruction
Generally Protected C	Low significance	No further recording is required before destruction

## RECOMMENDATIONS

The proposed upgrading of roads P443, D1886 and L1380 may proceed in terms of heritage values as no heritage sites are in any danger of being destroyed or altered. However, it should also be pointed out that the KwaZulu-Natal Heritage Act requires that operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities.

## RISK PREVENTATIVE MEASURES ASSOCIATED WITH CONSTRUCTION

Maputaland has a rich archaeological history. Construction work and excavations may yield archaeological and/or cultural material. If any heritage features are exposed by construction work then all work should stop immediately and the provincial heritage agency, Amafa, should be contacted for further evaluation. Attention is

drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.



# MAPS AND PHOTOGRAPHS

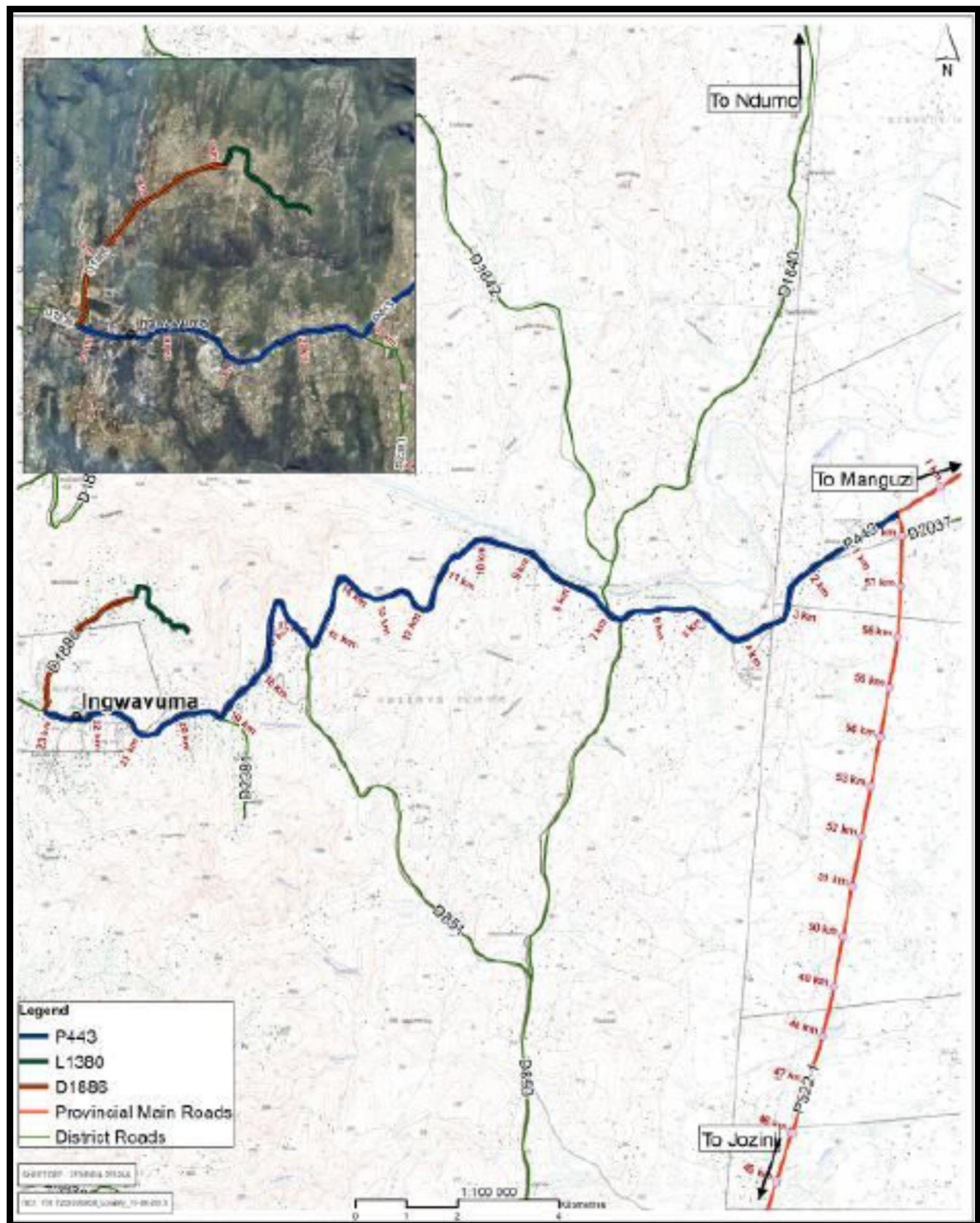
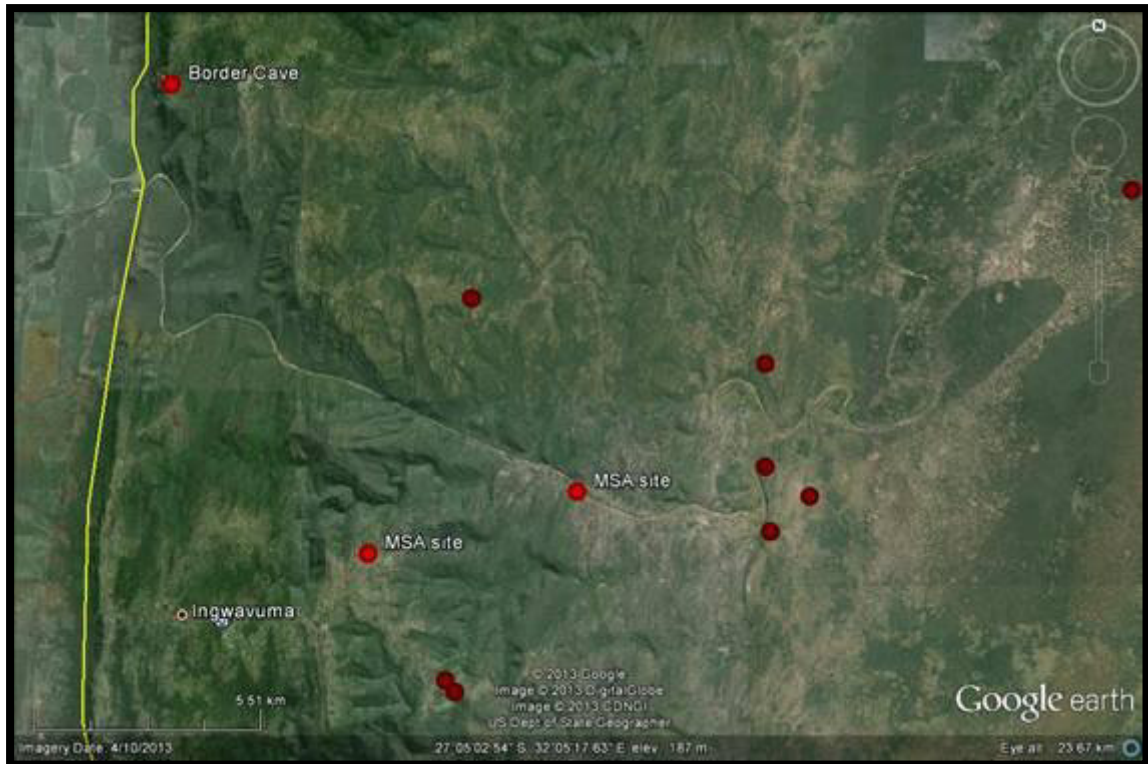
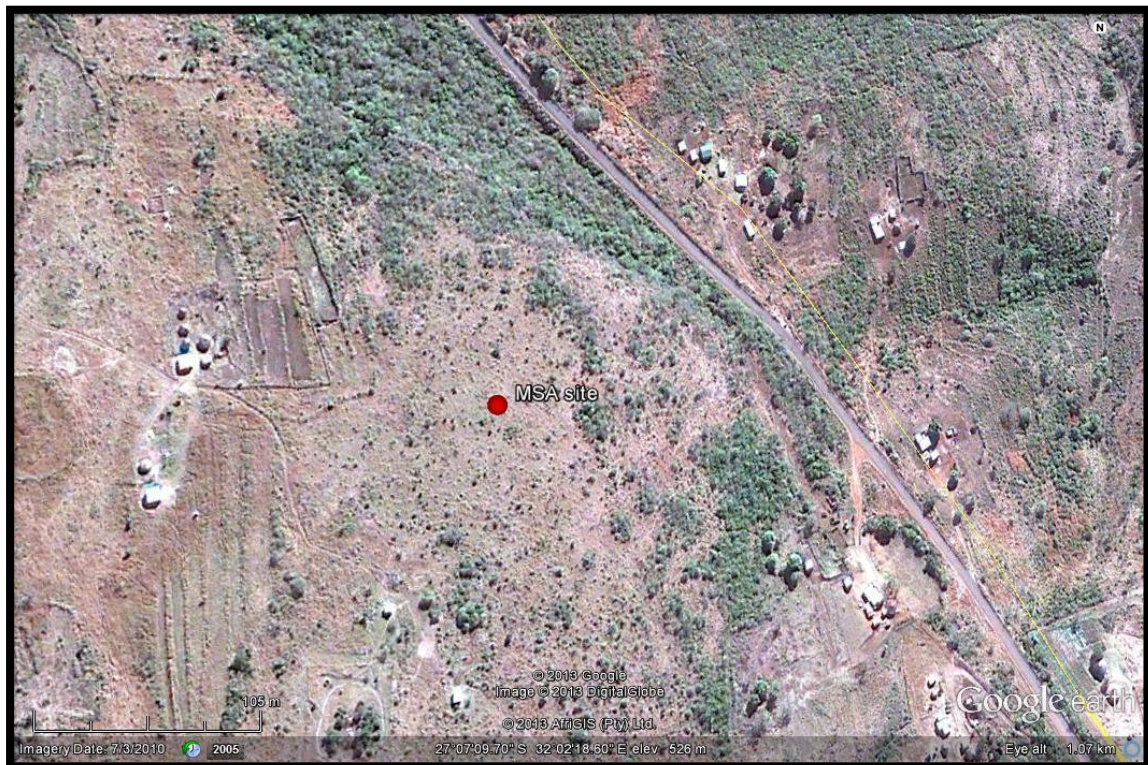


Figure 1. Map of the Study area showing roads P443, D1886, L1380 (after: Royal Haskoning DHV)





**Figure 2.** Google aerial photograph showing the distribution of known heritage sites in the greater Ingwavuma area.



**Figure 3.** Google aerial photograph showing the location of a MSA site approximately 100m to the west of the P443.





***Figure 4. Google aerial photograph showing the proposed location of a MSA site recorded by Oliver Davies in the 1970's. However, no site was observed by the consultant during a visit to this locality.***



***Figure 5. Middle Stone Age Site situated approximately 100m from proposed road upgrade.***



*Figure 6. Middle Stone Age flake situated on the surface in disturbed context.*



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## Appendix E: Comments and responses report



Figure 6. View of the Public Notice



Figure 7. View of the Public Notice



**NOTICE OF ENVIRONMENTAL  
AUTHORISATION PROCESS FOR THE  
PROPOSED UPGRADING OF  
WATERCOURSE CROSSINGS ALONG  
THE P443, D1886 AND L1380 ROADS;  
JOZINI MUNICIPALITY (EIA REF:  
PENDING)**

Notice is hereby given in terms of Regulation 54 of the National Environmental Management Act (NEMA Act 107 of 1998), published in the Government Notice No. R.543 (18 June 2010) of the intent to carry out an Environmental Authorisation process. Application has been made to the Provincial Department of Agriculture and Environmental Affairs (DAEA) for the above-mentioned development. The project triggers listed activity 18, 39 (iii) and 40 (iv) of GNR 544. The proposed development therefore requires a Basic Assessment Process for Environmental Authorisation.

**Proposed Activity:** The KZN Department of Transport are proposing the upgrade of the P443, D1886 and L1380 roads; commencing at the intersection with the P522 and heading toward Ingwavuma. In order to accommodate these upgrades, the associated stormwater structures require widening.

**Property Descriptions:** The project will take place predominantly within the road reserves of the P443, D1886 and L1380, however where required there may be some minor deviations.

**Applicant:** KZN Department of Transport (Pty) Ltd

**Consultant:** Terratest (Pty) Ltd. Contact Person: Theo Wicks; e-mail: [wickst@terratest.co.za](mailto:wickst@terratest.co.za); Terratest, PO Box 794, Hilton 3245; Tel: 033 343 6789, Fax: 033 343 6788.

In order to ensure that you are registered as an interested and/or affected party, please submit your **name, contact information and interest in the matter** as well as any **comments or queries** you may have to the contact person listed above.

**ISAZISO SOKU GUNYAZWA  
NGOKWEZEMVELO KOHLELO  
OLUHLONGOZWAYO  
LOKWANDISWA KWEZINSIZA  
ZOKUWELA UMFULA  
EZISEMGWAQWENI U-P443,  
U-D1886 KANYE NO-L1380,  
KUMASIPALA WASEJOZINI**

Isaziso sikhishwa ngokwe Nqubomgomo engunombolo 54 we National Environmental Management Act, Act 107 of 1998 (NEMA) Regulations, eshicilelwe kwisaziso sikaHulumeni ngokwe Nombolo. R.543 kusukela mhla ziyi 18 ku June 2010 ngenhloso yokuthola igunya ngokwezemvelo (Environmental Authorisation). Isicelo sesifakiwe eMnyangweni WeZolimo neZemvelo kwiSifunda saKwaZulu Natali (Department of Agriculture, Environmental Affairs- DAEA) mayelana nabulhlolelo oluhlongozwayo lwentuthuko. Lolu hlelo lokwandiswa kwezinsiza lungena ngaphansi kwemisebenzi esohleni lwe-18, olwama-39 (iii) kanye nolwama-40 (iv) ngaphansi kwenombolo GNR 544. Lolu hlelo oluhlongozwayo ludinga ukuhlolwa kwesigaba sokuqala (Basic Assessment) ukuze kutholakale igunya ngokwezemvelo.

**Umseberzi ohlongozwayo:** UMnyango WeZokuthutha KwaZulu Natali uhlongoza ukwenza kangcono umgwaqo u-P443, u-D1886 kanye no-L1380, kusuka kwimpambano mgwaqo eku-P522 kubhaka eIngwavuma.

Lokhu kwenziwa kangcono komgwaqo kuzodinga kwandiswa izinsiza zokuwela (amapayipi kanye namabhuloho).

**Indawo ngokwemikamo yebalazwe:** Lokhu kwandiswa kwezinsiza zokuwela umfula kuzokwenzeka ngaphakathi komkamo womgwaqo (road reserve) u-P443, u-D1886 kanye no-L1380, kodwa uma kunesidingo kungathi ukudlulela.

**Abafaki sicelo:** UMnyango WeZokuthutha KwiSifunda zwe saKwaZulu Natali.

**Abaxhumanisi:** Terratest (Pty) Ltd. Uthintane no: Theo Wicks; e-mail: [wickst@terratest.co.za](mailto:wickst@terratest.co.za); Terratest, PO Box 794, Hilton 3245; Tel: 033 343 6789, Fax: 033 343 6788.

Ukuqinisekisa ukuthi ubhalisiwe njengomuntu othintekayo noma onentshisekelo, uyacelwa ukuba uthumela igama, iminingwane yakho kanye nemibono noma izikhala-zo kumxhumanisi ongenhla.

List of Key Stakeholders contacted

Ezemvelo KZN Wildlife	Andy Blackmore	PO Box 13053, Cascades, 3202
Amafa	Weziwe Tshabalala	PO Box 2685, Pietermaritzburg, 3201
Department of Water Affairs	Colleen Moonsammy/ Ms N Mdlalose /	PO Box 1018, Durban, 4000
Department of Agriculture, Forestry and Fisheries: Land Use and Soil Management	Revival Mnguni	Private Bag X120, Pretoria, 0001
Department of Agriculture and Environmental Affairs: Macro Planning Directorate	Zibusiso Dlamini	Private Bag X9059, Pietermaritzburg, 3201
Department of Agriculture, Forestry and Fisheries	Wiseman Rozani	Private Bag X9029, Pietermaritzburg, 3200
Department of Cooperative Governance and Traditional Affairs	Norman Milne	Private Bag X9018, Pietermaritzburg, 3200
KZN Department of Transport	Roy Ryan	Private Bag X9043, Pietermaritzburg, 3201
Department of Human Settlement	Thokozani Makagula	Private Bag X9045, Pietermaritzburg, 3200
Ezemvelo KZN Wildlife	Andy Blackmore	PO Box 13053, Cascades, 3202
Jozini Local Municipality	The Municipal Manager	P/Bag x028, Jozini, 3969
Umkhanyakude District Municipality	The Municipal Manager	P.O. Box 449, Mkuze 3965
Ingonyama Trust Board	Belinda Benson	P.O. Box 601, Pietermaritzburg, 3200.

Comment & Response Report

Received from	Comment	Response

## Correspondence Recieved

## Correspondence Sent

## Appendix F: Draft Environmental Management Programme (EMPr)

# ENVIRONMENTAL MANAGEMENT PROGRAMME

## CULVERT UPGRADE ON P443, JOZINI LOCAL MUNICIPALITY, KWAZULU-NATAL

April 2014

**Prepared by:**

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## 1. INTRODUCTION

### 1.1 Background to the Environmental Management Programme

In accordance with the Integrated Environmental Management Guidelines published by the Department of Environmental Affairs & Tourism (DEAT) in 1992, the purpose of an Environmental Management Programme (EMPR) is “to describe how negative environmental impacts will be managed, rehabilitated or monitored and how positive impacts will be maximised”.

#### **National Environmental Management Act, (Act 107 of 1998)**

- (i) Section 28 of NEMA (National Environmental Management Act, Act 107 of 1998) states that:

#### **Duty of care and remediation of environmental damage**

*“(1) Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot be reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment”*

The EMPR ensures that environmental criteria are incorporated into the project process to enable the sustainable management of the development. In accordance with the Integrated Environmental Management Guidelines published by the Department of Environmental Affairs & Tourism (DEAT) in 1992, the purpose of an EMPR is “to describe how negative environmental impacts will be managed, rehabilitated or monitored and how positive impacts will be maximised”. It is a detailed plan of action prepared to organise and coordinate environmental mitigation, rehabilitation and monitoring so that positive impacts are enhanced, and negative impacts and damage to the environment are avoided, minimised or rectified where required.

This EMPR is a practical document that precisely sets out both the goals and actions required in mitigation. Though the term “Mitigation” can be broad in definition, it means in this context to “allay, moderate, palliate or temper.” Mitigation of a negative impact means that its significance is reduced. It is endeavoured to increase the significance of a positive impact.

It generally should include consideration of the following:

- Avoiding impacts by not undertaking certain actions;
- Minimising impacts by limiting aspects of an action;
- Rectifying impacts by rehabilitation or restoration of the affected environment;
- Compensating for impacts by providing substitute resources or environments;
- Minimising impacts by optimising industrial processes, structural elements and other design features.

The objectives of the EMPR are to:

- Provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site.
- Ensure that the construction and operational phases of the project continue within the principles of Integrated Environmental Management.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the recommendations provided in the impact assessment are complied with.

Some impacts may need ongoing monitoring or management. These requirements should be outlined, along with appropriate feedback procedures. Monitoring of impacts may include:

- A check that actions are in line with conditions of approval;
- A check that mitigation measures are being implemented during the construction phase;
- Monitoring of selected environmental variables;
- The duration for which monitoring must continue after the completion of construction, or during which phases such monitoring must take place;
- Details for monitoring actions;
- Delegation of responsibility for undertaking monitoring;
- Procedures to be followed if thresholds are exceeded or problems identified;
- The indication of the responsible authority.

This EMPR, which forms an integral part of the contract documents, informs the project developer / implementing agent as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction and operational activities associated with the project. This is to include any rehabilitation and revegetation processes work which is needed post-construction and which would be carried out by the contractor or specialist subcontractor who he may appoint to do such rehabilitation work. The provisions of the EMPR are binding on the Contractor and Proponent during the construction contract and operational phase. The EMPR must be incorporated into any future management associations during the operational phase of the development. It is mandatory that a copy of the operational EMPR is included in all sale agreements.

Any environmental issues that are identified during or after construction must be addressed in consultation with the environmental consultant. As such it should be viewed as a dynamic document that may require updating or revision where necessary.

All activities and earthworks associated with construction and reticulation of services must be undertaken in accordance with SABS 1200 standards, which deal with guidelines for civil engineering and general construction works.

## 1.2 Appointment of Consultant

Terratest (Pty) Ltd was appointed by Royal Haskoning DHV, on behalf of the KwaZulu-Natal Department of Transport to provide an EMPR for the proposed upgrade of the a culvert on P443

### Details of person(s) that compiled the EMPR

Section 33 of NEMA (National Environmental Management Act, Act No. 107 of 1998) EIA Regulations (2010) include a number of provisions regarding the content of EMPRs.

*“A draft environmental management programme must include –*

*(a) Details of –*

- (i) The person who prepared the environmental management programme; and  
(ii) The expertise of that person to prepare an environmental management programme; “*

Name and details of the Environmental Practitioners:

Consultancy: **Terratest (Pty) Ltd**

Practitioner: Theo Wicks

Qualification and Years Experience: M (Phil) Stellenbosch; BSc (Hons) University of KwaZulu Natal. Years of experience: 7

Email and web address: [wickst@terratest.co.za](mailto:wickst@terratest.co.za); [www.terratest.co.za](http://www.terratest.co.za)

## 2. PROJECT DETAILS

Provincial Road P443 extends from a T junction with the road from Ndumo, to Ingwavuma and is due to be rehabilitated as the black top is showing signs of wear, including potholes.

The P443 crosses a tributary of the Phongolo river at chainage 6.845. The road crosses the tributary by means of a 6 cell box culvert.

In order to improve the road safety at the site, the road is requiring realignment toward the north of the existing alignment. The realignment straightens out the road making for an easier approach and departure along the road

In addition, the hydraulic analysis of the existing structure indicated that it needs to be considerably upsized to comply with KZN DOT's current drainage criteria. Therefore a new, larger culvert is required.

This option will comprise a 3.6m box culvert of 2 units; a 2 cell unit and a 3 cell unit. The length of this structure (in the direction of flow) will be 18.5 m, with one a perpendicular joint in each unit. The structure will be 30° skew from the perpendicular to road centre. Excavation and sub-structure earthworks are to include a one metre rockfill layer, of crushed rock (max size 300mm).

The alignment of the P443 presents a risk of accidents to road users and as a result the KZN Department of Transport has proposed the realignment of the road to make it safer for road users.

## 3. LEGISLATIVE REQUIREMENTS

### 3.1 Signing of the EMPR

The acknowledgement form at the back of the approved EMPR is to be signed by the holder of the project proponent, any Project Managers / Engineers, the ECO, and all the Contractors. All the Contractors employees, especially the machine and equipment operators, are to be made aware of the conditions as contained in the EMPR and the contractual conditions relating to the environment, as contained in the contract document.

### 3.2 Legislation

Environmental legislation applicable to the formulation of an EMPR includes but is not restricted to the following:

- The Constitution of the Republic of South Africa (Act No. 108 of 1996), including the Bill of Rights (Chapter 2, Section 24)
- National Environment Management Act (Act No. 107 of 1998)
- National Water Act (Act No. 36 of 1998)
- Water Services Act (Act 108 of 1997)
- Water Act (Act No. 54 of 1956)
- National Forests Act (Act No. 84 of 1998)
- Forest Act (Act 122 of 1984)
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).
- The National Heritage Resources Act (Act No 25 of 1999 as amended)
- KwaZulu Natal Heritage Act (Act 10 of 1997)
- National Monuments Act (Act 28 of 1969)
- Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925)
- Forest and Veld Conservation Act (Act 13 of 1941)

- National Resources Development Act (Act No. 51 of 1947)
- Animals Protection Act (Act No. 71 of 1962)
- Atmospheric Pollution Prevention Act (Act No. 45 of 1965)
- Environmental Planning Act (Act No. 88 of 1967)
- Soil Conservation Act (Act No. 76 of 1969)
- Hazardous Substances Act (Act No. 15 of 1973)
- Conservation of Agricultural Resources Act (Act No. 43 of 1983)
- Environment Conservation Act (Act No. 73 of 1989)
- Minerals Act (Act No. 50 of 1991)
- Minerals And Petroleum Resources And Development Act (Act No. 28 Of 2002)
- Occupational Health and safety Act (Act No. 85 of 1993)
- Development Facilitation Act 67 of 1995
- Integrated Environmental Management (IEM)
- National Environmental Management: Waste Act (Act No. 59 of 2008)
- KwaZulu-Natal Nature Conservation Ordinance (No. 15 of 1974)
- Explosives Act (Act 15 of 2003)
- Provincial and Local Government Ordinances and Bylaws

In terms of the above, all regulations framed there under and amendments there to, and the relevant municipal bylaws.

*Of importance are also all provincial and municipal by-laws and regulations that are not listed here. Some of the acts may have changed or are in the process of change. However, once project implementation starts, legislation and all amendments that are current at that time would apply.*

### 3.3 Parties involved

The EMPR must be appended to tender documents and referred to in the tender documents as special conditions of tender. Responsibility for the implementation of the EMPR lies with all parties involved in the project. The "Responsibility" column in the EMPR is merely a guide and does not relieve the Contractor of his responsibilities in terms of overall compliance with the EMPR. Overall responsibility does however rest with the project proponent and their appointed representatives. This responsibility, in some instances may be delegated to contractors, but the implementing engineer / project manager and proponent will retain legal responsibility. In that capacity, the implementing engineer / project manager and proponent should delegate suitably qualified person(s) with the responsibility to ensure implementation of the EMPRs, and will:

- Guide, advise and consult the developer / implementing agent and its contractors on environmental issues during construction.
- Revise the EMPR as required and inform the relevant parties of the changes.
- Secure the protection and rehabilitation of the environment.
- Ensure that the EMPR has been accepted and understood as a contractually binding document on all contractors.
- Conduct environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil, pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.
- Manage the project to ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.
- Ensure staff operating equipment (such as excavators, loaders, etc.) are adequately trained and sensitised to any potential hazards associated with their tasks.
- Ensure no operator is permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Management.
- Educate staff as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.

The responsibilities of the service providers and contractors during the construction phase are to:

- Ensure that all requirements of the EMPR and specific project details, communicated to, understood and followed by all persons working on the project who may have an impact on the environment.
- Ensure that a procedure exists for reporting incidents and resolving any problems rapidly.

The responsibilities of the operators during the operational phase are *inter alia* to ensure that:

- All requirements of the EMPR are, communicated to, understood and followed by all persons working on the project who may have an impact on the environment.
- A procedure exists for reporting incidents and resolving any problems rapidly.

The management guidelines contained in this document must form part of the contractual agreements between the engineers / project managers and the implementing agents / contractors.

The following parties are applicable:

*Project Manager / Engineer (PM)*

The Project Manager / Engineer is the administrator of the project during construction. The engineer / project manager is responsible for all direct communication with the contractor.

*Project Developer / Proponent (Pro)*

The Developer (implementing agent) / Proponent must be in overall charge of the contract, the Contractor/s and the adjudication of the EMPR requirements. The Developer (implementing agent) / Proponent can delegate the daily controls on site to a project manager or similar responsible person, when necessary.

The Proponent is ultimately responsible for the implementation and operation of the project. The Engineer / Project Manager must report to the proponent during construction. The proponent will be directly responsible for the ongoing adherence to the EMPR during the operational phase.

*Contractor (C)*

This refers to the main contractor(s) appointed by the client for the construction of the Project, or portion of the Project. The main contractor(s) are required to adhere to the EMPR and are responsible to ensure that all sub-contractors, suppliers and staff appointed by them also adhere to the EMPR.

The Contractors must comply at all times with the requirements of the EMPR and must acknowledge in writing by signing the acknowledgement form that they will abide by the contents of EMPR. Copies of the signed acknowledgement form are to be forwarded to the DAEA: Compliance and Monitoring Department.

*All Staff*

All workers employed by the contractor or developer / implementing agent, persons involved with activities related to the project, or persons present or visiting the construction area, including permanent, contract, or casual labour and informal traders.

*Environmental Control Officer (ECO)*

The Developer / implementing agent / Proponent must appoint an independent ECO for the purpose of ensuring that the environmental conditions as outlined in this EMPR are implemented by the Contractor. The ECO is to have access to the site at all times, for the purpose of inspections to ensure that the environmental conditions of the EMPR are being implemented and adhered to. The ECO must report on the environmental aspects of the contract to the responsible person / Project Manager at agreed intervals.

The Contractors must have access to the ECO via the Project Manager for advice on the environmental aspects of the contract and any other associated information. The need for any deviations or variations in the environmental conditions must be reported to the Project Manager and the ECO prior to these being undertaken.

An ECO is an individual nominated by the developer / implementing agent to oversee and audit the ongoing implementation of the EMPR, and for liaison with the DAEA, Municipality, EKZNW and DWA and the public and owners or managers of properties affected by construction.

#### *DAEA*

The Compliance Officer appointed by the KZN Department of Agriculture and Environmental Affairs to this project.

#### *Local Community*

People residing or present in the region and near the construction activities, including the owners and/or managers of land affected by construction, workers on the land, and people in nearby towns and villages.

#### *Public*

Any individual or group concerned with or affected by the Project and its consequences, including the local community, local, regional, and national authorities, investors, workforce, customers, consumers, environmental interest groups, and the general public.

**Table of abbreviations used below:**

<b>Abbreviation</b>	<b>Meaning</b>
C	Contractor
PM	Project Manager / Engineer
Pro	Proponent
ECO	Environmental Control Officer

Please Note: An Environmental Control Officer (ECO) should be appointed to inspect this development on a regular basis during the construction and rehabilitation phases.

## **4. COMPLIANCE**

### **4.1 Record keeping**

Copies of the EMPR required for specific construction activities shall be kept on site and made available for inspection by visiting officials from the employer or relevant environmental authorities.

The Project Manager and appointed independent ECO must monitor the Contractor's adherence to the approved impact prevention procedures on a weekly basis and shall issue the Contractor a notice of non-compliance whenever transgressions are observed. The Contractor must document the nature and magnitude of any non-compliance in a designated register, the action taken to correct the non-conformance, the actions taken to mitigate its effects and the results of those actions. Any non-compliance shall be documented by the ECO and reported to the Project Manager and Competent Authority (DAEA) in Audit Reports. Any emergency incidents during the project must be reported to the Competent Authority.



The Contractor must also record all complaints received regarding activities on the construction site pertaining to the environment, and the response noted with the date and the action taken. These records shall also be submitted to the Project Manager and Competent Authority (DAEA) in the Audit Reports.

On completion of any component of the project, a post construction environmental audit report must be submitted to the DAEA compliance and Monitoring Department.

#### **4.2 Monitoring and penalties**

The EMPR will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. The overall responsibility for ensuring compliance with the EMPR is with the implementing proponent (Umgeni Water), their engineer / Project Manager and any Contractor(s) they might employ. The abovementioned parties must ensure that all staff members, sub-contractors, suppliers and visitors understand and adhere to the EMPR since the approval of the document implies that that it is legally binding. The duration over which the Contractor's controls shall be in place cover the construction period of the project as well as the limited time after the contract completion in the General Conditions of Contract, and the project specifications, as the defects liability period.

The duration over which the Contractor's is liable for the project shall be in place over the construction period of the project as well as the limited time after contract completion in the General Conditions of Contract, i.e. the defects liability period. Please note that the responsibility for ensuring compliance with the EMPR and any other statutory requirement it ultimately that of the proponent of the project or their appointed agents.

The monitoring and compliance of the development must take place as follows:

- An Environmental Control Officer (ECO) should periodically audit the area and report back to the Department of Agriculture and Environmental Affairs (DAEA).
- The requirements of the EMPR must be discussed at professional team meetings in order to understand the environmental content of the document. The requirements of the EMPR must be incorporated into any tender/contract documents by way of specific clauses that convey the impact and mitigation required. These clauses are to be agreed between the responsible professional members of the team and the environmental consultant.
- The Developer / implementing agent and the Contractor shall ensure that all staff members, sub-contractors, suppliers and visitors understand and adhere to the EMPR since it is a legally binding document. The Contractors must comply at all times with the requirements of the EMPR and must acknowledge in writing by signing the acknowledgement form that they will abide by the contents of EMPR. Copies of the signed acknowledgement form are to be forwarded to the ECO.
- Environmental auditing must be undertaken by an independent EAP who will act as the Environmental Control Officer (ECO).
- The ECO is to be appointed by the applicant and should be responsible for ensuring that the Contractor complies with all aspects of the EMPR to the satisfaction of all parties.
- The ECO should do regular (every month and more frequently during earth moving activities and other potentially disturbing construction activities) environmental audits to ensure compliance to the EMPR and provide relevant instructions.
- The ECO is to have access to the site at all times, for the purpose of inspections to ensure that the environmental conditions of the EMPR are being implemented and adhered to. The ECO must report on the environmental aspects of the contract to the farm owner or the Developer / implementing agent / Project Manager at agreed intervals.
- The Contractors and Developer / implementing agent must have access to the ECO via the developer / implementing agent for advice on the environmental aspects of the contract and any other associated information. The need for any deviations or



variations in the environmental conditions must be reported to the developer / implementing agent and the ECO prior to these being undertaken.

- The ECO is to complete audit reports which are to be submitted to the relevant organ of state (i.e. DAEA). The ECO has the authority to instruct the Contractor to cease a particular operation causing or liable to cause significant environmental damage, and issue fines or penalties for non-compliance of the EMPR.
- Monitoring should take place for the entire duration of the construction of the proposed development. Audit reports should be submitted regularly to the DAEA during the construction phase of the development as part of compliance and monitoring.
- In order to facilitate communication between the ECO, the Applicant and Contractor, it is vital that a suitable chain of command is structured that will ensure that the ECO's recommendations have the full backing of the project team before being conveyed to the Contractor. In this way, penalties as a result of non-compliances with the EMPR may be justified as failure to comply with instruction from the highest authority.
- EMPR amendments (relaxation or revision of any EMPR Mitigation Measure) will have to be circulated to the relevant organs of state for approval. Once construction has commenced, this will be by way of a request from the ECO outlined in the minutes of regular site visits.

The terms of reference for the audits would comprise the following:

- To determine from the EMPR document criteria that is prescriptive during all phases of the project.
- Develop a checklist against which the criteria can be referenced during the audit.
- During the audit process key individuals involved with the management of the site/project are to be given the opportunity to comment on issues being audited and where possible, will be invited to accompany the auditor to the relevant places of inspection.
- Obtain evidence of compliance or non-compliance and corroborate both verbal and physical evidence where possible.
- Investigate compliance of the project to the conditions of approval of the EMPR
- Compile a final audit report on the implementation of the EMPR and submit this report to the competent authority (DAEA).

An Audit Form must be completed, against which performance is measured. Compliance ratings against which the listed criteria are assessed should be as follows:

Symbol	Rating	Interpretation
Y	Yes	Evidence of compliance
P	Partial	Evidence of partial compliance
N	No	Evidence of non-compliance
NR	Not Relevant	The condition or commitment is not relevant at this stage of the development or it is inappropriate
NA	Not Audited	Not audited

The developer / implementing agent and contractors are deemed not to have complied with the EMPR if:

- Within the boundaries of the site, site extensions and access roads there is evidence of contravention of clauses;
- Environmental damage occurs due to negligence;
- The contractor fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time frame;
- The contractor fails to respond adequately to complaints from the public or local community

The Contractor / developer / implementing agent must act immediately after a notice of non-compliance is received, and correct the cause for the issuing of the notice. Application of a penalty clause will apply for incidents of non-compliance. The penalties imposed per incident or violation will be as follows:

<b>Incident / Violation</b>	<b>Penalty</b>
Failure to stockpile material correctly	R 5 000
Pollution of water bodies	R 10 000
Failure to control Stormwater runoff	R 10 000
Failure to provide adequate sanitation	R 20 000
Unauthorised clearing / removal of vegetation	R 5 000
Failure to provide adequate waste disposal facilities and services	R 15 000
Failure to reinstate disturbed areas within specified time period	R 3 000
Failure to rehabilitate disturbed areas within 3 months of completion	R 5 000
Any other contravention of the environmental specification	R 2 000

The PM/ECO will inform the Contractor of the contravention as an when it occurs and shall be entitled to deduct the amount from monies due under the contract for rehabilitation if the non compliance is not remedied within the specified timeframe provide by the ECO or any other competent authority.

The penalty associated with a chemical spill is not a set amount but will depend on the nature and extent of the spill. Rather than pay a set penalty the Contractor will need to pay for the cost of any soil and /or groundwater monitoring and any soil and / or groundwater remediation required by authorities.

The imposition of such a penalty shall not preclude the relevant provincial authority from applying an additional penalty in accordance with statutory powers.

Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as deemed fit. The polluter-pays principle applies.

The “polluter-pays” principle provides that “the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment. NEMA imposes a duty of care on every person who causes, has caused or may cause significant pollution or degradation of the environment is authorised by law or cannot reasonably be avoided, NEMA requires that the pollution must be minimised and rectified.

NEMA and its Regulations entitle environmental authorities to administer a fine not exceeding R 5 million or 10 years imprisonment and/or a fine and imprisonment for a person guilty of an unlawful activity. The Act makes allowance for the rectification of the unlawful activity but may charge up to R 1 million administration fees over and above the remediation costs.

Furthermore NEMA makes provision for damages to be awarded by the courts where loss or damage has occurred as a result of a contravention of certain environmental statutes. For example, offences under the National Water Act No. 36 of 1965 and the Environmental Conservation Act No. 73 of 1989 may result in penalties being imposed in terms of NEMA. Importantly, NEMA provides for the liability on conviction of employees, managers, agents and directors for any offences resulting from the failure to take all the reasonable steps that were necessary under the circumstances to prevent the commission of an offence.

The DAEA retains the right to inspect the project during all phases of its development.

## **5. AMENDMENTS TO THE EMPR**

This EMPR outlines the environmental practices and mitigation measures to be adhered to during the pre construction phase and construction phase, in order to curtail and/or minimise potential negative impacts and promote sound environmental practises.

Any major issues not covered in the EMPR as submitted, will be addressed as addenda to this EMPR, and submitted for approval prior to completion.

The EMPR is a living document and is subject to change from time to time in consultation with DAEA. Any amendments to the EMPR will require approval from DAEA. A confirmation letter from DAEA approving the amendments to the EMPR must be attached as addenda.

## **6. ENFORCING THE EMP**

The project proponent and the implementing engineers / project managers have a responsibility to ensure that all those people involved in the project are aware of and familiar with the environmental requirements for the project (this includes sub-contractors, casual labour, etc.). The EMPR shall be part of the terms of reference for all contractors, sub-contractors and suppliers. All contractors, sub-contractors and suppliers have to give some assurance that they understand the EMPR and that they will undertake to comply with the conditions therein. All senior and supervisory staff members shall familiarise themselves with the full contents of the EMPR. They shall know and understand the specifications of the EMPR and shall be able to assist other staff members in matters relating to the EMPR. On completion of construction, the EMPR shall be part of the terms of reference for the operators of the scheme.

All parties must sign an acknowledgement that they are familiar with the requirements of the EMPR.

## 7. PRE-CONSTRUCTION PHASE EMP REQUIREMENTS

The EMPR must be incorporated into the tender/contract documents prepared for this project and the companies/persons tendering for the project must provide the Proponent with the additional costs (if any) of complying with any requirement of this Environmental Management Programme. The sum tendered shall therefore cover the cost of all material, plant and labour required to comply with the specifications of this EMPR, including the provision of method statements and associated documentation.

ACTIVITY	MANAGEMENT / MITIGATION	RESPONSIBILITY	FREQUENCY / TIMING
<b>A1 - Legislation, permits and agreements</b>	a) In all instances the, Site Owner, Developer, Service Providers, Contractors and Project Managers must remain in compliance with all relevant local and national legislation. The supreme law of the land is "The Constitution of the Republic of South Africa" which states: "Every person shall have the right to an environment which is not detrimental to his or her health or well being". Laws applicable to protection of the environment in terms of Environmental Management (and relating to construction activities) include but are not restricted to those listed in the EMPR above.	All	At all times, during construction and operational phases.
	b) A copy of the EMPR must be kept on site during the construction and operational phases of the project. These documents must be made available to any authorised official department, employee or agent who undertakes work on the project site.	C & PM	At all times.
	c) The location of all service infrastructure, including sewage, electrical and water infrastructure needs to be identified before construction activities commence on the site so as to reduce the risk of damage to this infrastructure which may result in the temporary disruption of services to residents and businesses in the area.	PM	Before any construction activities commence.
	e) Written details of the ECO must be forwarded to the DAEA on appointment.	Pro & ECO	Before any construction activities commence.

	<p>f) Written notice must be given to DAEA prior to the commencement of construction and must include the following:</p> <ul style="list-style-type: none"> <li>• The reference number</li> <li>• Site preparation activities</li> <li>• Commencement date</li> </ul>	PM	Before construction commences.
	<p>i) The construction contract entered into between the proponent and any contractor is to state that preference must be given to the employment of local residents during construction.</p> <p>A prime recommendation is that local employment be maximised during construction. This would require an analysis of skills of adjoining communities, with the participation and input of relevant representatives from the local municipality and any traditional authority in the area. The co-operation of contractors appointed to undertake construction, in carrying out training and capacity building programmes would be vital.</p>	PM & Pro	During the tender process.

	<p>j) The Contractor is to provide the ECO and Project Manager with the following written Method Statements for approval within 14 days of receiving the appointment letter from the Proponent/Tender Winner and prior to any construction commencing on site:</p> <ul style="list-style-type: none"> <li>• Construction Method Statement detailing, but not limited to: Method of undertaking earthworks, including spoil management, erosion, dust and noise control measures to be implemented. The Method Statement must also include the materials and equipment to be utilised during construction and the management thereof, transportation access routes and proposed traffic safety measures which will be implemented.</li> <li>• A Method Statement detailing the proposed locality and management of stockpiles and storage areas which may fall out of the construction camp. The Method Statement must include the management of topsoil stockpiles and dust control measures to be implemented.</li> <li>• A Method Statement for the management of solid waste (refuse/building spoil) generated during construction, including but not limited to: Methods for the control and removal of waste from the site; the number, type and locality of rubbish bins/skips; proposed locality and methods for the temporary storage of waste on site; methods for recycling of waste (if any); the proposed landfill site which will be utilised, and details of the waste removal company to be sub-contracted (if any); and the frequency that refuse will be removed from the site. The above applies to both hazardous and non-hazardous solid wastes.</li> <li>• A Method Statement detailing the location and structure of any fuel storage site, and or any other hazardous materials. The statement must include the type of material to be stored, the volume of storage, and the design and capacity of the bund.</li> </ul>	C	Within 14 days of being appointed / awarded the Construction Tender.
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	<ul style="list-style-type: none"> <li>• A Method Statement describing the location and layout of the construction camp in the form of a site plan indicating offices, storage areas for fuels and explosives (if any), parking areas, access points, equipment cleaning areas, and ablution facilities.</li> <li>• A Method Statement for responding to emergency situations, including but not limited to: spillages of hazardous substances (Spill Contingency Plan), accidental leaks, personal injuries sustained to staff on site, emergency evacuation of the construction site, and emergency procedures in case of fire. Location, layout and preparation of cement/concrete batching facilities (if any), including the methods employed for the mixing of concrete and the management of runoff water from such areas. An indication must be given of how any concrete spoil will be minimised, cleared, and disposed of.</li> <li>• A Method Statement for the management of contaminated water, indicating potential sources and estimated volumes of contaminated water and how this will be disposed of.</li> <li>• Motivation and method for the undertaking of any construction related activities within areas identified as “no-go” areas. Unless the need is clearly motivated and the proposed methods exhibit clear focus on environmentally sound construction practice no activity will be permitted within the defined “no-go” areas.</li> </ul>		
	<p>The abovementioned Method Statements must include the names of staff that are responsible for the implementation of these plans. The responsible staff members must be adequately trained according to their allocated responsibilities prior to construction commencing.</p>		

	k) Any required building plans must be approved by the local authority prior to the commencement of any building construction activities	PM & Pro	Prior to construction commencing.
	m) The appointed ECO is to provide environmental awareness training to every person working on the site prior to the commencement of any construction activities.	PM & Pro	Prior to construction commencing.
<b>A2 - Access to Site</b> <i>Sound environmental principles must be followed.</i>	<b>A2.1 Routing</b>		
	a) Access to site must be via existing or planned roads only. The Contractor will have to ascertain the existing condition of access roads and repair accordingly should damage occur due to construction activities.	PM & C	Prior to moving onto site and during construction.
	b) New access routes must be clearly defined with white stakes/painted rocks and disturbance outside these areas is not permitted.	PM	Prior to moving onto site.
	c) The Engineer / Project Manager and Contractor must take into account any limitations identified, and recommendations made during the environmental studies when deciding on an access route to the construction site.	PM	Prior to moving onto site.
	d) The location of all underground services and servitudes must be identified and confirmed before construction commences.	PM	Prior to moving onto site.
	e) Choice of access routes must take into account minimum disturbance to residents and/or businesses neighbouring the site.	PM	Prior to moving onto site.
	f) A working corridor must be determined to avoid excess trampling and damage to the site.	PM & C	Prior to moving onto site.



	g) Pedestrian activity surrounding the construction sites must be controlled and demarcated during construction activities. Pedestrian thoroughfares immediately surrounding / through the construction areas must be established and demarcated where necessary to avoid any injury or inconveniences to local residents.	PM & C	During the entire construction period and during operation.
	<b>A2.2 Haulage Roads</b>		
	a) Temporary advance warning “construction traffic ahead” signs to be erected where construction access is to be taken, as well as in areas which may pose a hazard to motorists or pedestrians.	PM & C	Before transport movement onto site.
	<b>A.2.3 Survey Points</b>		
	a) Marking of survey points must be done with the Engineer / Project Manager’s approval.	PM	Prior to moving onto site.
	b) Vegetation clearing and disturbance must be kept to a minimum during the survey operations.	PM, & ECO	During surveys and preliminary investigations.
<b>A3 – Setting up the construction camp</b> <i>Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation is reduced.</i>	<b>A3.1 Layout &amp; Location</b>		
	a) Choice of site for the Contractor’s camp requires the Engineer / Project Manager’s permission and must take into account the location of local residents and / or ecologically sensitive areas, including flood zones, wetlands and slip / unstable zones. A site plan must be submitted to the ECO for approval. The construction camp must preferably be positioned on previously disturbed area, with limited cut and fill.	C / PM / ECO	During surveys and preliminary investigations, prior to moving onto site.
	b) If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the PM and the landowner.	C & PM	Prior to moving onto site.
	c) The size of the construction camp must be minimized (especially where natural vegetation has had to be cleared for its construction).	PM & C	During site establishment.

	d) The construction camp must be properly fenced and secured. It must be kept in a clean and orderly state at all times. This will deter rodents and other fauna from entering the camp.	C & PM	The site must be fenced during site establishment; the PM is to conduct ongoing weekly inspections of the construction camp.
	e) The construction camp must be located on a level area at least 100m from any watercourse or wetland. The position of the camp must be ratified by the Engineer / Project Manager and Environmental Control Officer.	E & ECO	Prior to moving onto site.
	f) The Contractor's camp may not be situated in a flood plain or on slopes greater than 1:3.	PM & C	Prior to moving onto site.
	g) The construction camp must be fenced with a 1.8m high bonnox (or similar type) fence and locked after construction hours.	C	During site establishment and ongoing.
	h) The Contractor must attend to the drainage of the campsite to avoid sheet erosion and / or standing water.	C & PM	During site establishment and ongoing; the PM is to conduct ongoing weekly inspections of the construction camp.
	<b>A3.2 Ablutions</b>		
	a) Where water borne sewage is not available, temporary chemical toilets must be provided by a company approved by the Engineer / Project Manager. These toilets must be made available to all staff, and must be no closer than 100m from any watercourse and out of the 1:100 year flood line. Ventilated pit latrines may also be used. Such facilities, which shall comply with local authority regulations, shall be maintained in a clean and hygienic condition. Their use shall be strictly enforced. They must be positioned in an appropriate place and within 100m of the work font.	PM, C & ECO	During set-up, with ongoing monitoring as the work progresses.
	b) Records of maintenance & removal must be kept.	PM & C	Ongoing.

	c) There shall be a minimum of 1 toilet for every 20 workers and these must be situated no further than 100m from the work front.	C	Ongoing monitoring.
	d) Under no circumstances may open areas or the surrounding bush or degraded areas be used as a toilet facility.	ECO & C	Ongoing monitoring.
	<b>A3.3 Provision for Camp Waste Disposal</b>		
	a) Bins and / or skips shall be provided at convenient intervals for the disposal of waste within the camp. The bins must be covered to prevent wind-blown rubbish and scavenging by people and animals.	PM & C	During site set-up and ongoing.
	b) Bins should have liner bags where possible for efficient and safe disposal of waste.	C	Ongoing.
	c) At least three rubbish bins must be located at the construction camp for the collection of waste.	C	Ongoing.
	d) Recycling and the provision of separate waste receptacles for different types of waste should be encouraged. Where possible, plastics, paper, glass and cans should be separated from other domestic waste for recycling. If waste is to be recycled, appropriately labelled waste receptacles must be made available.	C	Ongoing.
	e) Any potentially hazardous containers must be punctured or disabled prior to disposal.	C & ECO	Ongoing.
<b>A4 – Establishing Equipment Lay-Down &amp; Storage Areas</b> <i>Storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully. Hazardous substances are those that are potentially poisonous, flammable, carcinogenic, or toxic.</i>	<b>A4.1 – General Substances and Materials</b>		
	a) Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to water bodies, general on-site topography and water erosion potential of the soil. These areas must be located within previously disturbed areas where possible and outside any 1:100 year flood line. Impervious surfaces, bunded areas or drip trays must be provided where necessary i.e. refuelling points and hazardous chemical storage areas.	PM, C & ECO	During site set-up.

<p><i>Some examples are: diesel, petrol, oil, bitumen, cement, solvent based paints, lubricants, explosives, drilling fluids, pesticides, herbicides, LPG.</i></p>	<p>b) Fire prevention and fire fighting facilities must be present at all storage facilities.</p> <p>All staff to be educated in fire prevention and the contractor will be held responsible for avoiding the risk of fire. No fires shall be lit on private property. If fires are lit, provision shall be made that no accidental fires are started, or the fire is allowed to spread. Demarcate an area within contractor's camp. No fire wood shall be collected in the veld.</p> <p>If activities that can cause a fire are carried out, fire extinguishers shall be available on site and in the construction camp.</p>	PM, C & ECO	During site set-up and Ongoing.
	<p>c) Storage areas must be secure so as to minimise the risk of crime. They must be safe from access by children and animals etc.</p>	C & PM	Ongoing.
	<p>d) Equipment lay-down and storage areas must be designated, demarcated, signed and fenced.</p>	C	During site set-up.
	<b>A4.2 –Hazardous Substances and Materials</b>		
	<p>a) It is very important that the proximity of other infrastructure, neighbours etc. are taken into account when deciding on storage areas for hazardous substances or materials. The areas must be suitably signed, fenced and access controlled.</p>	PM, C & ECO	During site set-up.
	<p>b) Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of any spillages into the ground and groundwater regime around the temporary storage area(s).</p>	PM, C & ECO	During site set-up.
	<p>c) Fuel tanks must meet relevant specifications and be bunded and elevated so that leaks are easily detected.</p>	PM, C & ECO	During site set-up.
	<p>d) Any residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.</p>	PM & C	Ongoing.

	e) Chemical or Hazardous Materials storage facilities must be on an impermeable bunded surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. Bunded areas must be able to contain 110% of the volume of liquids being stored. The Contractor shall submit a method statement to the Engineer / Project Manager and ECO for approval.	C	Prior to moving onto site.
	f) Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site, this includes diesel. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.	PM & C	Ongoing.
	g) Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. The Contractor must ensure that his staff is made aware of the health risks associated with any hazardous substances used and provide them with the appropriate protective clothing / equipment in case of spillages or accidents. All staff working with hazardous materials must have received the necessary training.	PM & C	During site set-up.
	h) Absorbent materials must be available at the construction site to clean any chemical, fuel or lubricant spills during construction. Spent absorbent material is to be treated as a hazardous waste and suitably disposed of. Empty packaging associated with the storage of hazardous chemicals, paints, solvents, lubricants (such as tins, 210 l drums) is to be returned to the supplier where possible or alternatively be recycled (e.g. to a drum recycling company). If neither of these options are feasible then the packaging should be disposed of in a suitable landfill (A H:h landfill should be suitable for most if not all packaging).	PM & C	During site set-up and ongoing thereafter.
<b>A5 – Education of site staff on</b>	<b>A5.1 - Education</b>		

<p><b>general and environmental conduct</b></p> <p><i>These points need to be made clear to all staff on site before the project begins</i></p>	<p>a) Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics to be covered must include:</p> <ul style="list-style-type: none"> <li>• What is meant by “environment”;</li> <li>• Why the environment needs to be protected and conserved;</li> <li>• How construction activities can impact the environment;</li> <li>• What can be done to mitigate against such impacts;</li> <li>• Awareness of emergency and spills response provisions;</li> <li>• Social responsibility during construction e.g. being considerate to local residents.</li> </ul> <p>It is the contractor’s responsibility to provide the site foreman with no less than 1 hour’s environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p>	C & ECO	During staff induction and followed by ongoing monitoring.
	<p>b) Staff operating equipment shall be adequately trained and sensitised to any potential hazards associated with their tasks. ECO to provide basic environmental awareness training during first site inspection.</p>	PM & ECO	During staff induction, followed by ongoing monitoring.
	<p>c) Translators are to be used where necessary during staff training.</p>	C	During staff induction.
	<p>d) The Engineer / Project Manager / ECO must be on hand to explain more difficult / technical issues and to answer questions which may be raised.</p>	E & ECO	During staff induction.
	<p>e) Construction workers must be made aware that they are not to make excessive noise e.g. shouting, hooting.</p>	C & PM	Ongoing monitoring.
	<p>f) The use of pictures and real-life examples is encouraged as these tend to be more easily remembered.</p>	C	Ongoing.
	<p>g) Use should be made of environmental awareness posters on site.</p>	C & PM	Ongoing.
	<p>h) No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Management.</p>	C & PM	Ongoing.
	<p>i) All employees must undergo the necessary safety training and wear the necessary protective clothing at all times.</p>	C & PM	Ongoing.

	j) The need for a “clean site” policy also needs to be explained to the construction workers.	C & ECO	During staff induction, followed by ongoing monitoring.
	<b>A5.2 – Worker conduct on site</b>		
	a) A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following rules:	PM & C	During staff induction, followed by ongoing monitoring.
	b) No alcohol / drugs to be present on site; no vehicles or machinery are to be operated whilst under the influence of alcohol or drugs.	PM & C	During staff induction, followed by ongoing monitoring.
	c) Prevent excessive noise to minimise disturbances to local residents and surrounding areas.	PM & C	During staff induction, followed by ongoing monitoring.
	d) No firearms allowed on site or in vehicles transporting staff to / from the site (unless used by security personnel).	PM & C	During staff induction, followed by ongoing monitoring.
	e) No unsocial behaviour will be permitted.	PM & C	During staff induction, followed by ongoing monitoring.
	f) Bringing pets onto site is forbidden.	PM & C	During staff induction, followed by ongoing monitoring.
	g) Construction staff are to make use of facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility is strictly forbidden)	PM, ECO & C	During staff induction, followed by ongoing monitoring.
	h) No fires to be permitted on site. Encourage the use of gas operated cookers for preparation of food on site	PM, ECO & C	During staff induction, followed by ongoing monitoring.
	j) Only pre-approved security staff and workers shall be permitted to live on the construction site.	PM	During staff induction, followed by ongoing monitoring.

	k) No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.	PM & C	Ongoing.
	l) The staff conduct rules are described in a separate table of rules in the EMPR. This is aimed at providing staff with the basic information regarding worker conduct on site.	PM & C	During staff induction, followed by ongoing monitoring.
<b>A6 – Social Impacts</b> <i>It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work and increase cost in the form of delays.</i>	<b>A6.1 Public Participation</b>		
	a) A site notice (i.e. a public notice) must be erected on the construction site giving contact details of the Project Manager, the Contractor and the proponent before construction activities commence.	PM	Prior to moving onto the site.
	b) Open liaison channels must be established between the site owner, the developer, operator, the contractors and Interested and Affected Parties (IAPs) such that any queries, complaints or suggestions can be dealt with quickly and by the appropriate person(s). The IAPs can be identified as those that live close by the site, work close to the site, will have their services / infrastructure affected by the project, have a general interest in the project, and / or the Ward Councillor in which the construction is taking place.	PM	Prior to moving onto site and ongoing.
	c) Should construction staff be approached by members of the public or other stakeholders, they must assist them in locating the Project Manager / Contractor, or provide them with a number on which they may contact the Project Manager / Contractor.	C & PM	Ongoing.
	d) The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site by the Engineer or Project Manager.	C	During staff induction, followed by ongoing monitoring.
	e) Adequate designated parking must be provided for site staff and visitors.	PM & C	Prior to moving onto site.
	f) A complaints register must be kept on site. Details of complaints must be incorporated into the audits as part of the monitoring process. This must be in carbon copy format, with numbered pages.	PM & C	During site setup and ongoing.
	<b>A6.2 Noise Impacts</b>		



	a) Construction vehicles / machines are to be fitted with standard silencers prior to the beginning of construction.	C	Ongoing
	b) Construction workers must be made aware of not creating unnecessary noise such as hooting and shouting,	PM & C	During staff induction, followed by ongoing monitoring.
	c) Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers etc) will be used as per operating instructions and maintained properly during site operations.	C	Ongoing.
	<b>A.6.3 Visual Impacts</b>		
	a) Storage facilities, elevated tanks and other temporary structures on site must be located such that they have as little visual impact on local residents as possible.	PM, C & ECO	During site setup.
	b) Lighting on the construction site must be pointed downwards and away from oncoming traffic and nearby houses.	C & ECO	During setup and ongoing monitoring.
	c) Special attention must be given to the screening of highly reflective materials on site.	PM, C & ECO	During site setup and ongoing monitoring.
<b>A7 – Dust / Air / Light pollution</b> <i>Establishment of the camp site, and related temporary works can reduce air quality</i>	a) Vehicles travelling along access roads must adhere to speed limits to avoid creating excessive dust.	PM & C	Throughout the duration of the project.
	b) Camp construction / haulage road construction – areas that have been stripped of vegetation must be dampened periodically to avoid excessive dust. This would apply particularly in instances of high wind speed or when dust is seen to be generated in significant quantities or is seen to be blowing towards residential areas	C & PM	Throughout the construction of the project.
	c) The Contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed.	PM & C	During setup and ongoing monitoring.
<b>A8 - Soil Erosion</b> <i>The stripping of vegetation during preliminary activities on site greatly increases the risk of soil erosion.</i>	<b>A.8.1 Conservation of Soil Resources</b>		
	a) The time that stripped areas are left open to exposure must be minimised wherever possible. Care must be taken to ensure that lead times are not excessive.	C, PM & ECO	Throughout the duration of the project.

	b) Wind screening and storm water control must be undertaken to prevent soil loss from the site. It is recommended that gabion mattresses are placed at culvert inlets and outlets as erosion control measures.	E, PM & ECO	During setup and throughout the duration of the project.
	c) Procedures that are in place to conserve topsoil during the construction phase of the project are to be applied to the setup phase, i.e. topsoil is to be conserved while providing access to the site and setting up the camp.	E, PM & C	During setup and throughout the duration of the project.
	d) Topsoil stripped from the construction camp and other construction areas must be stockpiled away from any potential disturbances or watercourses.	PM, C & ECO	During setup and throughout the duration of the project.
	e) Stockpiled topsoil must be either vegetated or with indigenous grasses or covered with suitable fabric to prevent erosion and invasion by weeds.	PM, C & ECO	During setup and throughout the duration of the project.
<b>A9 - Stormwater</b> <i>Serious financial and environmental impacts can be caused by unmanaged storm water.</i>	<b>A.9.1 Stormwater Damage Prevention</b>		
	a) To prevent stormwater damage, the increase in stormwater runoff resulting from the construction activities must be estimated and the drainage system assessed accordingly.	C & PM	Prior construction activities.
	b) During site establishment, stormwater culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the Engineer / Project Manager.	PM & C	During site establishment.
	c) Temporary cut off drains and berms may be required to capture storm water and promote infiltration.	PM	During site setup.
	d) The stormwater drainage system must not be contaminated by other sources; therefore must be separated from other wastewater drainage systems. The stormwater management plan must ensure that flow from the development does not result in negative impacts on downstream properties or watercourses.	PM & C	During site establishment.
<b>A10 - Water Quality</b> <i>Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on</i>	<b>A.10.1 Maintenance of Water Quality</b>		
	a) Storage areas that contain hazardous substances must be bunded with an approved impermeable liner and have the capacity to contain 110% of the volume of materials being stored.	PM, C & ECO	During site setup.

<i>groundwater quality.</i>	b) Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimise pollution risk and reduce bunding capacity.	C, ECO & PM	Ongoing as events occur.
	c) A designated, bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed of to a suitable waste disposal site or as directed by the Engineer / Project Manager.	C & PM	Ongoing, to be monitored on a weekly basis.
	d) Provision must be made during setup for all polluted runoff to be treated to the Engineer / Project Managers approval before being discharged into the storm water system. Any waste which cannot be treated to acceptable standards on site must be treated and disposed of by a licensed treatment company.	C & PM	During site setup and ongoing monitoring.
<b>A11 - Conservation of the Natural Environment</b>	<b>A.11.1 Fauna and Flora</b>		
<i>Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on, and areas surrounding the site.</i>	a) Areas which are identified by the Engineer / Project Manager or the Environmental Control Officer as being ecologically sensitive and which are adjacent to any construction work are to be suitably demarcated to prevent damage by plant and labour.	ECO & PM	During site setup, and ongoing monitoring.
	b) No natural vegetation may be cleared without prior permission from the ECO / Engineer / Project Manager.	E & ECO	During site setup, and ongoing.
	c) Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas.	ECO & PM	Ongoing.
	d) Trees that are not to be cleared should be marked beforehand with danger tape.	ECO & PM	During site setup.
	e) Disturbance to birds, animals and reptiles and their habitats must be minimized wherever possible.	C, ECO & PM	Ongoing.
<b>A12 - Setup of Waste Management</b>	<b>A.12.1 Waste Management</b>		
	a) The contractor is responsible for the internal collection of refuse and for transporting it to a registered landfill site once every week; unless a service agreement is entered into between the contractor and the municipality.	C	Ongoing.
	b) The excavation and use of rubbish pits is forbidden.	C & PM	Ongoing.

	c) Burning of waste is forbidden <sup>1</sup> .	PM & C	Ongoing and monitored weekly by the PM.
	d) A fenced area must be allocated for waste sorting and storage prior to removal.	PM & C	During site setup.
	e) Individual skips for different types of waste (e.g. 'household' type refuse, building rubble, etc.) must be provided.	C	During site setup and ongoing.
<b>A13 - Cultural Environment</b>	<b>A.13.1 Protection of Cultural Environment</b>		
	<p>a) Prior to the commencement of construction, all staff need to know what possible archaeological or historical objects of value may look like, and to notify the Engineer / Project Manager / Contractor should such an item be uncovered.</p> <p>If any artefacts or graves are uncovered during construction, all work on site is to cease and AMAFA as well as the ECO is to be notified for comment. Construction may only commence once approval by AMAFA is granted.</p>	PM & C	During staff induction.
<b>A14 - Safety and Security</b>	<b>A.14.1 Fencing / Demarcation</b>		
	a) Potentially hazardous areas such as excavated trenches or pits / storage areas are to be demarcated and made clearly visible.	PM & C	Ongoing.
	<b>A.14.2 Lighting</b>		
	a) Lighting on the construction campsite is to be set out to provide maximum security and to enable policing of the site, without creating a visual nuisance to local residents or businesses.	PM & C	During setup with ongoing monitoring.
	<b>A.14.3 Risks Associated with Materials on Site</b>		
a) Material stockpiles or stacks, such as pipes must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	PM & C	Ongoing.	

<sup>1</sup> A possible exception to this may be that the alien invasive vegetation which is removed from the site should be burned to prevent the spread of the plants.

	b) Flammable materials must be stored as far as possible from existing buildings and sensitive receptors.	PM & C	During site setup and ongoing monitoring.
	c) Fire fighting equipment must be present on site at all times as per the Occupational Health and Safety Act of South Africa (OHSA).	C & PM	Ongoing.
	d) Obstruction to drivers' line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.	C	Ongoing.
	e) No materials are to be stored in unstable or high-risk areas such as in floodplains or on steep slopes.	C, ECO & PM	During site setup and ongoing monitoring.
	f) Affected parties must be notified in advance of any known potential risks associated with the construction site and the activities on it (for example by distributing flyers in potentially affected residential/trading areas). Examples of these are stringing of power lines, blasting, earthworks / earthmoving machinery on steep slopes above houses / infrastructure, risk to residences along haulage roads / access routes.	PM	During site setup and ongoing.
	<b>A.14.3 General Security Measures to be Implemented</b>		
	a) There must be 24 hr access control to the construction camp site at all times and no unauthorised person may be permitted to enter the construction site without prior permission of the Project manager or Contractor.	PM	During site setup and ongoing.
	b) After hours security may be arranged by the Project Manager/Contractor. This will prevent theft and criminal activities from occurring on the site.	PM	During site setup and ongoing.
	b) The Client / Proponent is to appoint an independent environmental control officer to conduct site inspections and produce audit reports during the construction phase, (including site establishment and post construction phase). Audit reports to be submitted to DAEA.  Auditing must consist of site inspections and audit reports as required by the competent authority (DAEA Compliance and Monitoring).	PM & ECO	Ongoing

## 8. CONSTRUCTION PHASE EMP REQUIREMENTS

This pertains to all environmental impacts associated with construction and is not limited to the land on which the Project is to be located. It includes the site footprint, construction campsites, access roads and tracks, as well as any other area affected or disturbed by construction activities. The EMPR is relevant for all areas disturbed during construction. Furthermore, the EMPR must take into account all secondary impacts on local communities and the general public.

ACTIVITY	MANAGEMENT / MITIGATION	RESPONSIBILITY	FREQUENCY / TIMING
<b>B1 – Access to the site</b>	<b>B1.1 Maintenance of the access</b>		
	a) The access to the site will need to be upgraded to an acceptable standard during construction (i.e. such that large amounts of dust are not generated and there is no unwarranted damage caused to construction vehicles).	PM	Initial setup and ongoing.
	b) Contractors shall ensure that they drive sensibly such that the surrounding public roads are not affected adversely.	PM & C	Ongoing maintenance.
	c) There needs to be adequate drainage of water underneath any new access roads (both during construction & in operation). This can be done through a culvert / water diversion system.	C & PM	Where necessary.
	d) During construction, any unstable access roads could potentially be surfaced with a compacted gravel layer (shale) in order to allow for the increase in vehicular traffic on these roads. A chemical stabilizer could be added to assist with the surface binding and reduce the dust produced by vehicular traffic on the road.	C & PM	When necessary.
	e) It is recommended that entry and exit points in dangerous areas are clearly marked and designed in such a way as to allow for good line of sight and traffic viewing (allowing a 100m – 150m line of site on both sides of the access).	C & PM	When necessary.
	f) Any large trees or foliage that blocks entry/exit visibility should be removed (with prior permission from the ECO) to increase traffic visibility.	C & ECO	During setup and where necessary.
	g) Unnecessary compaction of soil by heavy vehicles must be	C & PM	Ongoing, and

	avoided; construction vehicles must be restricted to the demarcated access, haulage routes and turning areas.		specifically after heavy rains.
	h) Machine / vehicle operators must receive clear instructions to remain within demarcated access routes. Movement of heavy-duty vehicles and vehicles not connected with work in progress must be restricted to the construction zone in order to control related impacts such as damage in the construction zone, compaction of soil, damage to vegetation and noise pollution	C & PM	Ongoing, and specifically after heavy rains.
	i) Personnel and vehicle access must be restricted during construction so as to control access to otherwise potential dangerous excavations and materials.	PM & C	Ongoing.
	j) Construction activities must where ever possible not impede the traffic flow on adjacent roads.	PM & C	Ongoing.
	k) Areas to be utilised by heavy machinery, etc must be clearly demarcated and a responsible person must be appointed to ensure that there is full compliance with the EMP.	PM & C	Ongoing
<b>B2 - Maintenance of Construction Camp</b>	<b>B.2.1 Surfaces</b>		
	a) The Contractor must monitor and manage drainage of the camp site.	C	Weekly inspection by contractor.
	b) Run-off from the camp site must not discharge into neighbouring properties.	C	Ongoing.
	<b>B.2.2 Ablutions</b>		
	a) Chemical toilets are to be maintained in a clean state on a regular basis and must be moved to ensure that they adequately service the work areas.	C & PM	Ongoing
	b) The Contractor is to ensure that open areas or the surrounding bush are not being used as a toilet facility.	C	Ongoing monitoring.
	<b>B.2.3 Camp Waste Disposal</b>		



	a) The Contractor shall ensure that all litter is collected from the work and camp areas daily. The construction area must be cleared of litter, debris (e.g. cement packets, bitumen residues etc) and other domestic waste on completion of the day's work.	C	Ongoing monitoring.
	b) Bins and / or skips must be emptied regularly and waste must be disposed of at a registered landfill site. Waybills for all such disposal are to be kept by the Contractor for review by the Project Manager / ECO.	PM, C & ECO	Daily or as needed.
	c) A registered chemical waste company is to be used to remove waste from chemical toilets on site. Documentation for this must be kept by the contractor for review by the ECO if requested.	C	Weekly or as needed
	<b>B.2.4 Eating Areas</b>		
	a) Eating areas must be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	PM & C	Ongoing with weekly monitoring by the Contractor.
	b) All litter throughout the site must be picked up on a daily basis and placed in the bins provided.	C	Ongoing monitoring
	<b>B.2.5 Housekeeping</b>		
	a) The Contractor shall ensure that the camp and working areas are kept clean and tidy at all times.	C	Ongoing monitoring.
<b>B3 - Staff Conduct</b>	<b>B.3.1 Environmental Education and Awareness</b>		
	a) The Contractor must monitor the performance of the construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear.	C & ECO	Ongoing monitoring.
	<b>B.3.2 Worker Conduct on Site</b>		
	a) The rules that are explained in the worker conduct section of the EMPR must be followed at all times. Non compliance of these rules could result in the removal of workers by the Contractor or Engineer / Project Manager.	C & PM	Ongoing monitoring.
<b>B4 – Dust / Air Pollution</b>	<b>B.4.1. Dust &amp; Air Pollution</b>		

<i>Main causes of air pollution are dust particles from vehicle movements and stockpiles, vehicle emissions and fires.</i>	a) Vehicles travelling to and from the construction sites must adhere to the speed limits so as to avoid producing excessive dust. A speed limit of 30 km/h must be adhered to on a construction route.	PM & C	Ongoing monitoring.
	b) It must be ensured that loads of loose material (such as sand) on trucks are covered and dampened if necessary to prevent excessive dust.	PM & C	Ongoing monitoring.
	c) Limiting construction operational hours from 06h00 and 17h00 will reduce congestion and disturbance in surrounding areas and minimize road deterioration and consequent dust creation.	PM	As directed by Engineer / Project Manager.
	d) Access points, access roads, material stockpiles and other cleared surfaces must be dampened whenever necessary and especially in dry and windy conditions to avoid excessive dust.	PM & C	Ongoing and whenever necessary.
	e) Vehicles and machinery are to be kept in good working order and to meet the manufacturer's specifications for safety, fuel consumption etc. Should excessive emissions be observed, the Contractor is to have the equipment seen to as soon as possible.	C	Ongoing Monitoring of equipment with weekly inspections.
	f) Stockpiles may cause dust and so must be managed in accordance with the guidelines in Materials Management.	C & PM	Ongoing.
	g) If dust is unavoidable, screening will be required utilising wooden supports and shade cloth.	PM & C	Ongoing monitoring of stockpiles.
	h) Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.	PM, C & ECO	Throughout the project.
	i) No fires or burning of waste is permitted on site.	PM & C	Throughout the project.
	j) Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or a biodegradable soil stabilising agent.	PM & C	Ongoing.
<b>B5 – Soil Erosion</b>	<b>B.5.1 Topsoil Stripping and Stockpiling</b>		

	a) Soil disturbance will be minimized by establishing the extent of the construction site (pre-construction) and clearly demarcating this on the site and route layout plans. No construction personnel or vehicles may leave the demarcated areas except when authorised to do so by the Engineer / Project Manager.	C & PM	As each activity is completed.
	b) Erosion prevention measures must be implemented: Berms, sand bags and hessian sheets may be used to contain all sediment whilst energy dissipaters must be constructed at all outflow points. The site must be monitored for any sign of off-site siltation. All exposed earth must be rehabilitated promptly with suitable vegetation to protect the soil.	PM, C & ECO	Ongoing
	c) Once an area has been cleared of vegetation, the top soil layer should be removed and stockpiled in a designated area for use in rehabilitation once construction is completed. If topsoil is mixed with clay subsoil, the usefulness of the topsoil for rehabilitation of the site will be lost. Excess topsoil must be sold or made available for use elsewhere.	PM, C& ECO	Ongoing.
<b>B.5.2 Exposed Surfaces</b>			
	a) Side tipping of soil and excavated materials shall not be permitted – all spoil material shall be disposed of as directed by the Engineer / Project Manager.	PM	Ongoing and as directed by the Engineer / Project Manager.
	b) Stormwater control and wind screening must be undertaken, if necessary, to prevent soil loss from the site.	PM & C	Ongoing as directed by the Engineer / Project Manager.
	c) There must be no offsite impacts of stormwater.	PM	Ongoing monitoring.
	d) In areas where steep slopes are excavated, erosion control measures need to be initiated and these may include the planting of indigenous vegetation at short intervals to prevent the formation of gullies.	PM & ECO	As directed by the Engineer / Project Manager and ECO.

	e) Appropriate cambers and v-drains must be constructed on the new access roads in order to dissipate surface water runoff and sheet erosion.	PM & C	During site setup and as directed by the Engineer / Project Manager.
	f) Drainage must be controlled to ensure that runoff from the site will not lead to erosion and offsite pollution of any water resources. The stormwater drainage system must not be contaminated by other waste sources generated during construction phases of the development. The temporary toilet facilities must not be allowed to enter the stormwater drainage system. Waste from these facilities must be collected by the service provider and disposed of at a permitted waste disposal site. These facilities must be regularly serviced and would be managed according to the service plan developed by the PM.	PM, C & ECO	Ongoing monitoring and as directed by the Engineer.
	g) Battering of all banks shall be such that cut and fill embankments are no steeper than previous natural slopes unless otherwise permitted by the PM. Cut and fill embankments steeper than previous ground levels shall be re-vegetated immediately on completion of trimming or shall be protected against erosion using bio-engineered stabilisation measures.	PM & C	Ongoing and as directed by the Engineer
	h) If cut and fill earthworks are required, these must be limited to the minimum necessary for the proposed development. Cut and fill banks must not be sloped steeper than 1: 1.5. All fill must be well compacted in layers on placement and must not be loose end-tipped. All earthworks must be vegetated as soon after completion of construction as is practically possible with locally sourced indigenous vegetation where possible.	PM, C and ECO	As directed by the Engineer and ECO.
	i) All embankments, unless otherwise directed by the PM, shall be protected by a cut off drain to prevent water from cascading down the face of the embankment and causing erosion.	PM, E & C	A directed by the Engineer.
<b>B6 – Storm Water</b>	<b>B6.1 General Principles</b>		

<p><i>Construction activities frequently result in diversion of natural water flow resulting in concentration of flow and an increase in the erosive potential of the water</i></p>	<p>a) The Contractor shall not in any way modify nor damage the banks or beds of streams, rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies must be kept to a minimum in terms of: removal of riparian vegetation; and opening of the stream channel. Authorisation in this regard will be required from the Department of Water Affairs before construction activities commence.</p>	PM, C & ECO	Ongoing Monitoring by the Engineer and ECO.	
	<p>b) Earth, stone and rubble is to be properly disposed of so as not to obstruct natural pathways over the site (i.e. these materials must not be placed in storm water channels, drainage lines or river).</p>	E & C	Ongoing monitoring by the Engineer.	
	<p>c) The provisions of the National Water Act (36 of 1998) shall be complied with at all times.</p>	PM & C	Ongoing.	
	<p>d) The Contractor is to ensure that impediments to natural water flow is avoided during construction, or is temporarily diverted.</p>	C	Ongoing monitoring.	
	<p>e) There must be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.</p>	C & PM	Ongoing monitoring.	
	<p><b>B.6.2 Un-channelled Flow</b></p>			
	<p>a) During construction un-channelled flow must be controlled into existing surface draining system to avoid soil erosion.</p>	PM & C	Ongoing monitoring	
<p>b) Where surface runoff is concentrated (e.g. along exposed tracks), flow must be slowed by contouring.</p>	PM & C	Ongoing monitoring.		
<p><b>B7 – Water</b> <i>Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment is also detrimental to water quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to</i></p>	<p><b>B7.1 Water Quality</b></p>			
	<p>a) Contact numbers for the Department of Water Affairs, the ECO, the Compliance, Monitoring and Enforcement Component of DAEA as well as other emergency contact numbers provided by the municipality must be made available and easily accessible on site. If spillages or contamination occur on site these departments (including the ECO) are to be contacted immediately in order to deal with the spillage or contamination. The Contractor is to compile a list of emergency contact numbers to refer to in order to deal with fire, spillages and contamination of land and aquatic environments.</p>	C	During site setup, and ongoing during the project life cycle.	

<i>water quality.</i>	b) Every effort must be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.	C, PM & ECO	Ongoing monitoring.
	c) Suitable absorbent material to be available on site to capture any spills. Any spent absorbent material to be regarded as a hazardous waste and disposed of accordingly.	C & PM	During site setup, and ongoing as needed.
	d) Care must be taken to ensure that runoff from vehicle or plant washing does not enter surface or ground water. Vehicles and machinery may only be cleaned at a designated place at the construction camp.	C & PM	Ongoing monitoring.
	e) Contaminated wastewater must be managed by the site manager to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility.	PM & C	Ongoing monitoring.
	f) Site staff shall not be permitted to use any watercourse or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities.	C & PM	Ongoing monitoring.
	g) Dewatering of vessels, tanks, etc is to take place in a controlled manner. No uncontrolled release of water shall be allowed onto the site area. Water wastage must be kept to a minimum and where possible water must be recycled. In the event of a problem occurring during dewatering, it must be stopped immediately until rectification of the problem. All taps must be maintained in good working order. It is not acceptable to have dripping taps or taps left open.	C	Ongoing monitoring.
	h) Mixing/decanting of all chemicals and hazardous substances must take place either on a drip tray or on an impermeable surface to prevent soil and water pollution. Waste from these trays should then be disposed of at a suitable waste site.	PM & C	Ongoing monitoring.
	i) Portable construction equipment (e.g. generators) to be located on an impervious surface or alternatively, drip trays to be provided.	PM & C	During site setup, and ongoing during the project life cycle.

	j) No concrete batching or mixing is permitted within 50m from the edge of the delineated hydromorphic soils of any watercourse or wetland.	PM & C	During site setup, and ongoing during the project life cycle.
	k) All equipment must be checked regularly for oil and fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such equipment has been repaired.	PM & C	Ongoing.
	<b>B7.2 Water Supply</b>		
	a) Use of natural fountains, springs, wetlands and adjoining river water for water provision is strictly prohibited.	PM, C & ECO	Throughout the project with ongoing monitoring.
	b) Ensure that any existing potable water source is maintained for domestic use during construction.	PM & C	Throughout the project with ongoing monitoring.
<b>B8 – Conservation of the Natural Environment</b>	<b>B8.1 Fauna and Flora</b>		
	a) The Contractor is to check that vegetation clearing has the prior permission of the PM / ECO. Indigenous vegetation that is removed as per the plant rescue plan / protocol is to be replanted and excavation is to be kept to a minimum.	C	Ongoing monitoring / as the work progresses
	b) Gathering of firewood, fruit, medicinal plants, crops or any other natural material on site or in areas adjacent to the site is prohibited.	C	To be addressed at the staff induction with ongoing monitoring.
	c) Development infrastructure must be screened wherever possible from ecologically sensitive areas to reduce the human disturbance factor.	C & ECO	As needed.
	d) Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction. Immediate re-vegetation of stripped areas once construction is completed and removal of aliens by weeding must take place.	ECO, C & PM	Ongoing monitoring.
	e) The hunting of birds and animals on site and in surrounding areas is forbidden.	C	To be addressed at the staff induction with ongoing monitoring.
	<b>B8.2 Geology</b>		



	a) In the event of excavation, the material that is removed must be separated into topsoil and subsoil. The soil must be placed back into any excavations in the same order it was removed.	C & PM	Ongoing monitoring as work progresses.
	<b>B8.3 Wetlands / Riparian Areas</b>		
	a) All works to be conducted in wetland / riparian areas must follow the guidelines and recommendations as indicated below.	C & PM	Ongoing
<b>B9 – Materials Management</b>	<b>B9.1 Stockpile Management</b>		
	a.) Stockpiles must not be situated such that they obstruct natural water pathways.	C & PM	Ongoing monitoring.
	b) Stockpiles must not exceed two (2) metres in height unless otherwise permitted by the Engineer / Project Manager or be left for longer than three (3) months.	C & PM	Ongoing monitoring.
	c) If stockpiles are exposed to windy conditions or heavy rains, they must be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases or screened from wind.	C & PM	Ongoing monitoring.
	d) Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding.	C	Ongoing monitoring, with weeding as needed.
	e) Increased sedimentation must be minimised and suitably mitigated against.	C	Ongoing monitoring
	<b>B9.2 Handling of Hazardous Materials</b>		
	a) Cement, bitumen and other potential environmental pollutants must be mixed on an impermeable surface with special provisions for storm water management.	PM & C	Ongoing monitoring.
	b) All empty containers must be removed from the site for appropriate disposal at a licensed commercial facility. Way bills must be available for review by the ECO.	PM & C	As needed.
	c) No vehicles transporting concrete or bitumen or chemicals /fuel to the site may be washed on site.	PM & C	Ongoing monitoring.

	d) Lime and other powders must not be mixed during excessively windy conditions.	C	As required.
	e) All substances required for vehicle maintenance and repair must be stored in sealed containers until they can be disposed of / removed from the site.	C & PM	As required.
	f) Hazardous substances / materials are to be transported in sealed containers or bags.	C & PM	As required.
	g) Spraying of herbicides / pesticides must not take place under windy conditions and must comply with Occupational Health and Safety Act of South Africa (OHSA) specs and other chemical handling laws.	C & PM	As required.
	<p>h) The Contractor is to outline a method statement for the dealing of accidents / spillages of hazardous materials. This statement must be handed to the Engineer / Project Manager, ECO as well as to DWA should the incident occur near to or in a water body.</p> <p>The following basic steps should be taken into account in the event of a spillage –</p> <ul style="list-style-type: none"> <li>• Stop the source of the spill</li> <li>• Contain the spill</li> <li>• All significant spills must be reported to DWA and relevant departments including the ECO and PM</li> <li>• Remove the spilled product for treatment or authorised disposal</li> <li>• Determine if there is any soil, groundwater or other environmental impact</li> <li>• If deemed necessary by the DWA or the ECO, remedial action must be taken</li> <li>• The incident must be documented</li> </ul>	C	During site setup, and ongoing as needed.

	<p>i) In the event of a significant spillage that cannot be contained and which poses a serious threat to the local environment, the following departments must be informed within 6 (six) hours of the incident and in accordance with the Section 30 of the National Environmental Management Act, Act 107 of 1998:</p> <ul style="list-style-type: none"> <li>• The Municipality</li> <li>• DWA</li> <li>• Provincial Department of Agriculture and Environmental Affairs (Pollution and Waste Management)</li> <li>• The Local Fire Department</li> </ul> <p>Please note that an updated list of all of the above departments contact details must be kept on site at all times.</p>	C & PM	In the event of such a spillage and ongoing updating of the contact details.
	<b>B9.3 Sourcing construction materials</b>		
	a) Wherever possible, materials that have been produced locally must be used for the construction of the site camp (e.g. bricks, window frames, etc)	C	During site setup.
<p><b>B10 – Waste Management</b> <i>Definition; “Refuse” refers to all construction waste (such as rubble, cement, bags, timber, cans etc)</i></p>	<b>B10.1 On-site Waste Management</b>		
	a) The Contractor shall ensure that all refuse is collected from the camp and work areas on a weekly basis or as needed.	C, PM & ECO	Monitored weekly by the contractor.
	b) All material used for construction and maintenance must be removed from the site after construction or maintenance work.	PM, C & ECO	As it becomes necessary.
	c) Refuse must be placed in the designated skips / bins which must be regularly emptied. These must remain within demarcated areas and must be covered to prevent wind-blown rubbish and scavenging by people and animals.	C	Ongoing.
	d) In addition to the waste facilities within the construction camp, provision must be made for waste receptacles to be placed at intervals along the work front.	C	Ongoing.
	e) Littering on the site is forbidden and the site shall be cleared of litter at the end of each working day.	C	Ongoing monitoring.

	f) Recycling is to be encouraged by providing separate receptacles for different types of waste and making sure that staff are aware of their uses.	PM & C	At staff induction meeting with ongoing monitoring.
	g) All waste generated during construction is to be disposed of at a facility registered in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).	PM & C	Ongoing.
	<b>B.10.2 Waste Disposal</b>		
	<b>Non – hazardous waste</b>		
	a) All waste must be removed from the site and transported to a registered landfill site.	PM & C	On a weekly basis or as needed.
	b) Waybills proving disposal at each site shall be provided by the Engineer / Project Managers or Contractor.	PM & C	Ongoing.
	c) Any construction rubble shall be disposed of at registered disposal sites.	PM & C	Ongoing.
	d) Waste from chemical toilets must be disposed of regularly and in a responsible manner by a registered waste contractor. Care must be taken to avoid contamination of soils and water, pollution and nuisance to adjoining areas. Service agreements need to be entered into before construction commences.	PM & C	Before site setup with ongoing monitoring.
	e) Water containing waste must not be discharged into the natural environment.	C	Ongoing monitoring.
	f) Measures to contain the water containing waste and safely dispose of it must be implemented	C & PM	Ongoing monitoring.
	<b>Hazardous Waste</b>		
	a) Contaminated water associated with construction activities must be contained in separate bunded areas and must not be allowed to enter into the natural drainage system.	C & PM	Ongoing monitoring.
	c) Chemical waste must be stored in appropriate containers and disposed of at licensed hazardous waste disposal facilities. Spent absorbent material to be regarded as a hazardous waste. Empty chemical packaging (e.g. empty 210 l drums) associated with the storage of hazardous materials to be returned to supplier, if possible, sent to a drum reconditioning company or disposed of as a hazardous waste as a last resort.	C & PM	Ongoing monitoring.

	d) Soil that is contaminated with, e.g. cement, bitumen, petrochemicals or paint must be disposed of at a registered hazardous landfill site.	C & PM	Ongoing monitoring.
	e) A sump must be created for any concrete waste. This is to be de-sludged regularly and the cement waste is to be removed to a tip site as approved by the local authority.	PM	As needed.
<b>B11 - Social Impacts</b> <i>Regular communication between the Contractor and the IAPs is important for the duration of the contract.</i>	<b>B.11.1 Disruption of Infrastructure and Services</b>		
	a) Contractors activities and movement of staff is to be restricted to designated construction areas.	ECO, C & PM	Ongoing monitoring.
	b) Should the construction staff be approached by members of the public or other stakeholders, they must assist them in locating the Engineer / Project Manager or Contractor, or provide a number on which they may contact the Engineer / Project Manager or Contractor.	C & PM	Staff to be made aware of this at the site induction meeting.
	c) The conduct of the construction staff when dealing with the public or stakeholders shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site by the Engineer / Project Manager or Contractor.	PM & C	Staff to be made aware of this at the site induction meeting.
	d) Disruption of access for local residents must be minimised and must have the consent of the Engineer / Project Manager. Any significant disruption to transport services or adjacent roads must be communicated to, and approved by the Department of Transport prior to the activity which may cause disruption commencing.	PM & C	As needed.
	e) The Contractor is to inform neighbours in writing of disruptive activities at least 24 hrs beforehand. This can take place by way of distributing flyers to affected I&APs.	PM	As needed.
	f) Drivers of construction vehicles must exercise care when travelling to and from the site – a maximum speed limit of 40km/h must be adhered to. Drivers of construction vehicles must be considerate of other road users. They are to be especially careful at narrow sections and water crossings.	PM, ECO & C	Staff to be made aware of this at the site induction meeting.
	<b>B.11.2 Visual Impacts</b>		

	a) Lighting on the construction site must be pointed downwards and away from oncoming traffic and nearby houses.	C, PM & ECO	During site setup and ongoing as required.
	b) The site must be kept clean to minimise the visual impact of the site.	C & PM	As required.
	c) If screening is being used, this must be moved and re-erected as the work front progresses.	C & PM	As required.
	<b>B.11.3 Noise</b>		
	a) Machinery and vehicles are to be kept in good working order for the duration of the project to minimise noise nuisance to neighbours.	C & PM	Ongoing monitoring.
	b) Notice of particularly noisy activities must be given to residents / businesses adjacent to the construction site. Examples of these include: noise generated by jackhammers; blasting; drilling; dewatering pumps.	C & PM	As required, at least 24hrs before the activity commences.
	c) Noisy activities must be restricted to normal weekday working hours.	C	Ongoing.
	d) The ambient noise levels relating to construction activities must not exceed 35dB adjacent to any residential areas.	C & PM	Ongoing monitoring.
	<b>B.11.4 Communication with Interested and Affected Parties (IAPs)</b>		
	a) The Engineer / Project Manager and Contractor are responsible for ongoing communication with those people that are interested / affected by the project.	C & PM	Ongoing for site setup.
	b) A complaints register must be kept at the site office. This must be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. This register is to be tabled during monthly site meetings.	C	Ongoing throughout the project lifecycle.
	c) IAPs need to be made aware of the existence of the complaints book and the methods of communication available to them.	PM	Before construction commences.

	<p>d) Queries and complaints are to be handled by:</p> <ul style="list-style-type: none"> <li>- documenting details of such communications (to be included in audit reports);</li> <li>- submitting these for inclusion in the complaints register;</li> <li>- bringing issues to the Engineer / PM's attention immediately;</li> <li>- taking remedial action as per Engineer / Project Manager's instruction</li> <li>- informing the party who lodged the complaint of remedial action taken.</li> </ul>	PM & ECO	As Required
	<p>e) Selected staff is to be made available for formal consultation with IAPs (if required) in order to: explain the construction process; answer questions.</p>	PM	Ongoing.
<b>B12 – Cultural Environment</b>	<p>a) Should any archaeological sites or items of historical or archaeological value, including old stone foundations, tools, clay ware, jewellery, remains, fossils, graves etc be uncovered during construction, their existence must be reported to the ECO and AMAFA ,an archaeological study may be required. Construction may only commence after permission has been granted by AMAFA.</p>	C & PM	Ongoing.
	<p>b) If any artefacts are uncovered the Research and Professional Services Division of AMAFA must be contacted and work must be stopped immediately. AMAFA's head office is in Ulundi and a satellite office is located in Pietermaritzburg. Contact: Weziwe Tshabalala – Tel: (033) 394 6543; Fax :( 033) 342 6097 or Barry Marshall Fax: (035) 870 2054, PO Box 523, Ulundi, 3838.</p>	PM & C	Ongoing if required.
<b>B13 – Sewage and sanitation</b>	<p>a) During construction, portable sanitation facilities need to be erected – unless an existing latrine is available. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding bush). The sanitation facilities need to be monitored and serviced regularly as to prevent contamination of the ground water table.</p> <p>The placement of the toilets is to be undertaken in consultation with the landowner/occupant. The latrines must be sited taking into account the possibility of the prevailing wind unfavourably</p>	C & PM	Ongoing monitoring.



	<p>dispersing unpleasant odours and the location of water resources and must be placed at least 100 metres outside of any drainage lines and rivers.</p> <p>Washing and toilet facilities shall be provided on site and in the construction camp. The facilities shall comply with accepted norms and standards and shall have the approval of the land owner. No human excrement shall be left in the veld. If no toilet facilities are available such waste shall be buried immediately.</p>		
<b>B14 - Security and Safety</b>	<b>B14.1 Signage</b>		
	a) Any potentially hazardous areas such as excavated trenches/pits or chemical storage areas are to be demarcated and clearly signed in English and isiZulu. Sidewall protection (e.g. shoring) to be erected for deep trenches as per the requirements of the Occupational Health and Safety Act of South Africa (OHSA).	C & PM	During site setup and as construction progresses.
	<b>B14.2 Risks Associated with Materials on Site</b>		
	a) Material stockpiles, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	C, ECO & PM	Ongoing.
	b) Fire fighting equipment must be present on site at all times.	C, ECO & PM	Ongoing.
	c) No materials are to be stored in unstable or high-risk areas such as in floodplains or on steep slopes.	C, ECO & PM	Ongoing with monitoring.
	<b>B14.3 General Safety</b>		
	a) The construction camp is to be securely fenced and locked when not in use. No unauthorised access is to be allowed to members of the public and people not associated with the construction process.	C & PM	Ongoing.
	b) After hours and weekend security is to be provided for the construction camp.	C	Ongoing.
c) Construction personnel to be issued with suitable PPE (e.g. safety shoes, hard hats) free of charge and PPE for construction areas are to be defined prior to the activity commencing.	C & PM	Before any construction or earthmoving activities occur and ongoing during construction.	

	d) All procedures and equipment on site must be used in accordance with the occupational Health and Safety Act regulations of South Africa (OHSA), Act No. 85 of 1993.	C & PM	Ongoing.
	e) All Eskom infrastructure in the area is overhead, therefore care must be taken when working with excavators near the powerlines.	C & PM	Ongoing.
	f) No excavations within 3/three metres of any Eskom wood pole powerline structures, nor 10/ten metres from any steel structures are permitted.	C & PM	Ongoing.
	g) Ground to conductor clearance of 6,5 metres, to reticulation powerlines to be maintained at all times.	C & PM	Ongoing.

## 9. POST-CONSTRUCTION EMP REQUIREMENTS

ACTIVITY	MANAGEMENT / MITIGATION	RESPONSIBILITY	FREQUENCY / TIMING
<b>C1 - Construction Camp</b>	<b>C.1.1 Construction Camp Rehabilitation</b>		
	a) All structures comprising the construction camp are to be removed from site.	PM & C	Project completion.
	b) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint and fuels, etc. and these must be cleaned up.	PM & C	Project completion.
	c) All hardened surfaces within the construction camp area must be ripped, all imported materials removed, and the area shall be top-soiled and re-grassed using the guidelines set out in the re-vegetation specification that is attached to this document.	PM & C	Project completion.
	d) The Contractor and PM must arrange the cancellation of all temporary services.	PM & C	Project completion.
<b>C2 - Vegetation</b>	<b>C.2.1 Replanting</b>		
	a) All disturbed areas, or areas which have been engineered for the purpose of the development, are to be re-vegetated as soon as possible. This will aid in preventing erosion within the site. A 100% indigenous planting plan must be adhered to in terms of all planting carried out on the site.	PM & C	Project Completion.
<b>C3 – Land Rehabilitation</b>	<b>C.3.1 Land Rehabilitation</b>		
	a) Soil disturbance will be minimized by establishing the extent of the construction site (pre-construction) and clearly demarcated in on-site layout plans. No construction personnel or vehicles may leave the demarcated areas except when authorized to do so by the Project Manager.  Surfaces are to be checked for waste products from activities such as concreting etc. and cleared in a manner approved by the PM and ECO.	PM, C & ECO	Project Completion.

	b) Rehabilitation must be executed in such a manner that surface runoff will not cause erosion of disturbed areas during and after rehabilitation.	PM	Project Completion.
	c) All areas to be vegetated that comprise surfaces hardened due to construction activities are to be ripped and imported material thereon removed.	C & PM	Project Completion.
	d) All rubble is to be removed from the site to an appropriate disposal site as approved by the PM. Burying of rubble on site is prohibited.	C & PM	Project Completion.
	e) The site is to be cleared of all litter.	C, PM & ECO	Project Completion.
	f) All embankments and open areas (areas to be replanted) are to be trimmed, contoured, shaped and re-planted to the satisfaction of the PM. The Engineer / Project Manager is to ensure that the rehabilitated areas allow free flow of runoff and will not result in ponding or saturated areas.	C & PM	Project Completion.
	g) All trimmed and / or compacted areas must be left rough to facilitate binding of topsoil and vegetation.	PM & C	Project Completion.
	h) The Contractor is to check that all watercourses are free from building rubble, spoils materials and waste materials.	PM, C & ECO	Project Completion.
	i) All wetlands or aquatic systems affected by construction activities need to be rehabilitated.	PM & C	Project Completion.
	j) Monitoring and / or rehabilitation of impacted soils and / or groundwater may be required on areas where chemical spillages have occurred during construction. These requirements would be dependent on the comments received from the ECO and relevant Authorities when the spillage was reported. The costs of any post construction monitoring / rehabilitation of impacted soils / water resources will be borne by the contractor.	PM & C	Monitoring / rehabilitation may extend beyond project completion.
<b>C4 – Materials and Infrastructure</b>	<b>C.4.1 Removal of Barriers, Remediation of Damage</b>		
	a) All material used for building and maintenance must be removed from site after construction or maintenance.	PM & C	Project Completion.
	b) All leftover building materials must be removed from the site.	PM & C	Project Completion.
	c) The Contractor must repair any damage that the construction works has caused to adjacent areas.	PM & C	Project Completion.

	d) Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer / Project Manager.	PM & C	Project Completion.
	e) All residual topsoil stockpiles must be removed to registered landfill sites or spread on site as directed by the Engineer / Project Manager.	PM & C	Project Completion.
	f) All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Engineer / Project Manager and ECO.	PM & C	Project Completion.
<b>C5 - General</b>	<b>C.5.1 General Remediation</b>		
	a) Temporary road works must be closed and rehabilitated; access across these roads must be blocked.	PM & C	Project Completion.
	b) All areas where temporary services/infrastructure were installed are to be rehabilitated to the satisfaction of the Engineer / Project Manager and ECO.	C, PM & ECO	Project Completion.
	c) The areas proposed for development would have to be demarcated prior to commencing construction processes.	PM & C	Project Completion and prior to operation.
	d) A Meeting is to be held on site between the PM, ECO, and the Contractor to approve all remediation activities and to ensure that the site has been restored to a condition approved by the Engineer / Project Manager and ECO. On completion of any phase, a post construction environmental audit report must be submitted to the DAEA compliance and Monitoring Department.  The Audit Report Must: <ul style="list-style-type: none"> <li>• Be carried out by an independent auditor or ECO</li> <li>• Include the environmental status post construction</li> <li>• Include the rehabilitation plan carried out after construction</li> <li>• Include an audit on the extent of compliance with the conditions of the approved EMPR</li> <li>• Include the notes taken during the weekly site inspection.</li> </ul>	C, PM & ECO	Project Completion.

## 10. OPERATIONAL PHASE EMP REQUIREMENTS

ACTIVITY	MANAGEMENT / MITIGATION	RESPONSIBILITY	FREQUENCY / TIMING
<b>D1 – Vegetation Management</b>	a) All rehabilitated areas must be maintained and re-seeded if necessary. Encroachment of invasive alien plants in this regard will need to be monitored on a regular basis to prevent re-infestation. This would need to be undertaken by the Proponent or designated management authority.	Pro	Ongoing
	b) Of critical importance would be the rehabilitation and continued management wetland areas that are impacted on, until such time as the wetland has stabilised.	Pro	Ongoing
	c) The contractor must make use of a palette of locally indigenous plants.	Pro	Prior to operation
<b>D2 - Storm Water Management</b>	a) Any negative stormwater effects, related to the site, must be remediated	Pro	Ongoing
	b) The above will require periodic monitoring	Pro	Ongoing
<b>D3 - Solid Waste / Refuse Removal</b>	a) There should be no solid waste generated during the operational phase.		
<b>D4 - Sewage</b>	a) There should be no sewage generated during the operational phase.		
<b>D5 – Electrical Supply</b>	a) Any electrical requirements of the pump stations and substations must be considered	Pro	Prior to operation and Ongoing
<b>D6 - Social Impacts</b>	a) A preferential procurement policy must be adhered to in the operational phase, if anyone is employed. A prime recommendation is that local employment be maximised during operation.	Pro	Prior to operation and Ongoing

<b>D7 - Soil Erosion</b>	a) The following measures need to form part of the management of the site: <ul style="list-style-type: none"> <li>• Monitoring storm water exit points.</li> <li>• Fill in and re-vegetated eroded areas.</li> </ul>	Pro	Ongoing
<b>D8- Compliance with planning regulations and specifications</b>	a) National and Local regulations/bylaws pertaining to the development components must also be adhered to at all times.	Pro	Ongoing

## 11. DECOMMISSIONING PHASE EMP REQUIREMENTS

The applicant has indicated that the development is a permanent entity and it is unlikely that the development will be decommissioned. In the unlikely event of the decommissioning of the development, the developer, or successors in title, must comply with the provisions for Duty of Care and remediation of environmental damage contained in Section 28 of the National Environmental Management Act 107 of 1998, as amended.



## 12. STAFF CONDUCT CONTROL AND INFORMATION SHEET

	<u>ALL STAFF MUST OBEY THE FOLLOWING RULES:</u>
1	<b>DO NOT</b> tamper with or destroy nesting sites, lairs or any other form of animal shelter.
2	<b>DO NOT</b> feed the native animals.
3	<b>DO NOT</b> leave the construction site untidy and strewn with rubbish that will attract animal pests.
4	<b>DO NOT</b> bring your pets to the construction site.
5	<b>DO NOT</b> trespass on private properties not linked to the project.
6	<b>DO NOT</b> carry a weapon on the construction site or in the vehicles transporting workers to and from the construction site.
7	<b>DO NOT</b> set fires unnecessarily.
8	<b>DO NOT</b> cause any unnecessary disturbing noise at the construction camp/site or at any designated worker collection/drop off points.
9	<b>DO NOT</b> drive a construction-related vehicle under the influence of alcohol.
10	<b>DO NOT</b> exceed the national speed limits on public roads or exceed the recommended speed limits in this management plan (where applicable) whilst driving a construction vehicle.
11	<b>DO NOT</b> drive a vehicle that is generating excessive noise (noisy vehicles must be reported and repaired as soon as possible).
12	<b>DO NOT</b> litter along the roadsides, including both public and private roads.
13	<b>DO NOT</b> remove or destroy vegetation at the construction camp/construction site without the prior consent of the Project Manager and Environmental Control Officer.
14	<b>DO NOT</b> tamper with, destroy or remove vegetation from any areas that have been fenced off or marked.
15	<b>DO NOT</b> pollute watercourses, whether flowing or not.
16	<b>DO NOT</b> drive through the watercourses except on the roads or at designated points.

## 13. ENVIRONMENTAL AWARENESS

### Construction Activities

It is incumbent on the Developer to ensure that all site personnel have a basic level of environmental awareness training. The aim of Environmental Awareness Training is to provide construction workers with the knowledge to identify environmental issues associated with their activities and best practice methods to minimise environmental impact. It is also to outline environmental legal obligations relevant to construction activities.

The plan provides the following:

- What is meant by “environment”

*Environment” means the surroundings within which humans exist and that are made up of (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.*

- Why the environment needs to be protected and conserved
- How construction activities can impact the environment
- What can be done to mitigate against such impacts
- Awareness of emergency and spills response provisions
- Social responsibility during construction e.g. being considerate to local residents

The Developer will conduct adequate inductions and training prior to the development being implemented to facilitate the following:

- Understanding of common environmental terms
- Understanding of legal obligations and responsibilities in relation to environmental legislation
- Recognition of common environmental impacts on construction sites and potential impacts resulting from the individual’s work activities
- Identification of accepted current environmental management best practices for relevant workplace activities
- Identification of situations which require further advice about appropriate work practices to minimise environmental damage
- Understanding of the link between various construction activities and the potential for these activities to impact on the environment.

It is the developer’s responsibility to provide the site foreman with no less than 1 hour’s environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. In training of the site foreman and other staff, translators are to be used where necessary during staff training. The Engineer / ECO must be on hand to explain more difficult / technical issues and to answer questions which may be raised. The use of pictures and real-life examples is encouraged as these tend to be more easily remembered. Use should be made of environmental awareness posters on site.

The induction must include the following:

- Walk a part of the construction route to identify the limit of vegetation clearance, significant vegetation, and other no-go areas
- Identification of locations for stockpiles, equipment lay-down areas, construction camps, and access roads
- Identification of the extent of the construction area and those areas to remain undisturbed
- Identification of sensitive adjacent areas e.g. existing residential areas
- A presentation of the EMPR and its associated implications

- It must be emphasized that the PM or ECO must be contacted in instances where clarity is required
- Examples of environmental incidents, and how to deal with them, *inter alia*:
  - significant spill of fuel or oil
  - significant chemical spill
  - severe erosion from flooding
  - fire (on site or from off-site)
  - damage to a heritage site
  - destruction of a rare plant outside the defined construction zone
- It is important to be aware of site instruction(s) dealing with such emergencies. Prompt and effective action is likely to significantly reduce the environmental impact. Any such action should not endanger the health or safety of any of the site workers. If any staff are unaware of the emergency plan it is important to discuss it with the site supervisor.

Contractors must be made aware of the following requirements prior to commencing any work:

- They must walk the site prior to starting any construction activities to ensure that they understand the limits of the site and construction activities and to identify the location of any sensitive areas and potential animal habitat.
- They must check for areas which may have been marked exclude construction activities, including natural areas and areas of heritage importance.
- They must check with the supervisor if unsure about anything.
- They must familiarise themselves with all environmental and engineering reports relevant to the site, including the EMPR and Stormwater Management Plan.

### Topics covered

The Environmental Awareness programme would cover a number of aspects. The topics to be covered in the environmental awareness training comprise the below (please note, this would have to be viewed in the context of the overall EMPR):

#### Biodiversity

A construction site may contain natural asset that needs to be protected and managed. The following must be communicated:

- Natural asset has a range of benefits including:
  - (i) Provides habitat for plants, animals and insects
  - (ii) Protects soil from erosion and water-logging
  - (iii) Beautifies or enhances the character of an area
  - (iv) May be of historical importance
  - (v) Provides corridors to allow wildlife to move between patches of habitat
  - (vi) May contain rare and endangered plants and animals
  - (vii) Is easier to look after than introduced vegetation
  - (viii) Provides a local seed source for revegetation
- Remnant natural vegetation or naturally occurring local indigenous plants must be protected unless advised otherwise by the ECO.
- The banks and beds of watercourses are important environments. These areas are likely to contain cultural heritage sites, water resources, vegetation and fauna which should be protected.
- Protecting vegetation involves more than protecting trees. The smaller plants such as shrubs, grasses and herbs reduce weeds, stabilise the soil and provide habitat for animals and insects

- All vegetation plays an important role within the ecosystem. Vegetation provides habitat for native animals, reptiles and insects including shelter, food, protection from predators and breeding areas.
- Aquatic vegetation provides habitat for fish and other aquatic animals. To avoid indirect impacts, staff must ensure that no runoff of materials, fuels or other substances are allowed to enter stormwater drains, watercourses and wetlands, to avoid damage to aquatic environments.
- Natural asset delivers critical ecosystem goods and services.
- The re-establishment of vegetation on areas cleared or degraded during construction is important.
- The following must be considered when working under trees:
  - (i) Healthy soil contains spaces holding air and water which are essential for plant growth.
  - (ii) When soil is compacted, water and air can no longer travel through the soil causing oxygen starvation for plant roots, germinating seeds, and soil organisms.
  - (iii) Soil compaction can also result in restricting the spread of plant roots and poor soil drainage.
  - (iv) Soil compaction can be caused by the weight of vehicles and machinery, or when materials are stockpiled on the soil surface.
  - (v) To reduce the effect of soil compaction, keep vehicle movements to marked areas and defined access tracks, use existing cleared land for stockpiling, and do not park machinery or vehicles under tree canopies (the drip-line).
- Construction sites may encroach on native animal habitat and it is important to make sure that no indigenous animals are harmed or killed during construction operations. If animals, including lizards and snakes, are found on site and are likely to be damaged by earthmoving equipment, they should be relocated to an area away from the project.
- An alien or weed plant is a plant growing in the wrong place. Undisturbed indigenous vegetation can generally resist weed invasion, but disturbance promotes alien plant encroachment. Proclaimed alien plants are plants that have been declared to be a serious threat to agriculture and conservation. Alien plants cause problems such as:
  - (i) competition with indigenous plants
  - (ii) poisoning of livestock
  - (iii) increasing fire hazards
  - (iv) blocking waterways
  - (v) invading and displacing indigenous vegetation.
- It is an offence to bring or let proclaimed alien plants to be brought into certain control areas.
- Dogs and cats are a particular threat to native animals; they are not permitted on the construction site.

#### Revegetation / Control of Erosion

A construction site may require prompt revegetation and erosion control. The following must be communicated:

- Revegetation of disturbed areas assists in erosion control and in minimising alien plant encroachment.

- Topsoil is important for plant growth and, in areas of indigenous vegetation, may be a significant seed source. Retaining and reusing topsoil will assist in vegetation replanting the project.
- When stripping topsoil maintain the soil layers in separate stockpiles and replace them in the same order as they were removed (the top 15 cm contains plant seeds, bulbs and soil microorganisms). Wherever possible, return topsoil and mulched vegetation to approximately the same area from which it was removed.
- Construction activities can contribute to erosion of soil that may impact on water quality downstream of the site and cause siltation of watercourses.
- Soil erosion causes pollution of watercourses, loss of vegetation, impact on aquatic fauna, decreases the aesthetic value of a watercourse and can damage infrastructure.
- The main factors that control the rate of soil erosion are speed and the quantity of water. The greater these factors, the greater the risk of erosion.
- Soil and pavement materials will erode if they are not protected. The best form of protection is to prevent water flowing over the site, except in designed and protected drainage lines.
- Mitigation measures to prevent erosion include silt fence, vegetated buffer strips, temporary bunds, cut off drains, mulching, and prompt revegetation of bare areas.

### Heritage

A construction site may impact on heritage resources. The following must be communicated:

- It is important that cultural heritage sites are conserved wherever possible. Examples must be provided to the staff, which include *inter alia*:
  - (i) Scarred trees
  - (ii) Spiritual / sacred sites
  - (iii) Burial sites
  - (iv) Stone artefacts
  - (v) Rock art
  - (vi) Heritage buildings
  - (vii) Stone walls
  - (viii) Monuments and memorials
  - (ix) Burial sites and cemeteries
  - (x) Artefacts and objects
  - (xi) Historic bridges
  - (xii) Vegetation and trees
  - (xiii) Geological features
- Sites of known significance within the construction zone have been identified in the reports and must be clearly delineated as no-go areas. This mapping must be provided to staff.
- No structures older than sixty years or parts thereof are allowed to be demolished, altered or extended without a permit from Amafa.
- Amafa must be contacted if any heritage objects are identified during earthmoving activities and all development should cease until further notice. If, during construction, a heritage or burial site is discovered, stop work immediately and notify the site supervisor. Do not recommence work near the site until Amafa has advised it is permissible to do so.
- No activities are allowed within 50m of a site which contains rock art.
- Amafa must be contacted if any graves are identified during construction and the following procedure is to be followed:
  - (i) stop construction
  - (ii) report finding to local police station
  - (iii) report to Amafa to investigate

### Noise and vibration

A construction site may render noise and vibration impacts. The following must be communicated:

- Construction noise and vibration can cause nuisance and structural damage. It is important that the noise and vibration impact adjacent to sensitive land uses is minimised and meets guidelines provided in environmental reports.
- Excessive noise can be a considerable nuisance to neighbours. It is important to minimise noise emissions, particularly outside normal operating hours and in areas of sensitive land use such as residential areas.
- Excessive vibration may cause property damage and be a nuisance to neighbours. Vibration may be due to blasting, piling, truck movements and compacting operations.
- Staff and Contractors must select the quietest available equipment and maintain noise reducing equipment (e.g. mufflers).
- Staff and Contractors must locate stationary noise sources distant from sensitive areas.
- Staff and Contractors must notify neighbours when operating noisy equipment outside of normal operating hours.
- Staff and Contractors must notify neighbours of blasting and piling operations.
- Staff and Contractors must monitor noise and vibrations in sensitive areas.

#### Air quality

A construction site may render air quality impacts. The following must be communicated:

- Construction activities can lead to dust emissions from traffic, cleared areas, stockpiles, and blasting. Dust can cause a nuisance to neighbours and impact on the environment by contaminating plants and watercourses.
- Other air emissions are related to the exhaust fumes of equipment. These emissions are generally controlled by ensuring that equipment is well maintained.
- Staff and Contractors must stay on defined roads.
- Staff and Contractors must seal or water dusty surfaces, as required.
- Staff and Contractors must control dust from stockpiles.
- Staff and Contractors must spray construction materials before transport or cover loads.
- Staff and Contractors must minimise disturbed areas, particularly during summer.
- Staff and Contractors must re-vegetate areas as soon as practicable.
- Staff and Contractors must clean equipment before leaving the site.
- Staff and Contractors must sweep or remove sediment from paved or sealed areas regularly.
- Staff and Contractors must Maintain equipment (e.g. tuning of engines) to reduce exhaust emissions.
- Staff and Contractors must avoid blasting or earthworks on windy days.
- Staff and Contractors must not track sediment on vehicles off site.

#### Waste management

A construction site produces waste. The following must be communicated:

- The disposal of construction wastes should follow these principles:
  - (i) minimise the production of wastes
  - (ii) maximise the reuse and recycling of wastes
  - (iii) dispose of wastes in an environmentally responsible manner.
- Waste can be avoided by good planning. Waste packaging may be reduced by selecting different products or returning the packaging to the supplier.
- Waste in the form of contaminated soil can be reduced by careful use of substances such as fuels, chemicals, concrete wastes on site to ensure that the soil is not contaminated by spillages and leaks caused by poor practices.
- Where possible, recycle all excess materials including soil wastes.
- Higher levels of recycling will be achieved if suitable bins can be used to enable separation of wastes.
- If excess fill from a project is contaminated in any way it must not be disposed of as clean fill. It will need to be tested and taken to the appropriate licensed waste depot or treated.

- All hazardous wastes must be collected and disposed of by a licensed waste contractor to a licensed waste disposal site.
- The following must be adhered to:
  - (i) Separate waste products for recycling, where appropriate
  - (ii) Label wastes, particularly liquid waste in drums
  - (iii) Use materials carefully and sparingly to reduce consumption and costs
  - (iv) Ensure that machinery is not leaking oil
  - (v) Reuse materials on site, if possible Get the job right first time (e.g. avoid contamination of soil)
  - (vi) Contain any spillage or leakage to minimise volume of soil contaminated
  - (vii) Clean up contaminated soil as soon as practicable
  - (viii) Use a licensed waste contractor to dispose of hazardous wastes
  - (ix) Do not take wrappings and packaging into the field
  - (x) Do not bury wastes on-site

### Materials storage

A construction site includes materials storage areas. The following must be communicated:

- Stockpiles and depot sites, if not located carefully, can damage vegetation and heritage sites, pollute watercourses or spread weeds. Before creating a stockpile or depot, check with the ECO if the location is suitable, away from significant environmental features and is weed-free.
- Surrounding vegetation is damaged by the creep of materials if stockpiles are gradually pushed outwards by machinery loading from one side only. Stockpiles are therefore most effectively worked if placed in the middle of the area available.
- Access to surrounding vegetation should be prevented by marking or fencing of the stockpile area.
- Stockpiles may not be located in drainage lines.
- The top 15 cm of topsoil is the most important for plant growth. Contained within this layer are native seeds for revegetation, essential minerals for plant growth, and soil microorganisms that break down decaying organic matter to simple minerals, which can be used by plants. When clearing topsoil it is important not to mix it with poorer quality subsoil. Most indigenous plant seeds will remain viable in the soil for approximately 12 months. Therefore it should be re-spread or reused within that time.
- The stockpiles and site should be weed-free. Spray weeds on and around stockpiles and dumpsites to prevent spread of weeds to new areas (plan to treat with herbicide 10 - 14 days before use).
- To rehabilitate a stockpile area:
  - (i) remove excess material
  - (ii) remove or treat weeds
  - (iii) restore contours to blend with surrounding land
  - (iv) rip parallel to the contours to break soil compaction
  - (v) re-spread topsoil
  - (vi) install erosion control measures, if needed
  - (vii) spread mulch to protect the soil from erosion and keep in soil moisture
  - (viii) re-vegetate the area with indigenous species, where appropriate.

### Fuels, oils and chemicals

A construction site includes the use of fuels, oils and chemicals. The following must be communicated:

- Storage and handling of fuels, oils and chemicals should be undertaken in a manner that does not contaminate soil, watercourses and groundwater. The risk of spillage and leakage can be reduced by careful handling and attention to containment.
- Clean-up materials such as absorbent granules should be available to reduce the spread of material.



- Storage (including drums and bulk tanks) of fuels, oils and chemicals must have an impervious base and be bunded.
- Any bund walls should be large enough to contain at least 110% of the contents of the largest tank.
- Stormwater from the bund must be removed regularly to ensure there is room to accommodate any spillage or leakage.
- Any oily water mixture must be removed by a licensed waste contractor.
- Large loading and dispensing areas should also be sealed and drain to a sump to retain any spillage. Any spillage should be cleaned up at the earliest opportunity to minimise the risk of further soil or water contamination. Contaminated clean-up materials (e.g. rags) should be disposed of by a licensed waste contractor.
- Dispense fuels and oils within a sealed area, if possible.

## Control

The above information would have to be communicated to all site staff via the following means:

- An initial induction / training exercise conducted by an environmental practitioner (this would apply to all contractors and site staff involved – it is therefore recommended that the Developer arrange for all relevant parties to make themselves available for the first induction to avoid a number of inductions)
- Hard copies of relevant information must be made available
- Quarterly refreshers would have to be carried out by the Contractors
- On-site posters must be erected
- The ECO would be available to provide advice

All staff training must be carried out by suitably qualified personnel. Trainees must sign an attendance register to confirm inductions have been carried out.

## Community & service provider awareness during and after construction

### Communication Framework

#### *Information chain*

The developers need to co-operate with local authorities, including the police, the municipality, the traditional authority, community leaders, and adjoining settlements to ensure all directly affected parties and the community in general is kept informed regarding all aspects of the project. This must include a minimum the following:

- Post-approval (EIA) meeting with community leaders to inform them that the site has been approved
- Pre-construction information sharing sessions, including Environmental Awareness overview
- Construction update meetings
- Post-construction close out meetings, including Environmental Awareness overview
- Quarterly meetings in the operational phase for two years; thereafter annually

The Environmental Awareness topics covered in the preceding section of this EMP must also be conveyed to the community and ongoing maintenance staff. This must include water saving measures (for the community) and water reconciliation methods (for the service provider).

All information must be made available in hardcopy, including minutes of meetings, and must also be summarised and conveyed to the community in isiZulu.

Communications must include the project manager's agenda, AND make provision for the addition of items onto the agenda by the community. The latter must be pro-active, and the community must be

informed of their right to include agenda items. The draft agenda must be circulated to the community a least 14 days prior to the meeting.

Items to be covered in the consultation must include the following:

- ➔ Clarify rights of legitimate stakeholders
- ➔ Opportunities for involvement of those affected by the project
- ➔ Provision of project management structure, with people responsible and their contact details
- ➔ Provision of DAEARD contact details
- ➔ Basic Environmental Education (primarily environmental awareness)
- ➔ Community Safety
- ➔ Preferential procurement policy
- ➔ Complaints procedure
- ➔ Updates on compensation
- ➔ Updates on timelines
- ➔ Feedback on issues raised

All information must be conveyed in a suitable format, that is relevant to the level of education within the community. This must include at a minimum the following:

- Zulu interpretation / translations
- Public liaison officer (details to be included in all correspondence)
- Flyers
- Information available in DVD format, in presentation style

In terms of the DVD, this should be limited to a 15 minute DVD, covering the critical aspects of the project, and **IMPORTANTLY** include the contact details of the public liaison officer, and how best to reach that person.

#### Community Safety

Control measures may need to be put in place during the construction phase to restrict access to the construction areas. Consultation with the municipality, local police, community leaders, and the traditional authority may need to take place with regards to these measures.

All areas to be impacted on in terms of earthworks are to be demarcated and the necessary signage is to be erected during construction, in order to prevent members of the public from wandering onto the site and being injured by construction activities.

## **14. SAFETY MANAGEMENT PLAN**

The safety management plan for the proposed development aims to outline the responsibilities, standards and control systems applicable to the proposed project to ensure safety requirements are adequately addressed. This includes identifying the physical and health hazards that could harm workers, procedures to prevent accidents, and steps to take when accidents occur. The following measures / controls must be adhered to:

### ***Induction and safety training***

- Before starting work on site, all personnel must attend adequate site-specific training and induction training for the particular work activity being undertaken;
- All personnel on the work site must attend appropriate refresher training of work site Safety matters; and
- All visitors when on the work site must be accompanied by a person who has received the above training

### ***Personal protective equipment***

- All personnel and visitors must wear appropriate personal protective equipment (PPE) when on the work site

***Site access and security***

- All entry to, movement on, passage adjacent to, and exit from the work site of persons, vehicles and equipment will be controlled in accordance with required procedures

***Illness/injury and emergency procedures***

- All first aid facilities and illness/injury and emergency procedures will be clearly identified and used, including reporting illness/injury and incidents

***Protection of all workers and the public***

- Effective barricades, fencing and overhead protection will be used where applicable

***Elevated work***

- All work at heights will be done in accordance with the relevant legislation, regulations, standards, codes and procedures;
- All electrical work, plant and equipment must comply with Safety and Health and electrical safety legislation, regulations, standards, codes and procedures, including inspection of leads and power tools; and
- The presence and location of all electrical cables will be identified before commencing adjacent work

***Demolition, excavation, scaffolding, formwork and other structural frames***

- All demolition, excavation, scaffolding, formwork, and work with other structural frames will be done in accordance with the relevant legislation, regulations, standards, codes and procedures

***Hazardous materials and dangerous goods***

- A register of hazardous substances must be kept and maintained for all hazardous substances brought onto the work site; and
- All hazardous substances and dangerous goods must be used, handled and stored in accordance with requirements.

***Safe working***

- All requirements identified will be followed, including fire prevention and housekeeping procedures; and
- The consumption of alcohol and illegal drugs is prohibited on the work site

The following table must form the basis of evaluation and reporting:

C – Contractor

SM – Site Manager

ECO – Environmental Control Officer

Control	Timing	Responsibility	Monitoring and Reporting	Performance Measure
Safety Management Plan adopted	Prior to commencing	C & Engineer & PM	Pre-construction review	Adherence to Safety Management Plan
Ensure that the site safety rules are displayed and available on site and provided to people who work on site.	Prior to commencing	SM	Pre-construction review	Adherence to Safety Management Plan
Site-specific work activity safety training	Prior to commencement	SM & C	Safety training and induction	No non-compliance with set safety rules
Preparing, maintaining and making available a register of hazardous substances	Prior to commencing and on-going	SM & C	Pre-construction and ongoing review	Register filed on site and with the ECO
Maintaining first aid stocks and providing first aid training	Ongoing	SM & C	Pre-construction and ongoing review	All staff have received basic training, first aid officer is on site, first aid boxes available
Regular site safety inspections and audits to be carried out by competent persons to review the safety and health aspects of work in progress	Construction Phase	ECO	Monthly Safety audits	Safety audits filed with ECO and SM; qualified OHSA staff conduct reviews

**Ongoing Risk Assessment (worksite hazard analysis)**

An Ongoing Risk Assessment is an integral part of the Safety Management Plan, and is conducted on a periodic basis during construction and operation, to ensure that the safety measures identified in this EMPR are adequate as the development is implemented. The assessment considers the following:

- Identifies new hazards associated with proposed development tasks and activities;
- Determines the level of risk of the above;
- Establishes appropriate risk control measures to mitigate any new hazards identified.

Any potential major or significant task or activity associated with construction shall periodically be assessed in terms of the associated hazards. When all hazards have been identified the most likely outcome as a result of an incident shall be determined.

Risks may be classified according to the following table:

Consequences & / or Impact What type of impact do you expect could result from exposure to this hazard?	Likelihood: What is the likelihood of this occurring?				
	Very (VL) The event could happen at any time	Likely The event could happen	Likely (L) The event could happen sometime	Unlikely (UL) The event could occur but very rarely	Very unlikely (VL) May happen but probably never will
<b>K</b> Kill or cause permanent disability	1	1	2	3	
<b>S</b> Serious injury	1	2	3	4	
<b>M</b> Medical attention and several days off work	2	3	4	5	
<b>F</b> First aid needed	3	4	4	6	

- 1** High risk; immediate action is required
- 2** Significant risk; important to do something about this hazard as soon as possible
- 3&4** Medium risk; risk control measures are required
- 5&6** Low risk; manage by routine procedures

The above would form part of the requirement of an OHSA practitioner once the construction and operational phases commence, and all information is to be communicated to staff working on the site. The above protocol can also be employed to re-evaluate historical issues raised.

A primary goal shall be to eliminate high, significant and medium risks associated with the works and should be a major focus of the Risk Assessment. The Contractor should detail risk control measures that adequately address all identified high and medium risks.

When determining risk control strategies, the hierarchy of controls summarised below should be considered:

<b>Hierarchy of Controls</b>
<p><b>1. Eliminate the hazard</b></p> <p>Get rid of the hazard out of the workplace e.g. repair damaged electrical plugs or cables.</p> <p><b><i>If it is not practicable, then..</i></b></p>
<p><b>2. Substitute the hazard</b></p> <p>With something of a lesser risk; e.g. use non-caustic chemicals instead of acid wash for finishing off tiling work.</p> <p><b><i>If it is not practicable, then..</i></b></p>
<p><b>3. Section off the hazard</b></p> <p>Isolate the hazard; e.g. barricade and cover floor opening.</p> <p><b><i>If it is not practicable, then..</i></b></p>
<p><b>4. Use engineering controls</b></p> <p>e.g. installing an exhaust ventilation system to extract dangerous fumes or dust.</p> <p><b><i>If it is not practicable, then..</i></b></p>
<p><b>5. Use administrative controls</b></p> <p>e.g. training, safe work method statements, regular inspection of electrical hand tools.</p> <p><b><i>If it is not practicable, then..</i></b></p>
<p><b>6. Use personal protective clothing and equipment</b></p> <p>e.g. fall arrest equipment, sun hat, safety boots, goggles, overalls.</p> <p><b><i>until you have a better method of control</i></b></p>

Where safe work procedures or instructions are developed they must clearly spell out the work sequence, highlighting the procedures required to adequately control each high and medium risk identified in the risk assessment. All employees directly involved in the activity, considered 'at risk' employees, shall receive appropriate training in the safe work procedures.

The Risk Assessment shall be completed and reported on, evaluating the full scope of work associated with the contract. Additional risk assessments may be undertaken during the course of the contract as required (i.e. work undertaken by subcontractors).

### **Induction and Safety Training**

Health and safety legislation requires all employers to ensure that their employees have the skills and training required to carry out their work in a safe manner. Contractors are required to document their safety training program ensuring that they have appropriately skilled

employees, suitable training programs and adequate supervision for the contract works. The following must be included in the training programmes:

- Identify the safety and health training needs of management, supervisors and other personnel for the contract;
- Conduct specific work activity and work site safety training, and refresher training in safety and health for everyone working on the work site;
- Make sure that all personnel attend adequate site-specific induction, work activity and refresher safety training;
- Keep appropriate records of safety and health training;
- Who will be available (both during and outside normal working hours) to prevent, prepare for, respond to and recover from illness/injury and incidents;
- Procedures for contacting these people, and any changes to these nominations and procedures, as they are kept up to date, are communicated and displayed promptly on the work site; and
- Details of how notifiable incidents shall be notified to the Department of Labour, Office of the Occupational Safety and Health Administration (OHSA).

### **Incident Management**

All incidents associated with the contract involving personal injury, medical treatment or property damage should be recorded, investigated and reported to the ECO and in some cases may be required to report to the relevant statutory regulatory authorities.

### **Site Safety Inspections**

Site safety inspections play an important role in the identification of hazards at the workplace and in the development of control measures. The ECO as a competent person (or OHSA practitioner) should undertake site safety inspections and audits to review the safety and health aspects of work in progress throughout the construction phase as well identifying and implementing any necessary changes from any risk assessments or hazards identified. Audits are to be included in the ECO audit reports.

### **Operational Controls**

The above principles would also apply to the operational phase.



## 15. MANAGEMENT OF SENSITIVE HABITATS

### 15.1 Wetland / Riparian Management

The Environmental Control Officer appointed should be familiar with the characteristics of wetland and riparian systems, such that any additional wetlands can be identified (if present). If further wetland or riparian systems are found along the proposed route, the following recommendations should be adhered to:

- i) Afford the wetland area a 30m buffer, and re-route the pipeline outside the 32m wetland buffer zone.

Should this not be feasible:

- ii) 'Trench-breakers' (seep collars) should be installed along the length of the excavated trench in order to inhibit the establishment of a flow path along the line;
- iii) Small-scale diversion berms should be constructed on the surface of the excavated trench in order to decrease the likelihood of the trench becoming the favoured flow path (which may lead to the formation of a gully);
- iv) Wetland vegetation must be planted where any wetland areas were located previously;
- v) The soil profile should be maintained – with sub-soil and topsoil being replaced in the correct sequence; and
- vi) Construction may not permanently alter the surface or sub-surface flow of water through the wetland

The following additional recommendations are provided:

- The ECO should provide the contractor with an induction on how to conduct works within wetlands and riparian areas.
- All construction activity should take place in the dry season, wherever possible. At minimum, works should take place during dry weather.
- Works in a watercourse should be constructed at a location where potential effects are eliminated or minimised.
- Sediment and erosion control measures (e.g. hay bales, silt fences, filter berms, mulching, geotextiles, etc.) must be incorporated in the Environmental Management Programme (EMPr).
- The EMPr must address construction related impacts and a working corridor must be defined.
- The wetland and riparian areas, including any buffers, must be demarcated prior to construction in order that the areas are not unduly disturbed.
- Stockpiles and spoil material must be located outside the wetland buffer and on even surfaces preferably upslope of the trench to prevent wash into drainage lines.
- Backfilling of the trenches should be done to a similar compaction / permeability as the surrounding soils.
- On steep slopes, fast-growing, locally indigenous plants should be planted soon after construction in order to stabilize the site.
- Maintenance roads / tracks should incorporate appropriate storm water attenuation / dissipation features into the design to prevent the channelling of runoff, which is likely to result in the exacerbation of gully erosion.
- Unnecessary compaction of soil during construction should be avoided and / or reversed.
- It will be important to keep cattle off the freshly seeded site, to prevent selective grazing (and subsequent erosion).
- Strict control of workers and machinery in and around water course.
- Single access and exit points to bank areas, for construction purposes, may be established.

- The Contractor shall not cause any physical damage to any aspects of a water course, other than those necessary to complete the works as specified and in accordance with the accepted method statement.
- A clear and concise plan and method of works should be implemented to ensure that the stream does not receive any sediment or runoff and to ensure that the ecological integrity of the stream is maintained or enhanced.
- Early planning can also help to check that all works in a watercourse comply with permitted activity or consent standards and ensures the stream is kept as natural as possible.
- The Contractor should submit a method statement for review at least 14 days prior to commencing construction within a watercourse. The method statement should highlight (but not be confined to) the following issues :
  - How water flow will be diverted during construction.
  - Containment of contaminated run-off and wastewater.
  - Width of working servitude (if not already detailed in project specification).
  - Final expected profile of river / stream banks.
  - Reinstatement and rehabilitation of river / stream banks
- There are a number of key factors that should be taken into account when designing stream works so that when implemented the works do not cause any damage to the watercourse. Below are a few key design factors for works in a watercourse:
  - (i) Ensure a safe stream diversion is created while doing earthworks in the watercourse.
  - (ii) Ensure the diversion is large enough to account for times of increased flow.
  - (iii) Keep the diversion on grade with the natural streambed to enable fish passage. It is important to keep the stream habitat as complete and unchanged as possible to keep a stable stream environment for any aquatic biota.
  - (iv) Construct spoilers or baffles within diversions to keep flow velocities low and create resting pools, where necessary.
  - (v) Line and stabilise diversion bed and banks; local rocks can be used for this purpose.
  - (vi) Check diversions after all major storm events and repair damage immediately.
  - (vii) Follow appropriate methods to ensure no sediment enters watercourse; stabilise area of construction immediately.
  - (viii) Planting in stream - use indigenous species appropriate to organisms present in stream; plant stream banks to enable stabilisation and stop further erosion; disturb as little sediment as possible while planting.
  - (ix) In the event of construction within a wetland, the Contractor should remove all wetland vegetation, as directed by the ECO, with their root ball intact. This vegetation is to be kept moist at all times. It is to be placed in the shade and covered with moistened Hessian cloth until replanting, which is to be undertaken immediately surface reinstatement, is complete.
- Should the project involve the crossing of any substantial rivers, the following measures must be included in addition to those mentioned above:
  - (i) The perennial nature of the river also means damming and / or diversion of flow will be required.
  - (ii) A clearly marked corridor must be created for the crossing.
  - (iii) All machinery must remain within this zone of operations.
  - (iv) No storage of fuels or pollutants may occur near the river.
  - (v) Any damming must be temporary and immediately removed and rehabilitated.
  - (vi) Re-vegetation of the crossing must occur where relevant.

- (vii) No permanent channel diversion may occur.

## 15.2 Vegetation Management

(a) Open areas are to be re-planted as per the revegetation specification. If original grass material is not available, an appropriate indigenous seed mix of indigenous grasses must be sewn over the area. Suitable grasses for this route include:

- *Panicum maximum*
- *Eragrostis curvula*
- *Digitaria eriantha*
- *Chloris gayana*
- *Eragrostis teff*

The above species would be successful for re-vegetation, and the inclusion of *Eragrostis teff* adds in an annual grass which will assist in creating a quick cover which will be effective in preventing erosion. The inclusion of *Panicum maximum* adds in a shade tolerant species that will be beneficial in areas where there are densely-bushed areas. Raking of the seeds into the surface soil is considered adequate for the germination of the above grass seed.

Where available, cut *Acacia* branches should be placed over the areas sown with grass seed; this would afford germinating grasses a measure of protection from grazing pressures in the area.

All indigenous planting programs are to source indigenous plant material from within a 50km radius. Locally harvested material should be free of alien and invader plants/seeds

(b) Grass delivered to the site (whether nursery grown or harvested) must be planted and watered within 36 hours of arrival on site. Sodds must be moist and shall have at least 30mm soil thickness for nursery-grown sodds, and 50mm soil thickness for veld sodds.

(c) All vegetation that has been cleared during construction is to be removed from site or used as mulch as per the re-vegetation specification, (except for seeding alien vegetation).

(d) The following fertilizers may be used in areas as indicated by the ECO:

- Ammonium nitrate
- 2:3:2 (22)
- 3:2:1 (25)

It is critical that the above grass species mix is fertilised after planting. The preferable fertiliser mix should comprise MAP, at an application rate of 200kg per hectare.

Care must be taken to avoid contamination of water bodies by fertilizer, i.e. Avoid use during windy conditions or on areas directly adjacent to a natural water source. Fertilizer should be kept in waterproof drums to ensure no leaching occurs into the natural environment.

The natural environment comprises an extremely low fertility and few surface water resources, and it is therefore extremely unlikely that increased nutrients from the fertiliser would have any meaningful impact on nutrient status (except in the immediate vicinity of application).

(e) Grass should be planted along the contour of slopes to prevent erosion. In steeper areas, brush cut material should be placed in horizontal lines along the contour (at intervals agreed to by the ECO). This is to prevent soil erosion during the period that planted material is becoming established

The above should be overseen by a suitably experienced or qualified specialist.

(f) The prepared soil must be uniformly moist to a depth of 150mm (if the topsoil layer is that deep) before planting or seeding begins. If this condition is not met by rainfall, the Contractor should irrigate the area accordingly.

The planting should take place after reasonable rain events, if possible, to avoid having to water; watering by water tanker itself can be problematic as the vehicles damage vegetation and harden soils.

(g) The actual natural basal cover at present in areas adjacent to the site is approximately between 5 and 10%, with some areas comprising less than 1% basal cover. This is due to the extreme overgrazing of the area. The instatement of a 75% grass cover on the site is therefore extremely unlikely, as domestic livestock would selectively graze the emerging grass species, especially as the site would be fertilised. The impact of domestic livestock is however likely to be mitigated by the time of planting, which will be in early spring. Environments typical of the region comprise a significant number of annual grass and herbaceous species, which have adapted to or are more resilient to grazing pressure. It is therefore likely that with a significant annual plant cover will emerge with the first rains, which would serve to 'distract' herbivores from the grasses emerging on the site. The amount of available forage in early spring should also mean that selective grazing of the site is unlikely, at least long enough for the sown seed to establish. Weeds will also colonise the site; this is seen as a positive impact, as these species assist in stabilising the soils in the short term, and they ultimately contribute to biomass in the soil. Should any weeds be present 24 months after re-vegetation, then these should be sprayed with herbicide at that stage.

In terms of % cover, acceptable cover should be judged by review of areas immediately adjacent to the site, which is a realistic measure of possible long term re-vegetation.

(h) The Contractor is to water and maintain all planted vegetation (in the event of lack of rain) until the vegetation has become re-established. Planting in the wet season, as is taking place, should obviate the need for watering.

## 16. ALIEN PLANT CONTROL

### *Benefits of control*

- Reduction of spread of these species into non-affected areas.
- Improvement of water quality and quantity.
- Legal compliance: landowners are required to eradicate or control declared weed and alien invader plants in terms of the Conservation of Agricultural Resources Act 43 of 1983.
- Improvement of biodiversity in conservation areas. Fast growing invader plants suppress indigenous flora, with a resultant loss in overall biodiversity.
- Reduction in soil erosion. Certain species of alien invader plants reduce soil cover and can lead to increased erosion.
- Commercial reasons: alien vegetation can spread from conservation areas into production land resulting in greater weed control costs.

### *Important factors influencing the effectiveness of a control programme*

- Timeous implementation of control operations is important as alien plants are more susceptible to herbicides when they are young and lower herbicide rates can be used with less chance of accidental drift occurring.
- Appropriate herbicides must be chosen. Selective broadleaf herbicides should be chosen where it is the intention to achieve rapid colonisation of the site by grasses. Care must be taken when applying herbicides in the proximity of watercourses and label prescriptions must be strictly adhered to.
- Operations must be directed towards killing alien vegetation rather than just cutting them or transplanting them. This is best achieved with an effective herbicide.

- Herbicide application equipment must be suitable for the job and correctly calibrated to give the required dosage. A team should be trained to carry out the spraying operation correctly. A poorly implemented operation can be ineffective or it can result in substantial damage to non target vegetation.

***Requirements for an effective alien vegetation control programme***

- Identify the problem: extent, location and species of problem plant.
- Divide the problem areas into manageable units, taking budget and resource constraints into account.
- Identify any sensitive ecosystems, rare or endangered plants etc which may be affected by a control programme. Identify the original ecosystem applicable to the area. The method of control will be influenced by the type of vegetation you wish the area to revert to.
- Identify an appropriate control method: mechanical or chemical, type of herbicide, application etc.
- Make provision for a number of follow up operations. The initial clearing operation is only part of the total programme. Failure to follow up will result in a failure of the entire programme.
- Implement an appropriate burning regime together with the weed control programme.

In order for the programme to be effective it will need to:

- Make provision for a number of follow up operations. The initial clearing operation is only part of the total programme. Failure to follow up will result in a failure of the entire programme.
- Implement an appropriate burning regime together with the weed control programme.

### ***Use of herbicides***

Agri-chemicals used in conservation areas, pastures, and on crops can have an adverse effect on human health and the environment. Whenever chemicals are used, the following guidelines should be adhered to:

- Chemicals must only be applied by trained operators wearing the necessary protective clothing;
- Chemicals must only be used and applied according to their manufacturers' recommendations and in terms of their registered use. Mixing of chemicals into 'cocktails' is illegal, unless registered in their own right;
- Before any herbicide treatment is undertaken it is advisable to check with the herbicide agents for effectiveness of chemicals on target weeds;
- A few examples of herbicides and their application are provided in Table 1.
- Invader plants and weeds and their method of control are summarised in Table 2.

Please note: The use of chemical control should be employed as a last alternative after mechanical methods have been exhausted and proved not to be effective. A suitable qualified ecologist should always be consulted should use of chemical control be inevitable.



**Table 1 Potentially useful herbicides for use in conservation areas and their application**

Active Ingredients	Trade Name Examples	Time of Application	Application
Bromacil	Bromacil 800 WP • Hyvar X	Before/during rainy season	Control of <i>A.mearnsii</i> , <i>A.dealbata</i>
bromacil – tebuthiuron	Bundu SC • Savana 500 SC	Before/during rainy season	Control of <i>A.mearnsii</i> , <i>A.dealbata</i>
Fluroxypyr	Tomahawk • Starane	Active growing	Control of Bugweed and <i>A.melanoxylon</i> .
glyphosate-ammonium	Roundup Max	Post Emergent	Annual grasses and broad-leaved weeds in Eucalyptus plantations.
glyphosate - isopropylamine	Senator Xtra • Mamba 360 SL	Post Emergent	Annual and perennial grasses and broad-leaved weeds.
glyphosate – sodium	Glyphosate WSG • No plough	Active growing	Annual and perennial grasses and broad-leaved weeds.
glyphosate – trimesium	Wipe-Out	Active growing	Control of Bramble, Bugweed, Lantana, Triffid Weed and <i>Sesbania punicea</i> .
Imazapyr	Chopper	After felling	Control of Bugweed, Castor Oil, Syringa, Triffid Weed
metsulfuron-methyl	Brush-Off • Climax • Nicanor	Active growth	Control of Bramble, Triffid Weed and Eucalyptus species.
Paraquat	Gramoxone • Paraquat SL	Post Emergent	Only to be used for tracer belt preparation.
Picloram	Acess 240SL • Browser	Post Emergent	Control of Bramble, Lantana and Eucalyptus species.
tebuthiuron	Lava • Tebusan 500 SC	Before/during rainy season	Control of Braken Fern, Hakea, Lantana, Bugweed, Bramble, Acacia and Eucalyptus species.
triclopyr (amine salt)	Timbrel 360 SL	Post Emergent	Broad-leaved weeds, coppice
triclopyr (butoxy ethyl ester)	Garlon 4 • Triclon • ViroAxe	Post Emergent	Broad-leaved weeds, coppice



Table 2 (a) Alien Shrub and Cactus Control

Species	Common Name	Mechanical Control	Chemical Control			
			Foliar Spray	Stem Injection	Control Stumps	Soil Applied
<i>Agave sisalana</i>	Sisal	-	-	Masmar MSMA 720 SL	-	-
<i>Alhag camelorum</i>	Camel thorn bush	-	-	-	-	Tebusan SC
<i>Caesalpinia decapetala</i>	Mauritius thorn	-	Garlon 4 Glyphosate 360g/l Stirrup Touchdown Touchdown Plus	-	-	-
<i>Cereus jamacaru</i>	Queen of the night	-	Masmar MSMA 720SL	Masmar MSMA 720SL	-	-
<i>Chromolaena odorata</i>	Triffid weed	Slash and Burn	Brush-Off Garlon 4 Glyphosate 360g/l Touchdown Touchdown Plus	-	Chopper Garlon 4	Tebusan CG Tebusan SC
<i>Harrisea martinii</i>	Moon cactus	-	Garlon 4 Masmar MSMA 720SL	Masmar MSMA 720SL	-	-
<i>Lantana camara</i>	Lantana	Slash and Burn	Access Chopper Glyphosate 144g/l Glyphosate 240g/l Glyphosate 360g/l Touchdown Touchdown Plus	-	Access Chopper Tordon Super	Tebusan CG Tebusan SC
<i>Opuntia aurantica</i>	Jointed cactus	-	Masmar MSMA 720SL	-	-	-
<i>Opuntia ficus-indica</i>	Sweet prickly pear	-	-	Glyphosate 360g/l Masmar MSMA 720SL Touchdown Touchdown Plus	-	-
<i>Pereskia aculeata</i>	Pereskia	Uproot and Burn	Garlon 4	-	-	-
<i>Pereskia loblata</i>	Kudzu vine	-	Garlon 4	-	-	-
<i>Ricinus communis</i>	Castor-Oil Plant	Handpull	-	-	Chopper	-

Species	Common Name	Mechanical Control	Chemical Control			
			Foliar Spray	Stem Injection	Control Stumps	Soil Applied
Rubus cuneifolius	American bramble & hybrids	Slash and Burn	Access Brush –Off Garlon 4 Glyphosate 240g/l Glyphosate 360g/l Stirrup Touchdown Touchdown Plus	-	-	Tebusan CG Tebusan SC
Rubus fruticosus	European blackberry	Slash and Burn	-	-	-	-
Sesbania punicea	Rod sesbania	-	Garlon 4 Glyphosate 360g/l Stirrup Touchdown Touchdown Plus	-	Chopper Garlon 4	Tebusan SC
Sctaria megaphylla	Broad-leaved setaria	-	Glyphosate 360g/l Touchdown Wipe Out Calemba	-	-	-

Table 2(b) Alien Tree Control

Species	Common Name	Mechanical Control	Chemical Control				
			Foliar Spray	Control Stumps	Basal Bark	Frill	Soil Applied
<i>Acacia cyclops</i>	Rooikrans	barkstrip / handpull	Garlon 4	-	-	-	Tebusan SC
<i>Acacia dealbata</i>	Silver wattle	barkstrip / handpull / fire	Garlon 4 Tordon 101 *	Access Mamba 360SL Timbrel Tordon 101 * Tordon Super	Garlon 4 Tordon Super	Mamba 360SL Tordon 101 *	
<i>Acacia decurrens</i>	Green wattle	barkstrip / handpull / fire	Basta	-	Garlon 4	-	-
<i>Acacia elata</i>	Pepper tree wattle	Fell / barkstrip / handpull	-	-	-	-	
<i>Acacia longifolia</i>	Long-leaved wattle	barkstrip / handpull / fire	Garlon 4				Tebusan SC
<i>Acacia mearnsii</i>	Black wattle	barkstrip / handpull / fire	Garlon 4 Glyphosate 360 g/l Stirrup Touchdown Touchdown Plus Tumbleweed	Access Chopper Timbrel Tordon 101 * Tordon Super Fungus	Garlon 4 Tordon Super	Access Chopper	Enviro- Bushwacker Savana SC Tebusan SC
<i>Acacia melanoxylon</i>	Australian blackwood	barkstrip / handpull / fire	Starrane 200	-	Garlon 4	-	-
<i>Acacia saligna</i>	Port Jackson	-	Garlon 4 Touchdown Plus Glyphosate				Tebusan CG Tebusan SC
<i>Casuarina equisetifolia</i>	Beefwood	-	-	Garlon 4	-	-	-
<i>Cestrum laevigatum</i>	Inkberry	-	-	Chopper	Garlon 4	Chopper	-
<i>Eucalyptus spp</i>	Gum trees	Barkstrip / handpull / ringbark	Brush-Off Chopper Garlon 4	Access Brush-Off Chopper Garlon 4 Glyphosate 360g/l Timbrel Touchdown	-	Chopper	-

Species	Common Name	Mechanical Control	Foliar Spray	Control Stumps	Basal Bark	Frill	Soil Applied
<i>Hakea sericea</i>	-	-	-	-	-	-	Tebusan CG Tebusan SC
<i>Jacaranda mimosifolia</i>	-	-	-	Chopper	-	Chopper	-
<i>Melia azedarach</i>	Syringa	-	-	Chopper	Garlon 4	Chopper	-
<i>Populus alba</i> & <i>Populus canescens</i>	White and Grey	-	-	Chopper	-	Chopper	-
<i>Populus deltoides</i>	Match poplar	-	-	-	-	-	-
<i>Prosopis glandulosa</i> & <i>Prosopis velutina</i>	Honey & velvet mesquite						
<i>Psidium guajava</i>	Guava	-	-	Chopper	-	Chopper	Tebusan SC
<i>Salix babylonica</i>	Weeping willow	-	-	-	-	-	-
<i>Schinus terebinthifolius</i>	Brazilian Pepper Tree	-	-	-	Garlon 4		
<i>Solanum mauritianum</i>	Bugweed	Handpull	Chopper Garlon 4 Glyphosate 360g/l Starane 200 Stirrup Touchdown Touchdown Plus	Chopper Timbrel	Garlon 4 Starane 200	Chopper	Tebusan CG Tebusan SC

## 17. SPILL CONTINGENCY PLAN

No concrete transport vehicles to be washed on site. Where concrete or another hazardous substance is spilled, clean-up and rehabilitation must be executed as a matter of urgency. All concrete mixing that is to take place for the construction phase must be undertaken in a controlled environment and on a suitable surface to avoid the contamination of the soil surrounding the area where the concrete is to be used. Any spillage or concrete that has leaked off the designated mixing areas needs to be collected and dumped at a registered landfill site or re-used in construction. Waybills from the registered landfill site will need to be provided on request to the ECO.

Construction phase chemicals (e.g. diesel, lubricating oils, paints and solvents) are to be stored in a temporary impervious bund. Absorbent material must be kept on site to clean any minor chemical spills into bund. Rainwater in temporary bund to be regarded as potentially contaminated and must not be released to the environment unless it is established by chemical analysis (e.g. COD) that water is not contaminated.

Portable construction equipment (e.g. generators) to be preferably parked on impervious surfaces. Alternatively drip trays need to be provided for portable construction equipment. Any chemical spills onto soil to be reported by contractor to PM and ECO. PM and / or ECO to evaluate extent of spill and required to report spill to KZN DAEA and DWA if the spill is regarded as significant. Monitoring and / or rehabilitation of impacted soils and / or groundwater may be required depending on authority requirements. The Contractor is to be responsible for cost of monitoring and / or rehabilitation of any soils / groundwater impacted by chemical spills from construction activities.

Safe disposal certificates to be retained by contractor and / or project manager for any material associated with chemicals / chemical spills disposed to landfill.

Should any significant chemical spillages occur the following steps must be followed:

- Stop the source of the spill
- Contain the spill
- All significant spills must be reported to DWA, KZN DAEA, the ECO and PM
- Remove the spilled product for treatment or authorised disposal
- Determine in conjunction with the ECO if there is any soil, groundwater or other environmental impact
- If deemed necessary by DWA or the ECO, remedial action must be taken
- The incident must be documented and reported to KZN DAEA

**18. ACKNOWLEDGEMENT FORM**

**CULVERT UPGRADE ON P443, JOZINI LOCAL MUNICIPALITY, KWAZULU-NATAL**

Record of signatures providing acknowledgment of being aware of, and committed to complying with the contents of this Environmental Management Programme (EMPR), which relates to the environmental mitigation measures for the project outlined above, and the environmental conditions contained in the civil and other construction contract documents.

**PROPONENT:**

Signed: ..... Date: .....

**PROJECT MANAGER / RESIDENT ENGINEER:**

Signed: ..... Date: .....

**CONTRACTOR / SITE MANAGER:**

Signed: ..... Date: .....

**SUB - CONTRACTOR:**

Signed: ..... Date: .....



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## **IMPACT ASSESSMENT AND MITIGATION MEASURES**

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This section of the report highlights and evaluates potential impacts that may be associated with the construction and operational phases of the proposed rail access road based on the information which the consultants had access to at the time of writing.

The extent and nature of environmental and social impacts varies according to the type of landscape, characteristics of the rail access road and its surroundings, and the control and management measures of activities associated with its construction and operation.

### **DETERMINATION OF IMPACT SIGNIFICANCE**

For the purposes of this study impacts were evaluated based on numerical scores to determine the overall extent of the impact on the environment and its significance. It must be noted that the identification of impacts has relied heavily on information which was obtained from the SGS Rail ESIA report and associated specialist studies undertaken in 2011, as well the consultants previous experience in impact assessment of road construction projects. For the purposes of this assessment impact significance was evaluated according to the following key criteria:

#### **Nature of Impact**

The environmental impacts of a project are those resultant changes in environmental parameters, in space and time, compared with what would have happened had the project not been undertaken. It is an appraisal of the type of effect the proposed activity would have on the affected environmental parameter. Its description includes what is being affected, and how.

#### **Spatial Extent**



This addresses the physical and spatial scale of the impact. A series of standard terms and ratings used in this assessment relating to the spatial extent of an impact / effect are outlined in Table 0-1.

**Table 0-1: Rating scale for the assessment of the spatial extent of a predicted effect / impact**

<b>Rating</b>	<b>Spatial Descriptor</b>
<b>7</b>	<b>International</b> - The impacted area extends beyond national boundaries.
<b>6</b>	<b>National</b> - The impacted area extends beyond provincial boundaries.
<b>5</b>	<b>Ecosystem</b> - The impact could affect areas essentially linked to the site in terms of significantly impacting ecosystem functioning.
<b>4</b>	<b>Regional</b> - The impact could affect the site including the neighbouring areas, transport routes and surrounding towns.
<b>3</b>	<b>Landscape</b> - The impact could affect all areas generally visible to the naked eye, as well as those areas essentially linked to the site in terms of ecosystem functioning.
<b>2</b>	<b>Local</b> - The impacted area extends slightly further than the actual physical disturbance footprint and could affect the whole, or a measurable portion of adjacent areas.
<b>1</b>	<b>Site Related</b> - The impacted area extends only as far as the activity e.g. the footprint; the loss is considered inconsequential in terms of the spatial context of the relevant environmental or social aspect.

### **Severity / Intensity / Magnitude**

This provides a qualitative assessment of the severity of a predicted impact / effect. A series of standard terms and ratings used in this assessment which relate to the magnitude of an impact / effect are outlined in Table 0-2.

**Table 0-2: Rating scale for the assessment of the severity / magnitude of a predicted effect / impact<sup>3</sup>**

<b>Rating</b>	<b>Magnitude Descriptor</b>
<b>7</b>	<b>Total / consuming / eliminating</b> - Function or process of the affected environment is altered to the extent that it is permanently changed.
<b>6</b>	<b>Profound / considerable / substantial</b> - Function or process of the affected environment is altered to the extent where it is permanently modified to a sub-optimal state. In the case of positive impacts it is permanently modified to an improved state.
<b>5</b>	<b>Material / important</b> - Function or process of the affected environment is altered to the extent where it is temporarily altered, be it in a positive or negative manner.
<b>4</b>	<b>Discernible / noticeable</b> - The affected environment is altered, but function and process continue, albeit in a modified way.

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<sup>3</sup> **Source:** adapted from Glasson J, Therivel R & Chadwick A. Introduction to Environmental Impact Assessment, 2<sup>nd</sup> Edition. 1999. pp 258. Spon Press, United Kingdom.

<b>3</b>	<b>Marginal / slight / minor</b> - The affected environment is altered, but natural function and process continue.
<b>2</b>	<b>Unimportant / inconsequential / indiscernible</b> - The impact temporarily alters the affected environment in such a way that the natural processes or functions are negligibly affected.
<b>1</b>	<b>No effect / not applicable</b>

## Duration

This describes the predicted lifetime / temporal scale of the predicted impact. A series of standard terms and ratings used in this assessment are included in Table 0-3.

Table 0-3: Rating scale for the assessment of the temporal scale of a predicted effect / impact

Rating	Temporal Descriptor
<b>7</b>	<b>Long term</b> – Permanent or more than 15 years post decommissioning. The impact remains beyond decommissioning and cannot be negated.
<b>3</b>	<b>Medium term</b> – Lifespan of the project. Reversible between 5 to 15 years post decommissioning.
<b>1</b>	<b>Short term</b> – Quickly reversible. Less than the project lifespan. The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the project phases or within 0 -5 years.

## Irreplaceable Loss of Resources

Environmental resources cannot always be replaced; once destroyed, some may be lost forever. It may be possible to replace, compensate for or reconstruct a lost resource in some cases, but substitutions are rarely ideal. The loss of a resource may become more serious later, and the assessment must take this into account. A series of standard terms and ratings used in this assessment are included in Table 0-4.

Table 0-4: Rating scale for the assessment of loss of resources due to a predicted effect / impact

Rating	Resource Loss Descriptor
<b>7</b>	<b>Permanent</b> – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, <u>or by artificial means.</u>

<b>5</b>	<b>Long term</b> – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, <u>but can be mitigated by other means.</u>
<b>4</b>	<b>Loss of an ‘at risk’ resource</b> - one that is not deemed critical for biodiversity targets, planning goals, community welfare, agricultural production, or other criteria, but cumulative effects may render such loss as significant.
<b>3</b>	<b>Medium term</b> – The resource can be recovered within the lifespan of the project. The resource can be renewed / recovered with mitigation or will be mitigated through natural process in a span between 5 and 15 years.
<b>2</b>	<b>Loss of an ‘expendable’ resource</b> - one that is not deemed critical for biodiversity targets, planning goals, community welfare, agricultural production, or other criteria.
<b>1</b>	<b>Short-term</b> – Quickly recoverable. Less than the project lifespan. The resource can be renewed / recovered with mitigation or will be mitigated through natural process in a span shorter than any of the project phases, or in a time span of 0 to 5 years.

### Reversibility / potential for rehabilitation

The distinction between reversible and irreversible impacts is a very important one and the irreversible impacts not susceptible to mitigation can constitute significant impacts in an ESIA (Glasson *et al*, 1999). The potential for rehabilitation is the major determinant factor when considering the temporal scale of most predicted impacts. A series of standard terms and ratings used in this assessment are included in **Table 0-5**.

**Table 0-5: Rating scale for the assessment of reversibility of a predicted effect / impact**

<b>Rating</b>	<b>Reversibility Descriptor</b>
<b>7</b>	<b>Long term</b> – The impact / effect will never be returned to its benchmark state.
<b>3</b>	<b>Medium term</b> – The impact / effect will be returned to its benchmark state through mitigation or natural processes in a span shorter than the lifetime of the project, or in a time span between 5 and 15 years.
<b>1</b>	<b>Short term</b> – The impact / effect will be returned to its benchmark state through mitigation or natural processes in a span shorter than any of the phases of the project, or in a time span of 0 to 5 years.

### Probability

The assessment of the probability / likelihood of an impact / effect was undertaken in accordance with ratings and descriptors provided in **Table 0-6**.

Table 0-6: Rating scale for the assessment of the probability of a predicted effect / impact<sup>4</sup>

Rating	Probability descriptor
1.0	Absolute certainty
0.9	Near certainty / very high probability
0.7 – 0.8	High probability / to be expected
0.4 - 0.6	Likely / to be anticipated
0.3	Seriously anticipated possibility
0.2	Possibility
0.0 - 0.1	Remote possibility

## Mitigation

In terms of the assessment process the potential to mitigate the negative impacts and enhance the positive impacts was determined and rated for each identified impact and mitigation objectives that would result in a measurable reduction or enhancement of the impact were taken into account. The significance of environmental impacts has therefore been assessed taking into account any proposed mitigation measures. The significance of the impact “without mitigation” is therefore the prime determinant of the nature and degree of mitigation required.

The interpretation of the significance of negative and positive impacts utilised in this assessment, taking into account the above criteria, is presented in Table 0-7 & **Error! Reference source not found.** below.

Table 0-7: interpretation of the significance scoring of a negative impact / effect

Scoring value	Significance
>35	<b>High - The impact is total / consuming / eliminating</b> - In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. Mitigation may not be possible / practical. <u>Consider a potential fatal flaw in the project.</u>
25 - 35	<b>High - The impact is profound</b> - In the case of adverse impacts, there are few opportunities for mitigation that could offset the impact, or mitigation has a limited effect on the impact. Social, cultural and economic activities of communities are disrupted to such an extent that their operation is

<sup>4</sup> Source: adapted from Glasson J, Therivel R & Chadwick A. Introduction to Environmental Impact Assessment, 2<sup>nd</sup> Edition. 1999. pp 258. Spon Press, United Kingdom.

	severely impeded. Mitigation may not be possible / practical. <u>Consider a potential fatal flaw in the project.</u>
20 – 25	<b>Medium - The impact is considerable / substantial</b> - The impact is of great importance. Failure to mitigate with the objective of reducing the impact to acceptable levels could render the entire project option or entire project proposal unacceptable. <u>Mitigation is therefore essential.</u>
7 – 20	<b>Medium - The impact is material / important to investigate</b> - The impact is of importance and is therefore considered to have a substantial impact. <u>Mitigation is required to reduce the negative impacts and such impacts need to be evaluated carefully.</u>
4 – 7	<b>Low - The impact is marginal / slight / minor</b> - The impact is of little importance, but may require limited mitigation; or it may be rendered acceptable in light of proposed mitigation.
0 – 4	<b>Low - The impact is unimportant / inconsequential / indiscernible</b> – no mitigation required, or it may be rendered acceptable in light of proposed mitigation.

	Environmental impact	Nature of project impact	Spatial extent		Severity / intensity / magnitude		Duration		Resource loss	Reversibility		Probability		Significance without mitigation	Significance with mitigation
			Without	With	Without	With	Without	With		Without	With	Without	With		
Construction / Maintenance Phase	Loss of existing indigenous vegetation	Indigenous vegetation will require clearing in order to access the new stream crossing.	1	1	5	1	7	7	7	7	3	1	1	Medium	Medium
	Accumulation of construction and general waste.	Construction waste will be generated during the implementation of the project.	1	1	3	1	1	1	1	3	1	0.5	0.2	Low	Low
	Traffic Impacts	The realignment of the existing road to make use of the new crossing as well as the introduction of construction vehicles.	1	1	5	2	1	1	1	1	1	0.5	0.3	Low	Low
	Air Quality Impacts	Impact as a result of vehicle emissions and dust.	1	1	3	3	1	1	1	1	1	0.3	0.2	Low	Low

	Invasive Plant Encroachment	Vegetation clearing and soil disturbance may lead to alien invasive plants encroaching.	1	1	5	2	3	1	1	1	1	0.8	0.3	Medium	Low
	Noise Impact	Noise will be generated by construction machinery and vehicles.	1	1	4	4	1	1	1	1	1	0.4	0.3	Low	Low
	Soil Erosion	Soils will be exposed during clearing and grubbing creating a risk of soil erosion.	2	1	5	2	2	1	3	7	1	0.7	0.2	Medium	Low
	Loss of topsoil	Topsoil will be grubbed during site clearing. This material will be stockpiled for application during the rehabilitation.	1	1	6	2	3	1	3	7	1	0.7	0.3	Low	Low
<b>Overall Impact Significance</b>														<b>Medium</b>	<b>Low</b>
<b>Operational Phase</b>	Soil erosion	Increased soil erosion along the boundaries of the rivers and steep slopes.	1	1	5	2	3	1	3	7	1	0.4	0.2	Medium	Low



	Sedimentation	Increased sedimentation of the watercourse	2	1	5	1	3	1	3	7	1	0.4	0.2	Medium	Low
	Risk of invasive alien plants being established	Loss / disturbance of indigenous flora may allow for the establishment of invasive alien plants	1	1	4	1	3	1	3	3	1	0.4	0.2	Low	Low
<b>Overall Impact Significance</b>														Medium	Low