

Basic Assessment Report



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Department :
Economic Development, Tourism and
Environmental Affairs
PROVINCE OF KWAZULU-NATAL

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

DC/
KZN/EIA/

FINAL BASIC ASSESSMENT REPORT

**THE PROPOSED UPGRADE OF ROAD P 254/1 SITUATED WITHIN VULAMEHLO AND
UMZUMBE LOCAL MUNICIPALITIES, UGU DISTRICT MUNICIPALITY, KWAZULU-NATAL**
EDTEA File Reference Number: DC21/0040/2014 - KZN/EIA/0001790/2014

**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 Economic Development, Tourism & 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").
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 Economic Development, Tourism & Environmental Affairs may require that for specified types of activities in defined situations only parts of this report need to be completed.

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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 Economic Development, Tourism & 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):	DC21/0040/2014: KZN/EIA/0001790/2014
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:	Afzelia Environmental Consultants (Pty) Ltd		
Physical address:	76 Valley View Road, Morningside, Durban, 4001		
Postal address:	P O Box 37069, Overport, Durban		
Postal code:	4067	Cell:	082 086 5133
Telephone:	031 303 2835	Fax:	086 692 2547
E-mail:	Solomon@afzelia.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)
Mr Solomon Fataki	BSc. Environmental Management: Botany stream	IAIAsa, IAP2	3
Ms Adrienne Edgson (Reviewer)	SAQA: Environmental Law; Environmental Impact Assessment Procedures; Environmental Risk Assessment; LA21 Trainer; Estuarine Management	IAIAsa, IAP2, ELA,	18

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

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Rowena Harrison	MSc Soil Science	Wetland assessment	Section C: 1, 2 & 3	Wetland and Riparian Delineation and Impact Assessment
Ronel Naude	BSc (hons) Environmental Sciences	Vegetation assessment	Section C: 4 & 5	Vegetation assessment
Jacob Schrijvershof	MSc. Aquatic Ecology	Aquatic assessment	Section C: 3	Aquatic Ecological Assessment

SECTION B: ACTIVITY INFORMATION

1. PROJECT TITLE

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

THE PROPOSED UPGRADE OF ROAD P 254/1 SITUATED WITHIN VULAMEHLO AND UMZUMBE LOCAL MUNICIPALITIES, UGU DISTRICT MUNICIPALITY, KWAZULU-NATAL

2. PROJECT DESCRIPTION

Provide a detailed description of the project:

Background

The KwaZulu-Natal Department of Transport is proposing to upgrade 28km of the existing Provincial Road P254/1 which will include road realignment, blacktopping of the gravel surface and formalising stormwater control within Vulamehlo and Umzumbe Local Municipalities which falls under the jurisdiction of the Ugu District Municipality in southern KwaZulu-Natal (Please see Appendix A: Location map).

Existing Conditions

Between km 0 and km 9, the road passes through plantation forestry areas and no houses are recorded along the road. The first 9.0 kilometres of the road traverses gentle to semi-mountainous terrain. The road along this portion is characterised by shallow cuts and generally moderate road grades, although the road grade descending to and ascending from the ifafa River crossing is steep. Horizontal curvatures along the first 9 kilometres are generally gentle. Surrounding land use is predominantly *Eucalyptus* spp. (Gum) tree plantations. There is very little settlement in terms of houses and other amenities.

From km 9 onwards, the density of houses increases with a medium to high density of houses located along the road and scattered in the catchment areas. From kilometre 9.0 onwards, the terrain becomes, mountainous with steep sides and longitudinal slopes (valley lines) and road grades become steep to very steep passing through *Eucalyptus* spp. (Gum) tree plantations, forest and natural grassland. Approximately 20% of the road gradients from km 9.0 onwards exceed 8%. The side cuts range on average between 0.5 to 4 meters in height. Horizontal curvatures from kilometre 9 onwards are sharp.

The existing road is a Type 6 District Gravel Road standard and is generally in a poor condition; it is also adversely affected by inclement weather conditions creating potholes and slippery conditions. In addition, at sharp bends and steep gradients; some deformation to the shape of the road has occurred.

The gravel wearing course comprises semi-cohesive to non-cohesive granite which varies in thickness between 0mm (where sub-grade is exposed) to 100mm. For most parts of the road, the gravel wearing course is generally well compacted and intact. However, at sharp bends and along steep gradients the gravel wearing course is loose making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance.

Storm water is controlled mainly using V-shaped side drains. The side drains along the road are mostly over-grown and silted. Along steep gradients, severe erosion of the side drains has occurred due to increased surface flow velocity of storm water runoff. In areas where side drains are silted and over-grown, deep erosion channels have formed across the road surface as a result of stormwater. A number of storm water pipes were noted. Most pipe inlets are silted and blocked and non-functional. A number of pipe crossings are recorded without any inlet and outlet structures.

The road P254/1 transverses the iFafa River, several channels and unnamed stream tributaries to the iFafa and Mtwalume River. The presence of thirteen wetland areas has been identified within a 500m buffer surrounding the existing road P254/1.

Proposed Upgrading

According to the Engineering report compiled by Samani Consulting (2014), the proposed development entails the upgrading of Road P254/1 from gravel to Type 3 black top Standard Provincial Road. The development will start in Vulamehlo Local Municipality at the intersection with P22 and end in Umzumbe Local Municipality at a "T" junction with P75. The new road will be 8.5m wide over a length of approximately 28km with full surface drainage, including kerb and channel and concrete lined v-drains. The design speed will be 60km/hr with the minimum horizontal radius of 110m and a minimum K value of 16. The minimum pipe size will be a 600mm diameter 100D Spigot and socket type with collar and 450mm diameter 100D at accesses to properties with the associated inlet and outlet structures.

At natural water courses and stream crossings, pipe crossings or low level causeways using portal culverts will be constructed with associated inlet and outlet structures. Seven culverts are proposed for an upgrade and construction. These are shown in Appendix A.

GPS co-ordinates for culverts proposed for an upgrade or sections where culvert required:

1. Existing culvert at km 3.0 - Co-ordinates: S 30° 18' 08.2", E 30° 25' 29.7"
2. Culvert required at km 7.2 - Co-ordinates: S 30° 19' 45.5", E 30° 24' 52.5"
3. Culvert required at km 7.4 - Co-ordinates: S 30° 19' 47.68", E 30° 24' 51.84"
4. Culvert required at km 20.7 - Co-ordinates: S 30° 24' 03.88", E 30° 29' 11.34"
5. Culvert required at km 22.4 - Co-ordinates: S 30° 24' 25.97", E 30° 30' 05.78"
6. Culvert required at km 22.7 - Co-ordinates: S 30° 24' 30.84", E 30° 30' 17.22"
7. Culvert required at km 25.6 - Co-ordinates: S 30° 24' 46.12", E 30° 31' 19.80"

In addition to the Basic Assessment process, a Water Use License application (WULA) will be submitted in accordance to the requirements of the National Water Act of 1998 (Act No. 36 of 1998) in terms of section 21, regulated by the Department of Water and Sanitation (DWS), for the upgrade of culverts within the 1 in 100 year flood line or riparian habitat whichever is the greatest distance, or for all the wetlands located within a 500m radius from the road upgrade.

The base-course materials is anticipated to be sourced from an existing borrow pit site. However, this is located some miles away from the project site and will necessitate the transportation of this material for a considerable distance. The use of the borrow pit falls outside the ambit of this assessment. All construction related materials must be sourced from an approved supplier.

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An application will also be submitted for borrow pit sites along the road section in accordance with the regulations pertaining to the Minerals and Petroleum Resources Development Act (Act No.28 of 2002) regulated by the Department of Mineral Resources.

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 No. 544 (11)	<p>The construction of: (vi) bulk storm water outlet structures; (xi) infrastructure or structures covering 50 square metres or more</p> <p>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.</p>
GNR No. 544 (18)	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <p style="padding-left: 20px;">(i) a watercourse;</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving</p> <p style="padding-left: 20px;">(i) is for maintenance purposes undertaken in accordance with management plan agreed to by the relevant environmental authority; or</p> <p style="padding-left: 20px;">(ii) occurs behind the development setback line.</p>
GNR No. 544 (39)	<p>The expansion of: (iii) bridges; (v) bulk storm water outlet structures</p> <p>within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.</p>

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.

The property on which or location where it is proposed to undertake the activity

Alternative 1 (preferred): The proposed project involves the upgrading of the Road P254/1 predominantly on an existing footprint including the position of culverts and the bridge. Site alternatives other than the location of the current road, have not been assessed as this is an existing road upgrade. The proposed project is located within Vulamehlo and Umzumbe Local Municipalities which falls under the jurisdiction of the Ugu District Municipality in southern KwaZulu-Natal.

Existing roads such as the P22 and P75 will provide access to the site

4 (b) The type of activity to be undertaken

The proposed project (alternative 1: preferred) involves the upgrading of the existing Road P254/1 from a gravel base to a type 3 blacktop. In addition old culverts and dilapidated stormwater structures will be upgraded to better handle flood occurrences. The following activities are all associated with the proposed Road P254/1 Upgrade:

- Planning and design phase
 - Engineering design
 - Geotechnical investigation
 - Geological & Geophysical investigations
- Construction phase with respect to Managing construction sites
 - On-going consultation with affected parties
 - Site establishment and de-establishment.
 - Pegging of overall construction footprint
 - Vegetation clearance
 - Management of vegetation clearance
 - Elimination and control of alien invasive vegetation within the entire work servitude.
 - Establish of construction camp (including material lay-down areas)
 - Fencing of site camp
 - Employment of temporary labour
 - Sourcing of construction material
 - Use of borrow pit
 - Storage and handling of material

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- Transportation of equipment, materials and personnel
- Topsoil clearance and stockpiling
- Upgrade and re-alignment of existing road and watercourse crossings
- Grading of site (where necessary)
- Excavations and Foundation related activities for associated infrastructure such as causeways and culverts
- Construction of detours
- Stormwater Drainage network for newly aligned portion of road
- Traffic Control and accommodation for construction under traffic
- Waste Management
- Refuelling
- Crossing sensitive areas
- Final road surface finishes and walkways
- Reinstatement and rehabilitation
- Wetland and vegetation rehabilitation
- Operational phase
 - Vegetation rehabilitation – on-going during the life-span of the project
 - Invasive alien control programme
 - Routine maintenance inspections
 - Repair and maintenance works
 - Maintenance of detours

4 (c) The design or layout of the activity

The following activities from the design drawings and engineering report provided by Samani are all associated with the proposed Road P254/1 Upgrade:

- The design speed will be 60km/hr with the minimum horizontal radius of 110m and a minimum K value of 16;
- Construction of a 150mm G7 upper and lower selected sub grade layer compacted to 95% Modified AASHTO density;
- Construction of a 150mm C4 Sub-Base course compacted to 97% modified AASHTO density;
- Construction of a 150mm (G2) Graded crushed stone Base course compacted to 102% modified AASHTO density;
- Sweeping and Priming;
- Surfacing using a 19mm and 9.5mm double seal.
- Road Furniture and Ancillary works;
- Finishing and Tidying the Road and Road reserve;
- Improving the vertical or horizontal alignment of the road at various places;
- Installing guardrails where fill embankment exceed 3m in height or where hazardous obstructions cannot be removed.
- Upgrading or constructing seven culverts;
- Replacing all existing drainage culverts found in unserviceable condition, with new ones to better handle the flood occurrences;
- The minimum pipe size with headwalls will be a 600mm diameter 100D Spigot and socket type with collar and 450mm diameter 100D at accesses to properties with the associated inlet and outlet structures.
- Constructing box culverts < 1,8m high in accordance with KZNDOT standards.

- Using cement grouted stone pitching or gabion mattresses at culvert inlets and outlets for erosion control.
- Constructing earth berms at culvert inlets to direct stormwater into culverts where necessary.
- Placing rock bolsters across the invert of drains susceptible to erosion for every 2m vertical drop;
- Construction of surface drainage, kerbing and concrete lined V Drains
- Using grassed or concrete lined v-drains for shallow cuttings of depth less than 5m measured at a point 6m from the edge of carriageway, and concrete lined 1000 v-drains for deep cuttings of depth higher than 5m measured at a point 6m from the edge of carriageway;
- Installing subsoil drains with 1000 v-drains, or where high water tables are encountered;
- Providing kerb and channel drains where fill embankments exceed 3m in height, also used in cuts;
- Providing catch-water banks where surface runoff is towards the road to divert stormwater to major cross drainage structures;
- Provision of taxi laybys.

The pavement design is likely to be for a medium to high trafficked road. The pavement layers will likely be as follows:

- 19mm + 9.5mm Double Seal
- 150mm G2
- 150mm C4

All storm water runoff from the site must be supplemented by soft engineering and the use of Sustainable Drainage Systems (SUDS). SUDS will encourage infiltration across the site, provide for the filtration and removal of pollutants and provide for some degree of flow attenuation by reducing the energy and velocity of storm water flows through porous pavements made from materials like concrete blocks, crushed stone or porous asphalt, or through an impermeable membrane, or through swales and basins which can be created as features. The swales must then be vegetated using indigenous sedges such as *Schoenoplectus corymbosus*, *Cyperus albostrisatus*, *Cyperus laevigatus*, *Cyperus sphaerospermus* and *Mariscus macrocarpus*. (As per SUDS principle) This SUDS option would also have less impact on nearby streams, river and wetland areas.

When compared to concrete V-drains, the use of SUDS is preferred.

4 (d) The technology to be used in the activity

The technology involved is standard road upgrade works resulting in the blacktopping of an existing gravel surface; upgrading of existing low-level bridge and culverts and the upgrading of existing stormwater and the installation of new stormwater control as described in section 4c above.

4 (e) The operational aspects of the activity

The road upgrade must cater for and undertake rehabilitation of degraded areas associated with the stream crossings by addressing excessive erosion aspects and by rehabilitating these areas with suitable indigenous vegetation once alien invasive vegetation has been removed.

Other operational aspects of the activity may include:

- Maintenance of the Sustainable Drainage Systems (SUDS)
- Vegetation rehabilitation on-going during the life-span of the project
- Invasive alien control programme
- Routine maintenance inspections
- Repair and maintenance works

4 (f) The option of not implementing the activity

The No-go alternative would leave the existing Road P254/1 in its current degraded and dangerous condition. At sharp bends and steep gradients, deformation to the shape of the road surface and formation of potholes would continue to occur; making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance. Stream crossings would continue to pose a safety risk to motorists and pedestrians and would continue to degrade the immediate and downstream environment. Severe erosion due to increased surface flow velocity of storm water runoff would continue to pose a serious threat as result of inadequate drainage systems not being in accordance with accepted standards.

The No-Go alternative would not require any construction works or have any detrimental impacts on the surrounding landowners, streams, rivers and wetlands. Vegetation, flora and fauna in the vicinity would not be negatively impacted. But the threat to biodiversity and water resources as a result of continuing encroachment of alien invasive species will remain.

Further, no temporary job opportunities or skill development will happen for the local community during the construction phase.

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.

	Latitude (S):			Longitude (E):		
Alternative:						
Alternative S1 ¹ (preferred or only site alternative)	°	'	"	°	'	"
Alternative S2 (if any)	°	'	"	°	'	"
Alternative S3 (if any)	°	'	"	°	'	"

In the case of linear activities:

	Latitude (S):			Longitude (E):		
Alternative:						
Alternative S1 (preferred or only route alternative)						
• Starting point of the activity	30°	16'	38.04"	30°	26'	03.6"
• Middle point of the activity	30°	21'	53.82"	30°	26'	37.19"

¹ "Alternative S.." refer to site alternatives.

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• End point of the activity	30°	25 ′	17.58 ″	30°	31 ′	59.1 ″
Alternative S2 (if any)	"					
• Starting point of the activity	0	′	"	0	′	"
• Middle point of the activity	0	′	"	0	′	"
• End point of the activity	0	′	"	0	′	"
Alternative S3 (if any)	"					
• Starting point of the activity	0	′	"	0	′	"
• Middle point of the activity	0	′	"	0	′	"
• End point of the activity	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.

6. PHYSICAL SIZE OF THE ACTIVITY

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

Alternative:

Alternative A1² (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

or, for linear activities:

Alternative:

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

Size of the activity:

m ²
m ²
m ²

Length of the activity:

28 000m
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:

238 000m ²
m ²
m ²

7. SITE ACCESS

Does ready access to the site exist?

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

Describe the type of access road planned:

YES
m

² "Alternative A.." refer to activity, process, technology or other alternatives.

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.

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.

[The above has been adhered to. Please see maps attached in Appendix A](#)

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.

[The above has been adhered to. Please see site photographs attached in 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.

The above has been adhered to. Please see Layout plans attached in Appendix C.

11. ACTIVITY MOTIVATION

11.1. Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R840 000 000.00
What is the expected yearly income that will be generated by or as a result of the activity?	NIL
Will the activity contribute to service infrastructure?	YES
Is the activity a public amenity?	YES
How many new employment opportunities will be created in the development phase of the activity?	20
What is the expected value of the employment opportunities during the development phase?	R5,280.00
What percentage of this will accrue to previously disadvantaged individuals?	98%
How many permanent new employment opportunities will be created during the operational phase of the activity?	NIL
What is the expected current value of the employment opportunities during the first 10 years?	
What percentage of this will accrue to previously disadvantaged individuals?	

11.2. Need and desirability of the activity

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

In considering the Need and Desirability for this particular project, the Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 – GN 891 issued in October 2014 in GG 38108 has been used to inform and provide structure for the Need and Desirability.

The concept of “need and desirability” relates to, amongst others, the nature, scale and location of the development being proposed, as well as the wise use of land. Need and desirability are inter-related and the two should be considered in an integrated and holistic manner.

In summary thereof of the discussion document, the following policies, statues and documents were interrogated:

1. National Spatial Development Perspective (NSDP) (2003 and updated in 2006);
2. The New Growth Path (2010);
3. The National Development Plan 2030;
4. The Integrated Development Plans (IDP) for the District and Local Municipalities;
5. The Spatial Development Framework for the District and Local Municipalities;
6. The Environmental Management Framework & Strategic Environmental Framework for the District and Local Municipalities;

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7. The National Environmental Management Act Principals.
8. The 18 Strategic Integrated Projects (SIPs)

The proposed P254/1 development forms part of the road network under jurisdiction of the Ugu Cost Centre Port Shepstone. The project supports the Ugu Municipality's proposed Integrated Municipal Infrastructure Project which aims at addressing the maintenance backlogs and upgrades required within the municipality infrastructure.

This road upgrade project will enhance service delivery capacity thereby impacting positively on the local community.

Rehabilitating and constructing infrastructure for economic development have been identified within the Vulamehlo Municipality Integrated Development Plans 2014/2015 (IDP) vision in order to improve the Vulamehlo Municipality and achieve their 2025 vision. The Infrastructure Development Plan identifies road P22-1 which intersects with P254/1 as a "primary level development corridor" in Vulamehlo as it is a link between Umzinto and Highflats. The upgrade of Road P254/1 falls under the focal areas for infrastructure investment of nodes and corridors as set out in the Vulamehlo Spatial Development Framework. .

In addition there are poor road linkages between the Umzumbe municipality and the Vulamehlo municipality. The P254-1 and P254-2 provide a link between Umgayi and Sawoti and Kenterton.

Roads Development has been identified as a community need for all wards in these two municipalities.

The Umzumbe Municipality Integrated Development Plan 2015/16's development priorities, objective and strategies is oriented towards construction and maintenance of existing infrastructure and access roads.

The Umzumbe Spatial Development Framework (SDF) identifies road P254 as a high order routes that require a high level of maintenance as they accommodate emergency services, public transport and inter-Municipal traffic. These are the routes that integrate Umzumbe with surrounding areas and Municipalities.

The P254/1 and its surroundings are considered as Areas of Special Need. These areas are environmentally degraded areas that require rehabilitation, as well as areas that require protection. Intervention required would be:

- remediation of soil erosion;
- alien invasive plant removal;
- development of a sustainable wood harvesting programme; and
- protection and maintenance of wetlands.

These required interventions outlined above from the Umzumbe Municipality SDF can only be achieved with the proposed upgrade of Road P254/1.

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

See below as the project entails upgrading of a public road.

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

The Road P254/1 links the P75 and P22, a route that affords a more direct linkage between the Vulamehlo area and Malangeni in Umdoni Municipality as well as onto Umzumbe Municipality. The existing road serves the local communities; the proposed upgrade will improve access to Mgyai Provincial Clinic, Ekubusisweni and Amahlaya Primary School, including Gobume High School. Taxis, government and private vehicles utilise the road on a daily basis. It accommodates emergency services, public transport and inter-Municipal traffic. It will further improve access to potential agricultural developments which is one of the most important key economic sectors within the Local, District and Provincial contexts of Vulamehlo Local Municipality.

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:
South Africa's Constitution (Act 108 of 1996), specifically the Bill of Rights (Chapter 2, Section 24)	The State	1996
National Water Act (Act 36 of 1998)	Department of Water and Sanitation	1998
National Environmental Management Act (Act No. 107 of 1998)	National Department of Environmental Affairs (DEA) Department of Economic Development, Tourism and Environmental Affairs (EDTEA (Provincial CA))	1998
Environmental Impact Assessment Regulations (2010) Government Notice No. R 544	Provincial EDTEA	2010
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	DEA & Ezemvelo KZN Wildlife (Provincial)	2004
The National Heritage Resources Act (Act No 25 of 1999 as amended)	Amafa aKwaZulu-Natali	1999
KwaZulu-Natal Nature Conservation Ordinance 15	Ezemvelo KZN Wildlife (Provincial)	1974
KwaZulu-Natal Planning and Development Act, 2008 (Act No.6 of 2008)	The local authority and COGTA	2008
Municipal Systems Act (Act No 32 of 2000)	Department of Co-operative Governance and Traditional Affairs	2000
Integrated Environmental Management (IEM) Guidelines	Department of Economic Development, Tourism and Environmental Affairs	2002
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)	Department of Agriculture, Forestry, and Fisheries	1983

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National Forests Act (Act No. 84 of 1998)	Department of Agriculture, Forestry, and Fisheries	1998
Fencing Act (No. 31 of 1963)	Department of Agriculture, Forestry, and Fisheries	1963
Hazardous Substances Act (Act No. 15 of 1973)	Department of Health	1973
Occupational Health and safety Act (Act No. 85 of 1993)	Department of Labour	1993
Spatial Planning and Land Use Management Act (Act 16 of 2013)	National Office of the Department of Rural Development & Land Reform	2013
KwaZulu-Natal Provincial Roads Act (Act No. 4 of 2001)	Department of Transport	2001
National Road Traffic Act (No. 93 of 1996)	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?

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

YES	
Approximately 30m ³	

How will the construction solid waste be disposed of? (describe)

The solid waste generated at the camp site and along the construction footprint must be kept in bins/skips clearly labelled for the different waste groups and will be removed at least weekly and taken to the nearest permitted landfill site. However, there are no suitable sites close to Vulamehlo and Umzumbe Municipalities at present. Therefore, the contractor/s and engineers must identify a suitable site prior to construction commencing. As this is likely to be some way away from the P254/1 sufficient budget must be allocated for the legal disposal of all waste.

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

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The Vulamehlo and Umzumbe Municipality do not have any landfill site in their areas of jurisdiction. The Integrated Waste Management Plan has recommended that the location of centralised disposal facilities/transfer stations /drop-off centre in un-serviced areas were to be determined based on the most populated areas and distance to existing landfills. Waste from these areas will then be transferred to the existing or neighbouring landfill sites closest to the municipality.

Umdoni has the Humberdale Landfill site; however, it is rapidly reaching capacity so negotiations MUST be done with the Municipality before any dumping can take place. Only on receipt of written permission form the Municipality will dumping there be allowed.

Another site that could be considered is the Lovu landfill site; but, again, permission form the eThekweni Municipality must be sought prior to dumping there. Written Municipal permissions as well as weigh-bills must be retained on site by the contractor for record keeping purposes

The following recommendations are made to reduce the amount of waste needing disposal:

1. Existing road surfaces must be re-milled and reused as much as possible.
2. Old materials such as pipes and culverts to be returned to KZNDOT after completion of construction activities.
3. Excess old road material must be offered to the Local Authorities for them to reuse where needed.
4. Materials sourced from the site (top soil) will be used for the site rehabilitation and landscaping post construction.
5. Recycling must be undertaken where possible to reduce the amount of waste sent to the landfill site.
6. Alternatively engineers to identify nearest permitted landfill site where disposal can take place.

PLEASE NOTE: NO SPOIL SITES ARE TO BE USED FOR THIS MATERIAL

Will the activity produce solid waste during its operational phase?

NO

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

m³

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

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

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?

NO

If yes, contact the KZN Department of Economic Development, Tourism & 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?

NO

If yes, contact the KZN Department of Economic Development, Tourism & 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? NO

If yes, what estimated quantity will be produced per month? m³

Will the activity produce any effluent that will be treated and/or disposed of on site? NO

If yes, contact the KZN Department of Economic Development, Tourism & 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? NO

If yes, provide the particulars of the facility:

Facility name:	N/A	
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:



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 Economic Development, Tourism & Environmental Affairs to obtain clarity regarding the process requirements for your application.

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

Increased air and dust levels as a result of construction activities will further degrade the air quality and has high nuisance impacts on the surrounding, however this is expected to be reduced with the proposed road upgrade and measures to reduce dust during the construction activities are stipulated to in the EMPr.

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:



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Noise will be generated by the use of construction equipment and the movement of large trucks transporting concrete, rock, sand and gravel to the site. However, measures to reduce noise will be contained in the EMP; and relevant legislation regarding noise levels must be adhered to.

Rural noise level limits as per SANS 10103: 2008

The measurement and assessment of environmental noise with respect to annoyance and speech communication is found in the table below:

RURAL	OUTDOORS		INDOORS	
	DAY	NIGHT	DAY	NIGHT
	45 dB(A)	35 dB(A)	35 dB(A)	25 dB(A)

14. WATER USE

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

<input type="checkbox"/> municipal	<input type="checkbox"/> water board	<input type="checkbox"/> groundwater	<input checked="" type="checkbox"/> river, stream, dam or lake	<input type="checkbox"/> other	<input type="checkbox"/> 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:

Approximately
160 000 litres

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

YES

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

- i. Section 21 (a) of the NWA Act No 36 of 1998 “taking water from a water resource”;
- ii. Section 21(c) of the NWA Act No 36 of 1998 “Impeding or diverting the flow of water in a watercourse”;
- ii. Section 21(i) of the NWA Act No 36 of 1998 “Altering the bed, banks, course or characteristics of a water course.”

15. ENERGY EFFICIENCY

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

There is Eskom power poles along the entire section of the road to be upgraded. The proposed Road P254 upgrade would require electricity for the construction camp site. Mobile generators may be used on the work fronts. These must be maintained by the Contractors and placed on a lipped drip tray during their use.

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



SECTION C: SITE/ AREA/ PROPERTY DESCRIPTION

Important notes:

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- 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

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50	-	1:20	-	1:15 – 1:10	-	1:10	-	1:7,5 – 1:5	Steeper than 1:5
	1:20		1:15				1:7,5			

Alternative S2 (if any):

Flat	1:50	-	1:20	-	1:15 – 1:10	-	1:10	-	1:7,5 – 1:5	Steeper than 1:5
	1:20		1:15				1:7,5			

Alternative S3 (if any):

Flat	1:50	-	1:20	-	1:15 – 1:10	-	1:10	-	1:7,5 – 1:5	Steeper than 1:5
	1:20		1:15				1:7,5			

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

WETLAND

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

YES	
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Afzelia In-house soil scientist undertook the wetland assessment for this project.

Peer Review: Andrew Husted

If YES, please complete the following:

Name of the specialist:	Rowena Harrison		
Qualification(s) of the specialist:	MSc Soil Science		
Postal address:	P O Box 37069, Overport, Durban		
Postal code:	4067		
Telephone:	031 303 2835	Cell:	078 023 0532
E-mail:	rowena@afzelia.co.za	Fax:	086 692 2547

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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: YES NO

The following protected plant species are present on site: *Aloe barberae* (Tree Aloe) and *Hypoxis hemerocallidea* (Star flower), *Podocarpus latifolius* (Real Yellowwood), and *Zantedeschia aethiopica* (White Arum Lily). In the event of any damage or disturbance to specimens of these species, permits from Ezemvelo KwaZulu-Natal Wildlife (EKZNW) and Department of Agriculture, Forestry and Fisheries (DAFF) would be required prior to any construction activity commencing.

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: YES NO

Approximately 13 wetland areas comprising of six channelled valley bottom wetlands, and seven hillslope seepage wetlands. Drainage channels and associated riparian habitats and aquatic ecosystems. The iFafa River including all streams which are tributaries to iFafa River and Mtwalume River). All steep areas of the site and areas that are highly susceptible to erosion such as sharp bends and steep gradients. Please see below for the summary of the wetland assessment.

Are any further specialist studies recommended by the specialist? YES NO

If YES, specify: YES NO

Wetland rehabilitation and implementation

If YES, is such a report(s) attached in Appendix D? YES NO

Signature of specialist: _____ Date: _____

Input from the wetland specialist:

The main findings of the wetland report have been summarised below:

- The presence of thirteen wetland areas was identified within a 500m buffer surrounding the existing P254/1 road. The wetlands were classified into thirteen separate hydrogeomorphic (HGM) units, comprising of six channelled valley bottom wetlands, and seven hillslope seepage wetlands. A number of drainage channels were also identified including both “B” and “C” Section channels associated with riparian areas.
- A health assessment revealed that all wetlands were categorised as either **moderately (PES Category C)**, **largely modified (PES Category D)** or **seriously modified (PES Category E)** according to the WET-Health methods.
- Modifications to all wetland systems stem from the use of the larger catchment area for Eucalyptus spp plantations; sugarcane cultivation; infrastructural development and livestock grazing.
- These impacts have changed the hydrological flow, entering and flowing through the wetland systems. Such changes have led to soil erosion in all wetland systems as well as a general drying of the hydric soils.
- Despite the impacted state of the wetlands they all still provide a number of functions and ecosystem services that are predominantly associated with flood attenuation, streamflow regulation, sediment trapping, erosion control and the provision of natural resources. These functions need to be protected and improved through rehabilitation to protect downstream users.
- The Ecological Sensitivity and Importance of the wetlands has generally been recorded as “**medium**” as a result of the provision of natural resources and the maintenance of biodiversity that many of these wetlands provide as well as a general improvement in groundwater quality.

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- The road upgrade involves black topping the road, road re-alignment and the formalisation of stormwater control structures. The extent to which this civil work will have an impact on the wetland systems including further soil erosion, sedimentation, disturbance to the wetland and pollution of the wetland is central to the terms of reference of this study.
- The terms of reference of the wetland study do not address the issue of stormwater control in the larger catchment area. The current lack of adequate stormwater control from the larger catchment and existing road has created erosion in all the wetland areas. Failure to address this is likely to lead to the complete destruction of the majority of the wetland systems in the future.
- Mitigation measures are therefore key to limiting the effects on the wetlands and include the protection of soil, the rehabilitation of disturbed areas, the management of stormwater and pollution prevention. Such measures (as stated in the wetland report) must be included in the Environmental Management Programme.
- It must however be recognised that, apart from threats arising from anticipated future civil work, mitigation measures implemented within the wetland systems will only partly alleviate the threats already facing these systems. In order to effectively inhibit the damage caused by soil erosion and sediment deposition within the wetlands, the volume and velocity of water entering the system from outside the wetlands needs to be effectively managed. It is recognised that the volume of water entering the wetland system arises outside of and beyond the demarcated road reserve.
- The approach to wetland conservation and sustainable use therefore needs to take into account socio-economic and cultural implications and it is recommended that local communities are made aware of the very real negative impacts resulting from a lack of catchment management practices such as overgrazing.

In addition to the wetland delineation and functionality as outlined above an **AQUATIC ASSESSMENT was undertaken (in accordance with the requirements for a Water Use Licence application – a summary thereof is included below.**

Afzelia In-house aquatic specialist undertook the aquatic ecological assessment for this project.
Peer Review: Andrew Husted

Name of the specialist:	Jacob Schrijvershof		
Qualification(s) of the specialist:	MSc. Aquatic Ecology		
Postal address:	P O Box 37069, Overport, Durban		
Postal code:	4067		
Telephone:	031 303 2835	Cell:	
E-mail:	jacob@afzelia.co.za	Fax:	086 692 2547

Input from the aquatic specialist:

Aquatic Ecological Assessment Findings:

- I. The levels of in situ water quality constituents were observed to occur within the acceptable range for both the iFafa and the Nontunja rivers.

- II. The riparian vegetation was assessed according to the Riparian Vegetation Response Assessment Index (VEGRAI) methods. The riparian ecosystem of the iFafa and Nontunja rivers was found to be **seriously modified (Class E)**.
- III. The habitat assessments were used to evaluate the instream and riparian habitat of the iFafa and Nontunja rivers resulted in a **largely modified state (Class D)** according to the IHIA and adequate in supporting macro-invertebrate communities according to the IHAS findings for the iFafa and Nontunja rivers.
- IV. The macroinvertebrates assessment was found to be in a **moderately modified state (Class C)** according to the SASS scores and the MIRAI scores for the iFafa River. The Nontunja River's limited flow conditions restricted successful SASS 5 sampling.
- V. The overall Ecological Category (EC), determined through the application of the Eco-status V4 integration tool, resulted in a **largely modified C/D-class rating** for the current integrated ecological wellbeing of the iFafa and Nontunja rivers. This can be attributed to local and upstream water quality pollution, local habitat modification and extensive alien invasive vegetation which has impacted on the wellbeing of the ecosystem. Additional impacts include extensive sugar cane and Eucalyptus plantations, rubbish dumping and sand mining in the iFafa and Nontunja rivers and other tributaries.
- VI. A number of impacts from the construction and operational phases relating to erosion and sedimentation, pollution of water sources and the possible spread of alien invasive species will potentially occur as a result of the proposed bridge, culverts and road upgrades.
- VII. Mitigation measures, include (but are not limited to):
 - Design and implementation of a suitable stormwater runoff systems for the proposed iFafa River bridge, the Nontunja River culvert crossings and the road upgrade;
 - Effective rehabilitation of the disturbed areas as a result of the road upgrade, the bridge construction over the iFafa River and replacement of the culvert over the Nontunja River;
 - Limiting instream sedimentation;
 - Minimising pollutants entering any watercourses from the road, bridge and culvert; and
 - Implement a programme for the clearing/eradication of alien species including long term control of such species.
- VIII. Mitigation measures provided herein need to be incorporated into an Environmental Management Programme (construction and operational) for the proposed project.

GEOLOGICAL INFORMATION

No geotechnical investigations have been undertaken for this project so answers to the questions below are not possible.

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

	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).

The geological information has been extracted from the Department of Mineral Resources and Energy 1998 Map (1:250000 – 3030 Port Shepstone). The area is dominated by Mzunbegneis of Quha formation. The types of rocks found are shale, dwyka tillite and dolerite.

4. GROUND COVER

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

YES NO

Afzelia In-house botanist undertook the vegetation analysis for this project.

Peer Review: Gavin McDonald

If YES, please complete the following:

Name of the specialist:	Ronel Naude		
Qualification(s) of the specialist:	BSc (hons) Environmental Sciences		
Postal address:	P O Box 37069, Overport, Durban		
Postal code:	4067		
Telephone:	031 303 2835	Cell:	082 387 9408
E-mail:	ronel@afzelia.co.za	Fax:	086 692 2547

Are there any rare or endangered flora or fauna species (including red data species) present on any of the alternative sites?

YES NO

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If YES, specify and explain: The following protected plant species are present on site: *Aloe barberae* (Tree Aloe) and *Hypoxis hemerocallidea* (Star flower), *Podocarpus latifolius* (Real Yellowwood), and *Zantedeschia aethiopica* (White Arum Lily). In the event of any damage or disturbance to specimens of these species, permits from Ezemvelo KwaZulu-Natal Wildlife (EKZNW) and Department of Agriculture, Forestry and Fisheries (DAFF) would be required prior to any construction activity commencing. Please see below for the summary of the vegetation assessment.

Are there any special or sensitive habitats or other natural features present on any of the alternative sites? ~~YES~~

If YES, specify and explain: Approximately 13 wetland areas comprising of six channelled valley bottom wetlands, and seven hillslope seepage wetlands. Drainage channels and associated riparian habitats and aquatic ecosystems which includes the iFafa River and all streams which are tributaries to iFafa River and Mtwalume River.

Are any further specialist studies recommended by the specialist? ~~YES~~

If YES, specify: Invasive alien control programme must be incorporated into the Environmental Management Programme, particularly for the eradication of the *Lantana camara*, *Chromolaena odorata* (Paraffin weed) *Rubus cuneifolius* (American bramble), and *Solanum mauritianum* (Bugweed).

If YES, is such a report(s) attached in Appendix D? ~~YES~~

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).

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

If any of the boxes marked with an “E” 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.

Input from the vegetation specialist:

The main findings of the vegetation report have been summarised below:

- The dominant plant communities in the study area are grasslands and woodland.
- Large parts of the road run through *Eucalyptus spp* plantations and sugarcane.
- The woodlands associated with the plantations consist mostly of alien species like *Acacia longifolia* (Long-leaved Wattle), *Lantana camara* (Common Lantana), *Acacia decurrens* (green wattle) and *Solanum mauritianum* (Bugweed).
- The dominant species in the grasslands is *Aristida junciformis* (Gongoni three-awn).
- The dominant tree species in the area is *Syzygium cordatum* (Waterberry); other species include *Erythrina lysistemon* (Coral-tree), *Halleria lucida* (Tree fuchsia) and *Strelitzia nicolai* (Natal wild banana).
- In general, the vegetation in the study site is of low to medium ecological importance.
- The dominant graminoid species in the wetland and riparian areas is *Phragmites australis* (Common reed). Other species include *Pycnostachys urticifolia* (Hedgehog sage) and *Mariscus solidus*.
- The following protected plant species were encountered *Hypoxis hemerocallidea* (Star-flower) Red Listed as Declining, *Podocarpus latifolius* (Real Yellowwood) a Protected Tree species and the Provincially protected *Aloe barberae* (Tree Aloe) and *Zantedeschia aethiopica* (White Arum Lily).

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Impacts anticipated both during the construction and operational phases of the proposed road upgrade include the following:

- The removal of vegetation will cause dust, erosion, unstable slopes and loss of topsoil;
- Spread of alien vegetation; and
- Loss of conservation-important species and plant communities.

The following recommendations are proposed:

- Plant permits must be obtained from relevant authorities prior to any construction commencing.
- Once pegged, the route must be inspected during the summer season by a botanist and all conservation-important species identified must be translocated prior to any construction activities;
- Indigenous trees removed during construction must be replaced at a ratio of 1:5 (5 trees must be planted for every 1 tree removed) and protected trees at a ratio of 1:10 (10 trees must be planted for every 1 tree removed).
- An invasive alien control programme must be implemented to eradicate the existing alien invasive plants/trees and to prevent the introduction and spread of these species as per the legislative requirements specified under the Conservation of Agricultural Resources Act, 1983 amended in 2001 and the National Environmental Management: Biodiversity Act 2004 (Act No, 10 of 2004). The implementation of the invasive alien control programme must be for a period of 10 years.
- Loss of indigenous tree species must be kept to a minimum;
- Erosion control measures must be implemented in areas sensitive to erosion such as edges of slopes, exposed soil etc. These measures include but are not limited to - the use of sand bags, hessian sheets, silt fences and retention or replacement of vegetation.
- Disturbed areas must be rehabilitated immediately after construction has been completed in that area by planting appropriate indigenous plant species.
- Progressive rehabilitation must be implemented from the start of the construction period.
- The clearing of vegetation must be kept to a minimum and restricted to the working servitude.
- During the construction phase workers must be limited to areas under construction within the road servitude and access to the undeveloped areas must be strictly regulated.
- Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas and to ensure a ground cover of 85%.

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			Description
Natural area	YES		
Low density residential		NO	
Medium density residential	YES		Residents near the proposed development site could be affected by the increase in dust and noise levels; visual impacts, and construction related traffic delays during the

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	YES		<p>construction phase.</p> <p>The anticipated positive impacts of the activities during both its construction and operational phase will be employment opportunities and eventually improved access and road safety, and reduced dust and erosion risks</p>
High density residential		NO	
Informal residential		NO	
Retail commercial & warehousing	YES		
Light industrial		NO	
Medium industrial		NO	
Heavy industrial		NO	
Power station	YES	NO	
Office/consulting room		NO	
Military or police base/station/compound		NO	
Spoil heap or slimes dam		NO	
Quarry, sand or borrow pit		NO	
Dam or reservoir		NO	
Hospital/medical centre	YES		<p>There is Mgyai Provincial Clinic along the proposed Road P254/1. Care must be taken during construction to ensure safety of people and patients visiting the facility. Noise levels and dust pollution from construction activities must be managed to an acceptable level so as to avoid nuisance and health risks.</p>
School/ creche	YES		<p>There is Ekubusisweni and Amahlaya Primary School, including Gobume High School along the proposed Road P254/1. Care must be taken during construction to ensure safety of school children and noise levels from construction activities managed to an acceptable level so as to not interfere with teaching and learning.</p>
Tertiary education facility		NO	
Church	YES		As above.
Old age home		NO	
Sewage treatment plant		NO	
Train station or shunting yard		NO	
Railway line		NO	
Major road (4 lanes or more)		NO	
Airport		NO	
Harbour		NO	
Sport facilities		NO	
Golf course		NO	
Polo fields		NO	
Filling station		NO	
Landfill or waste treatment site		NO	
Plantation	YES		<p>The first part of the route consists mainly of larger catchment area for Eucalyptus spp plantations which contribute to the detriment of wetland systems. The proposed</p>

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	YES		<p>development is likely to impact on nearby plantations in the following ways:</p> <ul style="list-style-type: none"> • Improved access. • Increased risk of fires emanating from the construction site. • Traffic delay during construction activities. <p>Mitigation measures to reduce those impacts are included in the EMPr attached in Appendix F.</p>
Agriculture	YES		<p>The proposed Road P254/1 upgrade will provide access to potential agricultural developments, hopefully improving the agricultural sector which is one of the most important key economic sectors within the local, District and Provincial contexts of Vulamehlo Local Municipality.</p>
River, stream or wetland	YES		<p>The road traverses, streams and river (Fafa River) and there are 13 wetlands.</p> <p>The project will further impact on wetland system areas in the vicinity of the proposed road upgrade, <i>inter alia</i>, soil erosion, sedimentation, disturbance to the wetland and pollution of the wetland.</p> <p>Mitigation measures stated in the wetland report are included in this report and the EMPr.</p> <p>Construction and Upgrade of the culverts must be carefully managed through provisions within the Environmental Management Program (EMPr) and impacts monitored by an independent Environmental Control Officer (ECO).</p>
Nature conservation area	NO		
Mountain, hill or ridge	YES		<p>The first 9.0 kilometres of the road passes through gentle to semi-mountainous terrain. And from kilometre 9.0 onwards, the terrain becomes mountainous; at sharp bends and steep gradients, some deformation to the shape of the road and severe erosion has occurred due to this mountainous terrain and inadequate drainage systems and stormwater runoff control.</p> <p>The proposed road upgrade makes provision for stormwater control plan to improve the status quo.</p>
Museum	NO		
Historical building	NO		
Protected Area	NO		
Graveyard	NO		
Archaeological site	NO		
Other land uses (describe)	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?

	NO
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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:

N/A

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

	NO
	NO

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

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

Comment dated 21/06/2015 has been received from AMAFA which states as follows:

- According to the Paleo-sensitivity Map, the development falls in an area of low fossil sensitivity and does not require a paleontological survey. The general area of proposed development is associated with the Stone Age, Iron Age and historical resources and activities.
- The development is due to take place in a disturbed environment and is an upgrade of an existing road and is therefore not likely to impact on heritage resources.
- The Proponent's attention is drawn to the possibility of encountering heritage resources around the development area and is requested to record any such findings and send co-ordinates and images to Amafa.
- Amafa, the KwaZulu Natal Heritage Authority has no objection to the development.

The Proponent is also required to adhere to the below-mentioned standard conditions:

- Development including access roads and stock pile areas must be restricted within the existing servitude to avoid inadvertent damage or disturbance to heritage resources.
- Amafa must be contacted if any heritage objects are identified during earthmoving activities and all development must cease until further notice.
- No structures older than sixty years or parts thereof are allowed to be demolished altered or extended.

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—

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- (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—
 - (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.

This has been adhered to. Please refer to Appendix E.

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 Economic Development, Tourism & 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.

This has been adhered to. Please refer to Appendix E.

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.

This has been complied with appropriately. An advert was placed in both a regional and local newspaper namely Isolezwe and South Coast Herald. Please refer to Appendix E

We informed registered I&APs and surrounding land owners – directly – of the availability of the DBAR and where it can be viewed.

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 Economic Development, Tourism & 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.

This has been adhered to. Please refer to Appendix E.

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.

[This has been adhered to. Please refer to Appendix E.](#)

6. PARTICIPATION BY DISTRICT, LOCAL AND TRADITIONAL AUTHORITIES

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? NO

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

[REDACTED]

Has any comment been received from the local municipality? NO

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

[REDACTED]

Has any comment been received from a traditional authority? NO

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

[REDACTED]

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

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

[See below and the comments and response report in Appendix E.](#)

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.

The following comments and concerns have been raised by stakeholders and I&APs:

1. A vegetation specialist report must be compiled and included in the Draft Basic Assessment Report (DBAR) to determine the species and extent of indigenous trees and/or protected trees that will be affected in terms of Natural Forest Act, 1998 (Act 84 of 1998) as amended.

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2. Excavated furrows need to be back-filled and levelled properly in order to alleviate soil erosion.
3. Vegetation clearing must be kept at a minimum during site preparation and re-vegetation of disturbed areas during construction.
4. The following must be addressed in the Basic Assessment Report with regard to the proposed project:
 - I. Management of solid waste and hazardous waste material generated during the construction phase. This should include the storage of any material, chemicals, fuels, etc.
 - II. Identification of any environmental sensitive areas and water resources such as wetlands, streams, Rivers, etc, as well as possible pollution impacts and proposed mitigation measures to protect such water resources.
 - III. Stormwater management onsite both during and after the construction.
 - IV. Type of toilets facilities to be provided for construction workers.
 - V. Information regarding the 1:50 and 1:100 year floodlines of any watercourse on a clear legible.
 - VI. Erosion measures.
 - VII. Spill contingency plan for the construction phase of the project.
 - VIII. Sewage and Wastewater Management during the construction phase.
 - IX. the applicant must apply for a water use license for Section 21 (i) and (i) water uses of National Water Act, 1998 (Act No.36 of 1998) (NWA).
 - X. All Section 21 (i) water uses; the application must delineate the watercourses and riparian habitat using the Departmental guideline, "*a practical field procedure for identification and delineation of wetlands and riparian areas*". The applicant will require an authorization from the Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.
 - XI. A pre-Water Use License Application meeting is recommended during which administration and type of authorisation will be discussed.
 - XII. Wetland Delineation Study and a Functional Assessment must be carried out for all wetlands occurring onsite in close proximity to the site
 - XIII. Environmental Management Plan (EMP)
 - XIV. Department of Agriculture, Forestry and Fisheries must be contacted with regard to the Coastal Forest.
5. The Proponent is also required to adhere to the below-mentioned standard conditions:
 - Development including access roads and stock pile areas must be restricted within the existing servitude to avoid inadvertent damage or disturbance to heritage resources.
 - Amafa must be contacted if any heritage objects are identified during earthmoving activities and all development must cease until further notice.
 - No structures older than sixty years or parts thereof are allowed to be demolished altered or extended.

The EAP responded to each of the comments raised above. The detailed response are included in the comments and response report in Appendix E.

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:

Alternative S1 (preferred alternative)

Direct impacts:

1. Geotechnical investigation & Geological disturbance:
 - Digging of trial pits may cause limited physical change to soil structure.
 - Vehicular movements on and around the project site impacting on natural areas.
 - Disturbance to vegetation fauna, flora and aquatic fauna in the area. (through physical removal and compaction).
 - Potential hazard for fauna.
2. Road, drainages and culvert design and layout:
 - Inappropriate, poor or undersized culvert design.
 - Poor road design and alignment.
 - Poor design of drainage system.

Indirect impacts:

1. Road, drainages and culvert design and layout:
 - If inadequate or incorrect it will lead to stream or river sedimentation and erosion.
 - In likely to result in water flow problems such as impeding flow or bank erosion or constriction of the river width or constriction of the stream flow and becoming perched.

Cumulative impacts:

- Additional disturbance i.e. disturbance from various specialists.
- Greater erosion and transport of exposed soils on the hillslope
- Increased sedimentation of stream channels and rivers.

Alternative S2 (if any)

Direct impacts:
No alternative sites have been identified as this is an existing road in need of upgrading to improve road user safety and reduce the present level of environmental degradation caused by severe erosion, deformation to the shape of the road surface and inadequate stormwater management.

Indirect impacts:
N/A

Cumulative impacts:
N/A

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
Direct impacts:	No

<p>1. <u>Geotechnical investigation & Geological disturbance:</u></p> <ul style="list-style-type: none"> • A geotechnical investigation is required as soil classification is very helpful in the identification of suitable materials for use in road construction and also influences design protocol. • Geotechnical investigations must be conducted effectively so as to ensure minimum geological disturbance. • Geological investigation pits must be refilled and suitably compacted. • Vehicular movements must be kept to a minimum on natural areas. • Soil samples not used in geotechnical analysis must be returned to its original sequence (i.e. from parent material to topsoil) so as to minimise the impacts on the inherent soil structure and adjacent drainage lines. • Inform workers of all the sensitive fauna and aquatic fauna in the area prior to conducting assessments. <p>2. <u>Road, drainages and culvert design and layout:</u></p> <ul style="list-style-type: none"> • Apply appropriate design standards and surface grading. • The road design must be devised to deal with particularly sensitive environment. • Care must be taken at the design stage that the correct placement of water directing techniques within the road upgrade area be designed and specified in a manner that will best mitigate the effects of stormwater runoff. • Sustainable Urban Drainage Systems (SUDS) must be implemented to improve the management of stormwater drainage and road drainage system. This must include open, grass-lined channels, swales and basins, infiltration trenches and filter drains, pond or wetland. • Ensure the drainage provisions impose a minimal change to the natural pattern of hillslope hydrology, limit the potential for erosion, minimise scouring and degradation of adjacent wetlands. • The drainage provisions must include culverts of adequate discharge capacity and placed at a grade that maintains effective flow and the design must make provision for scour protection at the culvert outlet. • Designs include: <ul style="list-style-type: none"> ○ Bed level crossings or culverts which are wider than the channel providing the best opportunities for maintaining channel functions. ○ The outlet of box culverts must be designed to resist undermining and scour through using energy dissipaters. ○ The culverts must be designed so as to avoid excessive ponding at the inlet which will cause accumulation of floating debris, culvert clogging, and alterations to the hydrological and geomorphologic processes which govern the wetland. <p>Indirect impacts:</p> <p>1. <u>Road, drainages and culvert design and layout:</u></p> <ul style="list-style-type: none"> • Ensure that the culvert design does not impede the flow of 	<p>alternative assessed.</p>
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<p>water.</p> <ul style="list-style-type: none"> • The location and design of road drainage and discharge points must be done in a manner that minimises peak discharge to downstream aquatic resources. This must be done by: <ul style="list-style-type: none"> ○ Decreasing the volume of water directly reaching wetlands, rivers and streams as surface wash by encouraging infiltration; through the use of Sustainable Urban Drainage Systems (SUDS) techniques, stilling basins, swales and detention ponds. ○ Reducing the velocity of flows entering aquatic resources (either through structural or vegetative means); ○ Appropriately armouring discharge points against scouring. <p>Cumulative impacts:</p> <ul style="list-style-type: none"> • Additional disturbance must be mitigated by limiting the duration and extent of any studies which need to be undertaken on site to the minimum possible requirements in order to meet the objectives of the planning process. Any planning activities which require the removal or disturbance of vegetation and/ or excavation must be kept to a minimum. All disturbed area must be appropriately rehabilitated to their previous conditions once completed. 	
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No-go alternative (compulsory)

Direct impacts:

- The No-go alternative would leave the existing Road P254/1 in its current degraded and dangerous condition. At sharp bends and steep gradients, deformation to the shape of the road surface and formation of potholes would continue to occur; making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance. Severe erosion due to increased surface flow velocity of storm water runoff would continue to pose a serious threat and would continue to degrade the immediate and downstream environment as result of inadequate drainage systems.
- Elevated dust on P254/1 gravel road will continue to cause a health and environmental risk.
- The No-Go alternative would not require any construction work or have any detrimental impacts on the surrounding landowners, streams, rivers and wetlands. Vegetation, flora and fauna in the vicinity would not be negatively impacted. But the threat to biodiversity and water resources as a result of continuing encroachment of alien invasive species and the pollution of the water resource will remain.
- Further, no temporary job opportunities or skill development will happen for the local community during the construction phase.

Indirect impacts:

No indirect impacts

Cumulative impacts:

- Continued encroachment of alien invasive species.
- Continued erosion as a result of a lack of stormwater management
- Continued degradation of sensitive area such as the adjacent wetlands and

- riverine as a result of a lack of a rehabilitation plan.
- Traffic accidents

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):

Alternative A1 (preferred alternative) Not applicable

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:

1. Soil erosion and sedimentation including hydrological impact
Construction activities (i.e. Construction and upgrade of river crossings and surface drainage systems, stormwater control, construction of gabion baskets, diversion of stream, abstraction of water flow, bringing fill material to site, depositing fill material, excavations and vegetation clearing)

- Construction activities within the streams, rivers and on the river banks will loosen sediment material resulting in an increase in the current sediment load in the iFafa River or Mtwalume and associated tributaries.
- Construction activities in the vicinity of the rivers on site will also result in decreased bank stability within the construction zone.
- Physical disturbance of soil which will expose it to environmental factors including rainfall and wind which will accelerate sediment loading in the water bodies.
- Erosion of the soil surface has dramatic impact on topsoil availability and the ability of an area to support vegetation growth.
- Localised erosion and increased lateral sediment delivery to aquatic resources.

- Unchecked erosion will lead to the desiccation of the soils associated with the wetlands.
- Soils compaction will reduce aeration, permeability and water-holding capacity of the soils.
- Changes to natural drainage patterns.
- The culvert set at the incorrect elevation and the slope of the culvert not following the slope of the channel will increase the risk of erosion.
- Alteration of natural patterns of surface runoff reaching water resources downslope / downstream due to construction activities associated with bulk earthworks (such as excavations, reshaping, back-filling and compaction).

2. Impact on vegetation and reduction in hydrophilic and terrestrial vegetation

Road upgrade, installation of the culvert, vegetation clearing, clearance of vegetation within the riparian zone and wetlands, establishment of construction camp.

- Loss of indigenous species and species diversity including protected/threatened species.
- Loss of conservation-important species and plant communities.
- The removal of plants will result in a change in the natural vegetation composition of the area.
- Patches of natural vegetation and wetlands located outside of the construction footprint will be unnecessarily disturbed by construction workers and plant if the site is not appropriately demarcated.
- Disturbance to habitats.
- Disturbance of riparian zone and wetland vegetation

3. Impact on wetlands and aquatic environment

Installation of the culvert, construction activities near wetlands and instream, drainage patterns and stormwater runoff.

- Degradation of wetland areas due to the Negative impact on the geomorphological/functional integrity of the wetland systems and watercourse resources.
- The potential loss of riparian vegetation will result in the alteration of the riparian habitat.
- Physical alteration of natural water flow and sediment dynamics within wetlands/rivers, have a knock-on effect on habitat and ecosystem dynamics.

4. Pollution of water resources and soil

Road upgrade, installation of the culvert, surfacing, movement of vehicles and equipment, site establishment and de-establishment, waste management

- Pollution of water resources and soil through the mismanagement of waste and pollutants like hydrocarbons, construction waste and hazardous chemicals resulting in these substances entering and polluting sensitive natural environments either directly through surface runoff during rainfall events, or subsurface water movement.
- Oil / fuel leaks from vehicles and portable construction equipment such as generators will result in surface / groundwater contamination.
- Paints, solvents, fuel cement/concrete, oil/grease and other hazardous substances stored will result in surface/groundwater contamination if not appropriately managed.

- Roadside soils may be affected by airborne pollutants emitted by vehicle exhausts, particulates from tyre, brake and road wear; petrochemical products leaking from vehicles; hazardous spills at construction camps, refuelling depots, asphalt plants and temporary sanitation facilities; polluted runoff from the construction camp and material stockpiles.

5. Spread of Alien Invasive Species

Vegetation clearing, clearance of vegetation within the riparian zone and wetlands, movement of vehicles, equipment and construction workers.

- Increased risk of invasive alien plant.
- The disturbance of riparian habitat due to construction activities will also provide an opportunity for invasive alien plants to proliferate in the area and increase the competition to indigenous plants.
- Seed-bank enrichment – seed contamination via material and equipment imports, vehicles and workers (seeds attached to these implements and workers).
- Alien invader plant species pose an ecological threat as they alter habitat structure, lower biodiversity (both number and “quality” of species), change nutrient cycling and productivity, and modify food webs.

6. Disturbance of fauna and livestock

Road upgrade, installation of the culvert, movement of vehicles and equipment, site establishment and de-establishment.

- Potential to destroy to disturb, harm or injure faunal species & livestock (especially species with limited mobility) inhabiting the site directly through construction activities and poaching by construction workers.
- Reduce habitat quality and species diversity.
- Disruption of access to grazing and crop areas during construction process.
- Potential for theft of livestock.

7. Elevated air and dust level

Excavation, operation and movement of vehicles and equipment, transportation of soil and other material to disposal sites, sourcing of construction materials.

- Dust generation associated with construction and excavation activities.
- Removal of plants and soil disturbance associated with construction will increase the level of dust emission.
- Dust emissions associated with movement of vehicles transporting concrete, rock, sand, pre-mix and gravel to the site with respect to site preparation and driving to and from the site.
- Soil and material stockpiles, if not properly seeded/ covered/contained, will generate dust during windy weather.
- Loading of soil and material into load trucks will generate significant amounts of dust.
- Transportation of soil and other material to disposal sites (landfill or stockpile areas) without the load being covered will generate dust.
- Not covering skips and other waste disposal containers used to hold construction related waste materials (rubble and concrete) can generate dust.
- Air pollution from improper waste management.
- Diminished visibility and therefore safety.

8. Noise pollution

Excavation, operation and movement of vehicles and equipment

- Construction activities have the potential to generate significant amounts of noise e.g. the operation of large plant (machinery or equipment) will increase the noise levels and nuisance factor.
- Workers, bystanders and adjacent landowners to construction footprint Road servitude are likely to be exposed to noise generated by other construction workers.
- There is Ekubusisweni and Amahlaya Primary School, including Gobume High School along the proposed Road P254/1 which will be impacted by noise pollution during construction activities.

9. Waste production

Site establishment and de-establishment, Contractor's laydown area (camp), Road upgrade, installation of the culvert.

- Increasing the potential contamination of the surrounding environment due to improper storage and transport of waste.
- Failure to provide enough skips and bin strategically situated throughout the work face and at the construction camp will lead to increase littering by workers.

Types of waste include:

- Solid waste – e.g. Plastics, metal, wood, stone, construction rubble, concrete and general domestic waste.
- Chemical waste – e.g. Petrochemicals, resins, paints and herbicides
- Sewage and waste water:
 - Chemical toilet has the potential to contaminate the environment if not appropriately managed.
 - Wastewater from construction activities may be contaminated and can result in the pollution of the surrounding environment. This would mainly relate to storm water potentially contained within bunded areas where spillages may have occurred.

10. Social impacts & Road safety

Road upgrade, excavation, operation and movement of vehicles and equipment

- Road safety during the construction phase is also a key issue, as the movement of heavy machinery, vehicles and other dangerous construction activities (e.g., blasting) could pose a risk to road users and will require careful management and planning.
- Site access points and construction areas will result in increased road safety issues to members of the public if not adequately delineated with the necessary road warning signage or Stop/Go controls.
- Uncontrolled stopping and dropping of passengers by taxis and private vehicles in the vicinity of the construction works will increase the risk of accidents and delays on surrounding roads.
- If appropriate passage for pedestrians through the construction site is not provided and controlled this will increase the risk of accidents.
- Hazardous areas such as excavations and chemical storage areas pose a potential safety risk to members of the public as well as site workers.
- Dust (air) pollution caused by grading and levelling will cause a nuisance to

adjacent communities.

- Absence of secured waste storage facilities (fenced) pose a health and safety risk to pedestrians, workers and animals.

11. Positive impact

- Removal of Invasive Alien Vegetation during the construction period would control future impacts and improve the current conditions.
- Improved stormwater management will prevent extreme erosion and potential loss of vegetation.
- Temporary employment and skills development during construction phase.
- Increased spend and support of local businesses during construction phase.
- Improved access to the area between the Vulamehlo and Umzumbe Local Municipalities.
- The development will reduce inconvenience and delays while providing increased traffic efficiency and pedestrian safety.
- Expenditures on equipment, materials, fuel, lodging, food, and other needs will stimulate the local economy over the duration of the project.

Indirect impacts:

1. Degradation of water quality

- Sedimentation will impact on the water quality downstream of the construction site.
- An increase in pollutants will negatively affect aquatic ecosystems and lead to changes in the water quality of the wetlands.

2. Changes in the hydrological flow

- Disturbance to the soils and vegetation associated with the wetlands will lead to changes in the hydrological and geomorphologic integrity of these systems.
- Establishment of hardened surfaces and structures near or within watercourses (wetlands) will result in the following:
 - Increased volume and velocity of runoff which leads to erosion if not properly controlled.
 - Increased frequency and severity of flooding.

3. Loss of habitat

- Poaching of fauna for food and traditional medicine from area in the vicinity of the proposed construction site.
- Disturbance of habitats for faunal species having an impact on their protection and food sources.

4. Increased risk of fire

- Increased traffic and human activities add to the risk of accidental veld and forest fires along the road.

Cumulative impacts:

- Cumulative and downstream storm water effects resulting in degradation of riparian ecosystems.
- Deterioration in water quality will also affect the suitability for human domestic/agricultural use and have far reaching impacts for local communities who rely on rivers/wetlands as water supply.
- Soil compaction and blending will impact the viability of future vegetation establishment.

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- Increased alien plant seed contamination via construction material and equipment imports, vehicles and workers.
- Increased traffic in the local and regional area.
- Economic up-liftment for the local communities and businesses.

Alternative S2 (if any)

Direct impacts:

No alternative sites have been identified as this is an existing road in need of upgrading to improve road user safety and reduce the present level of environmental degradation caused by severe erosion, deformation to the shape of the road surface and inadequate stormwater management.

Indirect impacts:

N/A

Cumulative impacts:

N/A

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
<p>Direct impacts:</p> <p>1. <u>Soil erosion and sedimentation including hydrological impact</u></p> <ul style="list-style-type: none"> • Working during the winter months will reduce soil erosion potential in disturbed areas. • A stormwater management plan must be compiled to provide adequate drainage and reduce erosion potential prior to any construction activities commencing on the site. This is especially important in more steeply sloped areas. • Sustainable Urban Drainage Systems (SUDS) attached in Appendix F in the EMPR must be implemented to improve the management of stormwater drainage and road drainage system. This must include open, grass-lined channels, swales and basins, infiltration trenches and filter drains, pond or wetland. • Erosion control measures must be implemented in areas sensitive to erosion and where erosion has already occurred such as edges of slopes, exposed soil etc. These measures include but are not limited to - the use of sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which are used in the protection of slopes. • Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. • No scupper pipes may be placed onto any watercourse crossings. • Erosion protection measures must be installed at all pipe culverts or stormwater drainage pipes' outlets located along the route. • Culverts must be set at the correct elevation, the slope of culverts must follow the slope of the channel, and the use of embedded culverts which lie below the level of the channel are recommended to lower the risk of erosion and allow for aquatic faunal movement through the culvert. 	<p>No alternative assessed.</p>

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- The base of the culvert must have a minimum of 750mm stone base to allow water to flow under the concrete base.
- Culverts must span the entire width of the watercourse channel in order to maintain the channel functions.
- There shall be no mining of soil/sand required for construction purposes from the banks of rivers, channels, or wetlands. Sand must be brought in, if needed for construction purposes.
- Imported construction material must be stockpiled away from the river's and wetland's edge.
- Steep areas along the river bank which have been disturbed must be protected. One way to do this is through the use of gabion baskets placed at strategic locations where steep areas have been disturbed.
- Soil saver cells must be used to protect slopes against erosion, the cells must be filled with topsoil for revegetation.
- Bank erosion must be monitored at regular intervals during the construction phase in order to assess whether further river bank protection works are required.
- Increases in the turbidity of the river/channel must be monitored and controlled. Ways to control turbid water include passing it through sediment curtains.
- Implement appropriate topsoil management practices (stripping, stockpiling and reuse during rehabilitation of disturbed areas).
- Disturbed sites must be rehabilitated as soon as construction in an area is complete or near complete and not left until the end of the project to be rehabilitated.
- All soil stockpiles (in terrestrial areas) must be protected from erosion, stored on flat areas, and be surrounded by appropriate berms and silt fences.
- If water is temporarily diverted or dammed; minimal flow must be maintained, and natural flow patterns must be restored after construction has been completed, and the channel/wetland rehabilitated/restored to their original configurations as soon as practically possible.
- Water diversions must be temporary and only one diversion will be made at a time.
- Disturbed sites must be rehabilitated as soon as construction in an area is complete by planting appropriate indigenous plant species and not left until the end of the project to be rehabilitated.
- Banks and areas of erosion must be stabilised following construction activities with soft engineering options such as geofabric bags; soil cells; geo-mats etc. These options are preferred over hard engineering options.
- Where risks are high, unstable/eroding banks must be reinforced/stabilised using appropriate engineering works such as gabions.
- If the runoff after construction will cause erosion in a channel, the channel must be lined or flow control practices must be installed. The first choice of lining is grass or sod because this reduces runoff velocities and provides water quality benefits through filtration and infiltration. Should the velocity in the

channel erode the grass or sod, turf reinforcement mats, riprap, gabions or reno-mattresses must be used.

- Stockpiled topsoil must be replaced following construction activities and be shaped to match the natural topography of the site.

2. Impact on vegetation and reduction in hydrophilic and terrestrial vegetation

- Plant permits must be obtained from relevant authorities prior to any construction commencing.
- Once pegged, the route must be inspected during the summer season by a botanist and all conservation-important species identified must be translocated prior to any construction activities.
- Indigenous trees removed during construction must be replaced at a ratio of 1:5 (5 trees must be planted for every 1 tree removed) and protected trees at a ratio of 1:10 (10 trees must be planted for every 1 tree removed).
- Vegetation clearing must not be undertaken more than 10 days in advance of the work front. Vegetation clearing within 50m of any wetland, river must only be undertaken when construction activity is actually being undertaken at this point and such areas must be rehabilitated within 2 weeks of initial clearing occurring. The entire construction area must not be stripped of vegetation prior to commencing construction activities.
- Loss of indigenous tree species must be kept to a minimum.
- The clearing of vegetation must be kept to a minimum and restricted to the working servitude.
- During the construction phase workers must be limited to areas under construction within the road servitude which is 8m to 10m and access to the undeveloped areas must be strictly regulated.
- The construction and site camps must be fenced off for safety and security.
- Construction vehicles may not deviate from authorised routes so as to prevent damaging any vegetation outside the footprint.
- Upgrade of the road through streams and rivers must be carefully designed to ensure that soil and moisture regimes are not altered.
- In the event of construction within a wetland such as the installation of the culvert, the Contractor must remove all wetland vegetation (Hydrophytic plants) with the root ball intact. This vegetation is to be kept moist on site at all times and in a condition conducive to its continued existence. It is to be placed in the shade and covered with moistened (at all times) Hessian cloth until replanting, which is to be undertaken immediately after surface reinstatement, is complete. Alternatively the plants can be kept in a holding bed which is kept wet. The holding bed must be situated upstream of the construction area.
- Rehabilitate disturbed wetland vegetation as soon as construction in this area has ended. A wetland rehabilitation plan compiled by a suitable qualified/experienced specialist must be compiled.

3. Impact on wetlands and aquatic environment

- All river and wetland areas identified on site and mapped must be treated as sensitive and important areas.
- Activities directly impacting on wetlands and watercourses must occur during the dry winter months (low or zero flow periods) in order to limit the potential impact linked to high runoff rates.
- Construction within or adjacent to rivers and wetlands must be minimised as far as possible.
- Appropriate measures must be put in place to minimise erosion and the amount of sediment entering rivers and wetlands, particularly during the construction phase when the risk of such impacts will be high.
- No stockpiling of any materials may take place adjacent to the river or wetlands.
- Use vehicular digging of the banks of the streams associated with channelled valley bottom wetlands only in areas where this is deemed absolutely necessary.
- Excavating in wetlands to intercept groundwater or diffuse surface flows is strictly prohibited.
- The construction zone must be clearly demarcated and maintained (e.g. with chevron style tape strung between two well set poles) prior to the commencement of construction activities to ensure that construction vehicles do not unduly disturb wetland and riparian areas.
- The use of equipment/plant operating within watercourses (wetlands and rivers) is discouraged. Work must be undertaken by hand.
- The Proponent must ensure that a wetland rehabilitation plan is compiled by a suitable qualified/experienced specialist.
- No further physical damage other than that already present from the current road infrastructure must be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified.
- Rehabilitate disturbed wetland vegetation as soon as construction in this area has ended. A wetland rehabilitation plan compiled by a suitable qualified/experienced specialist must be compiled.

4. Pollution of water resources and soil

- The use of the borrow pit falls outside the ambit of this assessment.
- All construction related materials must be sourced from an approved supplier and copies of all permits must be given to the ECO prior to construction commencing.
- Proper management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the road.
- All waste generated during construction is to be disposed of as per the Environmental Management Programme contained in **Appendix F**.
- No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the wetland.

- Portable toilets must be placed outside of the 1:100year flood line from streams or 30m away from the temporary boundary of the wetland whichever is the greatest.
- Do not locate the construction camp, lay down areas, batching plants, storage facilities or any depot for any substance which causes or is likely to cause pollution within a distance of 50m of the watercourses or outside of the 100-year flood line.
- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area rehabilitated immediately – consult with a wetland/aquatic specialist if spills occur.
- Implement appropriate operation and maintenance of construction equipment to avoid petrochemical products from polluting the soil.
- The proper storage and handling of hazardous substances (hydrocarbons and chemicals) must be administered. All employees handling fuels and other hazardous materials are to be properly trained. Storage containers must be regularly inspected so as to prevent leaks.
- Routinely check machinery/plant for oil or fuel leaks each day before construction activities begin.
- Provide drip-trays, at all times, beneath standing machinery/plant.
- Washing and cleaning of equipment (i.e. paint brushes, containers, wheelbarrows, spades, picks) or labourers clothes must not be undertaken in or adjacent to wetlands or rivers/streams.
- An emergency spill response procedures contained in the EMPr attached in **Appendix F** has been developed to deal with the containment and clean-up of hazardous spills such as Drizit™ or Abzorbit™. A spill response team must be formed and must be trained on hazardous chemical substances, handling of hazardous chemical substances and how to perform clean-ups and at least one spill kit must be at the construction site and one at the campsite.

5. Spread of Alien Invasive Species

- An invasive alien control programme must be implemented to eradicate the existing alien invasive plants/trees and to prevent the introduction and spread of these species as per the legislative requirements specified under the Conservation of Agricultural Resources Act, 1983 amended in 2001 and the National Environmental Management: Biodiversity Act 2004 (Act No, 10 of 2004). The implementation of the invasive alien control programme must be for a period of 10 years.
- An alien invasive management programme must be incorporated into the Environmental Management Programme (both construction and operational phases), particularly for the eradication of the *Lantana camera*, *Chromolaena odorata* (Paraffin weed), *Rubus cuneifolius* (American bramble),

Solanum mauritianum (Bugweed) and eucalyptus trees/saplings outside of the plantation borders.

- Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.

6. Disturbance of fauna and livestock

- Selected workers must be given training by the ECO on the possible fauna that may be encountered along the Road P254/1.
- Site workers are to be informed of any sensitive fauna on the site prior to construction activities commencing and informed that poaching or disturbance is strictly prohibited.
- Under no circumstances shall any fauna be handled, removed, killed or interfered with by the applicant, site manager, contractor, engineers, and their employees, his subcontractors or his subcontractors' employees. However, if construction activities are likely to injure, kill or interfere with any fauna encountered on the site, appropriate action must be taken to ensure their protection.
- Any fauna that are found within the construction corridor must be moved to the closest point of natural or semi-natural vegetation outside the construction servitude. This includes those species perceived to be vermin (such as snakes and rats). The latter species may require the services of a specialist to catch and relocate dangerous/venomous species.
- No livestock is permitted in the construction camp and storage areas.
- Ensure that livestock watering points are located away from the road working servitude so as to prevent animals congregating near the road and avoid collisions with vehicles.

7. Elevated air and dust level

- Avoid the excavation, handling and transport of erodible materials under high wind conditions.
- Soil stockpiles must be wetted and/or sheltered from the wind, as required.
- All plant machinery must be maintained in good working order to minimise emissions.
- It must be ensured that, during transport, loads of loose material (such as sand etc.) on trucks is covered and/or dampened.
- Do not exceed the freeboard levels when transporting construction related materials
- Use dust abatement techniques, such as spraying from a water tanker, on unpaved, un-vegetated surfaces, camp construction areas, access road, work face to minimize airborne dust and during earthmoving activities, prior to clearing, before excavating, backfilling, compacting, or grading. This must apply particularly in instances of high wind speed or when dust is seen to be generated in significant quantities.
- Spray down surrounding/adjacent vegetation to prevent dust clogging the stomata which can prevent the plant from breathing.

- Vehicles travelling to and from the construction site must adhere to the speed limits so as to avoid producing excessive dust.
- Further ways to mitigate dust generation are detailed in the EMPr in **Appendix F**.

8. Noise pollution

- Operational hours (of construction) must be limited to between 07h00 and 17h00 to avoid sleep/rest disruption and general disturbance of adjacent land users. Notify adjacent land owners and ECO of after-hours construction work and of any other activity that could cause nuisance.
- The Contractor must warn any local communities and/or residents or road users that could be disturbed by noise generating activities, such as blasting, well in advance and must keep such activities to a minimum.
- During construction keep noise levels within acceptable limits in compliance with all relevant guidelines and regulations such as SANS 10103: 2008
- All vehicles and machinery must be fitted with appropriate silencing technology that must be properly maintained.
- The use of all plant and machinery must be appropriate to the task required in order to reduce noise levels.
- Temporary noise pollution due to construction works must be minimised by ensuring the proper maintenance of equipment and vehicles, as well as using low noise equipment where possible.
- When feasible, shut down idling vehicles and equipment
- Increased attention to maintenance of tools and equipment will reduce worksite noise levels.
- Ensure that employees and staff conduct themselves in an acceptable manner while on site during work hours as per EMPr contained in **Appendix F**.

9. Waste production

- All waste generated during construction is to be disposed of at a suitably permitted landfill site that has capacity to take such waste. Letters of confirmation that the landfill site has capacity must be received from the local authority under whose jurisdiction the landfill falls.
- Management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the culverts.
- Signs must also be placed at appropriate locations to remind workers of good housekeeping practices including litter, recycling and pollution control.
- Provide adequate waste disposal facilities (bins, drums, skip) throughout the workface and at all construction camps and equipment lay-down areas. Workers must not litter or dispose of solid waste in the natural environment.
- Ensure that any rubbish/litter is cleared from the site on a daily basis and at least twice a day on windy days.
- Reuse and recycling activities during construction phase will

minimise waste production, avoiding large quantities of waste from being disposed of at the nearest permitted landfill site as all landfill sites within Vulamehlo and Umzumbe Local Municipalities have already reached the end of their lifespan.

- Any cement mixing must not occur directly onto bare soil; it must be done on bunded lipped mixing boards.
- Sanitation – portable toilets (**1 toilet per 7 users**) to be provided where construction is occurring. Portable toilets must be placed on a stable impervious level surface outside of the 1:100year flood line from streams or at least 30m away from the temporary boundary of the wetland and riparian zone; whichever is the greatest. Females must have a separate toilet from male workers. Male and female toilets should be positioned in separate areas.
- All waste products (spoil, construction materials, hazardous substances and general litter) must be removed following construction activities from wetland/riparian areas and disposed of in proper local waste facilities.

10. Social impacts & Road safety

- Strict safety regulations must be considered during the construction phase to avoid incidents of collisions between road users and construction vehicles, or risks of accidents on areas under construction during poor weather conditions
- Early closure construction activities must be considered during bad weather.
- Regular notices must be distributed to inform road users of construction activities to various points along the Road P254/1.
- Construction site workers must remain within the designated construction zone at all times unless otherwise authorised by the engineer and the ECO.
- Construction workers / construction vehicles to take heed of normal road safety regulations. A courteous and respectful driving manner must be maintained so as not to cause injury to animals or people.
- A speed limit of 30 km/h must be adhered to within the construction site and on all surrounding roads within the immediate vicinity of the site.
- Adequate road safety signage (DoT Standard) must be erected during construction to warn motorists and pedestrians of the potential dangers of the construction site e.g. concrete barriers must be installed along Road P187 to protect both site workers and motorists.
- Experienced Flagmen must be used to control traffic flow.
- Additional signage must be kept in storage on the construction site for replacement of missing and damaged signage.
- Adequate and safe passage through the construction zone for pedestrians and road users must be maintained at all times during the construction phase of the project.

11. Positive impact

- To ensure benefit to local community members a preferential procurement policy of employment for local community

members (including women) should be established at the start of the project.

- Appoint a suitable qualified / experienced Environmental Control Officer (ECO) to monitor the construction activities, the removal of IAPs during the construction period and the rehabilitation process and an independent Environmental Site Officer (ESO) to monitor the site on a daily basis.
- Consult with local communities regarding location of construction camps, access routes, and other likely disturbances during construction.
- Maximisation of skills development for local community members.

Indirect impacts:

1. Degradation of water quality

- Necessary erosion protection works for unstable banks and erosion gullies (e.g. coarse rock pack, riprap and gabions) including soft engineering techniques such as geotextiles or geofabric bags (e.g. Bidim, MacMat, Sealmac), soil savers; soil cells etc.; need to be utilised to ensure that banks of watercourses are appropriately stabilised and do not fail.
- The ESO must perform daily visual inspections of on-site water quality, identifying the source of any rapid increases in turbidity of surface waters and report to the ECO for remedying process where necessary.

2. Changes in the hydrological flow

- Reduce the volumes of flows deflected into the watercourse through appropriate drainage / stormwater systems. Infiltration must be promoted by means of oversized grassed side drains/swales, retention cells, etc. (SuDS principles).
- Water must be discharged at regular intervals along the road by means of mitre drains or culverts to prevent the build-up of stormwater. The spacing of the culverts/mitre drains must be dependent on the ability of the receiving environment to cope with the water and not simply on the capacity of the culverts/side drains (SuDS principles).
- Construct attenuation features (e.g. stilling basins) at the discharge points of the side drains to control the flows entering the water courses and allow contaminants to settle out.
- The location of run-off points must be located to minimise concentrated flows directly into wetlands and watercourses.
- Armouring of the downstream buffer zones area must be installed below all storm water outlets prior to flows entering downstream watercourses (SuDS principles).
- Discharge points must be well vegetated to increase surface roughness and encourage infiltration (SuDS principles).

3. Loss of habitat

- Appropriate environmental awareness talks must be given to workers on a weekly basis. This needs to include training on the need to protect indigenous biodiversity.

<p>4. <u>Increased risk of fire</u></p> <ul style="list-style-type: none"> No fires to be permitted at or around the construction site. <p>Cumulative impacts:</p> <ul style="list-style-type: none"> The contractor and engineer are to ensure that the abovementioned mitigation measures regarding soil erosion, soil compaction, sedimentation, flora, fauna disturbance, management of riparian ecosystem and water bodies are adhered to during the construction phase of the project. 	
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No-go alternative (compulsory)

<p>Direct impacts:</p> <ul style="list-style-type: none"> The No-go alternative would leave the existing Road P254/1 in its current degraded and dangerous condition. At sharp bends and steep gradients, deformation to the shape of the road surface and formation of potholes would continue to occur; making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance. Severe erosion due to increased surface flow velocity of storm water runoff would continue to pose a serious threat and would continue to degrade the immediate and downstream environment as result of inadequate drainage systems. Elevated dust on P254/1 gravel road will continue to cause a health and environmental risk. The No-Go alternative would not require any construction work or have any detrimental impacts on the surrounding landowners, streams, rivers and wetlands. Vegetation, flora and fauna in the vicinity would not be negatively impacted. But the threat to biodiversity and water resources as a result of continuing encroachment of alien invasive species and the pollution of the water resource will remain. Further, no temporary job opportunities or skill development will happen for the local community during the construction phase. <p>Indirect impacts: No indirect impacts</p> <p>Cumulative impacts:</p> <ul style="list-style-type: none"> Continued encroachment of alien invasive species. Continued erosion as a result of a lack of stormwater management Continued degradation of sensitive area such as the adjacent wetlands and riverine as a result of a lack of a rehabilitation plan. Traffic accidents
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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) Not applicable

<p>Direct impacts:</p> <p>Indirect impacts:</p> <p>Cumulative impacts:</p>

Alternative A2

<p>Direct impacts:</p>

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:

1. Erosion and sedimentation

- High runoff velocity and volumes due to an increase in hardened artificial surfaces after the road upgrade; often cause erosion in newly constructed or existing runoff stormwater channels.
- Erosion and sedimentation of surrounding banks due to malfunctioning or inadequate stormwater management system.
- If maintenance is not carried out as and when necessary, dilapidating culverts will lead to erosion within the channel.

2. Pollution of watercourses and hydrological impact

- Establishment of hardened surfaces and structures near or within watercourses (wetlands) will result in increased frequency and severity of flooding.
- Changes to the hydrological flow entering the wetland areas will contribute to further changes in the wetlands catchments leading to increased degradation of wetland areas.
- If maintenance is not carried out as and when necessary, the dilapidation of the entrance and exit of the culverts will lead to degradation within channelled valley bottom wetlands.
- Road run-off has been identified as a significant source of diffuse pollution contaminating receiving waters and may contain significant loads of nutrients, heavy metals, polycyclic aromatic hydrocarbons (PAHs), Volatile Organic Compounds (VOCs) such as benzene, toluene, ethylbenzene, xylene, and methyl tert-butyl ether (MTBE) These pollutants accumulate on impervious surfaces during the preceding dry period and then are washed into the receiving environment during the first rains after construction (First flush effect).
- General waste produced by road users has the potential to pollute and contaminate the environment around the point source and further afield.

3. Alien invasive species and reduction in hydrophilic vegetation

- Disturbed areas will quickly become colonised by invasive alien species if no management plan is implemented along the road, river, streams and its banks and within wetland areas.

- Alien invasive plants contribute to a reduction in stream flows thereby potentially increasing sediment inputs and altering natural hydrology of receiving watercourses.

4. Road safety

- Increased traffic and faster travel speeds.
- Increased risk of accidents associated with vehicular traffic and transport which may result in injuries or loss of life.

5. Positive impacts

- Reduced dust on roadside plants.
- Stormwater management will be upgraded through efficient runoff and drainage systems that adopt the principle of increasing surface roughness and infiltration leading to a greater control of surface flow during the operational phase.
- Noteworthy potential benefits to the aquatic environment are favourable; particularly in terms of sedimentation and modified hydrology of the rivers and wetlands, which have the greatest potential improvement from the current road situation due to expected significant control in surface runoff and improved soil erosion controls
- Removal of alien vegetation which is a threat to water security as they consume hundreds of litres of water per day and destroy indigenous vegetation by impacting on the ecological integrity of an area.
- Improved Road Safety.
- Infrastructure improvements are likely to impact on the market access and transport logistics for agricultural products.
- Improved access and travel conditions on the P254/1 will help to reduce the transport costs and therefore retail prices of commodities and, due to improved affordability.
- The construction of upgrade improvements to the P254/1 Road itself will generate direct and indirect economic impacts to the local and regional economy.
- An improvement on the current situation, both in terms of improved air quality and vegetation survival as a result of reduced dust levels.

Indirect impacts:

- Unchecked erosion will lead to the desiccation of the soils associated with the wetland which will have knock on effects on the flora and fauna that utilise the wetland areas.
- Impacts on the water quality downstream during operation of the road.

Cumulative impacts:

- Failure of District Municipalities and DOT to repair damaged roads, upgrade low level stream crossings or replace results in damage to vehicle death or injury to pedestrians, and an increase in traffic accidents and congestion.
- Pollution during operation of the road (spillages of hazardous substances during road accidents and breakdowns).
- Contaminated runoff as a result of high concentrations of phosphorous, lead, iron, chromium, manganese, ammonia, cadmium, copper and zinc are usually present during initial runoff after a storm.

Alternative S2 (if any)

Direct impacts:

No alternative sites have been identified as this is an existing road in need of

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upgrading to improve road user safety and reduce the present level of environmental degradation caused by severe erosion, deformation to the shape of the road surface and inadequate stormwater management.

Indirect impacts:

N/A

Cumulative impacts:

N/A

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
<p>Direct impacts:</p> <p>1. <u>Erosion and sedimentation</u></p> <ul style="list-style-type: none"> • Water course crossings, stormwater pipe and culverts must be regularly checked and maintained to ensure they are not being degraded or causing degradation and that, openings (under or at a culvert opening) are kept clear to avoid impeding flows to downstream areas. This minimises erosion by ensuring also the culvert is maintaining the base level. • Erosion upstream and downstream of the road must be monitored at regular intervals in order to assess whether further river bank protection works are required. • Mitigation for long-term hydrological impacts can only be achieved through Sustainable Urban Drainage Systems (SUDS). <p>2. <u>Pollution of watercourses and hydrological impact</u></p> <ul style="list-style-type: none"> • The drainage provisions identified in design must be established early during the construction period and each provision must then be assessed after construction, and inspected after the first major storm event, to ensure there are no unexpected consequences. • Mitigation for long-term hydrological impacts can only be achieved through Sustainable Urban Drainage Systems (SUDS). All storm water runoff from the site must be supplemented by an appropriate road drainage system that must include open, grass-lined channels/swales rather than simply relying on underground piped systems or concrete V-drains. • Ensure waste management of the Road P254/1 is integrated into the Management Plan for the Municipalities. • Provide and manage waste collection services to ensure waste bins at taxi laybys and bus stops are regularly emptied and kept clean. • An awareness programme must be implemented by the responsible authority to encourage road users to minimise their waste generation, and thereby minimise the potential for waste pollution. If necessary, road users should be given plastic bags to collect their waste instead of disposing of it out the windows of their vehicles, into the surrounding environment. <p>3. <u>Alien invasive species and reduction in hydrophilic and terrestrial vegetation</u></p> <ul style="list-style-type: none"> • Implement an alien plant control programme on an on-going basis to ensure that alien plants are actively monitored and controlled/managed/eradicated from the road servitude particularly the eradication of the Lantana camera, Chromolaena 	<p>No alternative assessed.</p>

odorata (Paraffin weed) Rubus cuneifolius (American bramble), and Solanum mauritianum (Bugweed). , with adequate follow-up measures (particularly within the first 12 months of operation) to ensure that areas remain weed-free. This will need to include any disturbed areas created during construction that may have become colonised by invasive alien plants.

- Indigenous trees removed during construction must be replaced at a ratio of 1:5 (5 trees must be planted for every 1 tree removed) and protected trees at a ratio of 1:10 (10 trees must be planted for every 1 tree removed).
- Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas and to ensure a basal ground cover of 85%.
- Vegetation is to be reinstated as soon as weather conditions allow for plant growth. The following guidelines apply to re-vegetation:
 - Utilise erosion and sediment control techniques where needed.
 - Grade the disturbed area to a stable uniform slope. Vegetative cover will not develop on an unstable slope.
 - Loosen the soil by hand.
 - Plant when the weather will permit e.g suitable temperatures and moisture for plant growth. Spring plantings give the best results.
 - On unstable soils use a soil cells such as fibre netting or a fibre mat. The sloped area is seeded and the mat placed on top to protect the bare soil before the planted vegetation has become established.
 - A species list is provided in the EMPr in Appendix F for the rehabilitation of wetland vegetation affected by the proposed road upgrade.

4. Road safety

- Maintenance programme to undertake road repairs and clear debris are required.
- Regular maintenance and checking of the infrastructure must however take place over the lifespan of the project.

5. Positive impacts

- A monitoring programme must be implemented to enforce the continual eradication of alien invasive species during the construction phase. See EMPr attached in Appendix for the invasive alien plant control plan.
- Provincial & Local Government must ensure regular routine maintenance, maintenance works and repair of damaged culvert structures and stream crossing to avoid further damage to vehicle, death or injury to pedestrians and avoidance on ecological impacts, degradation, pollution both at downstream of its stream crossings.
- Appropriate signage must be placed to advise road users of sharp bends.
- Undertake timely maintenance of signs and roadway particularly

after severe storm and flooding.

Indirect impacts:

- Appropriate design of a stormwater management system for the proposed road upgrade during the design phase would render this impact insignificant during operation (SUDS principles).
- Regular maintenance and checking of the infrastructure must take place over the lifespan of the development.
- Erosion control measures must be used as soon as erosion is noted to stabilise soils and prevent wash prior to re-vegetation.
- Where significant soil compaction has occurred, the soil will need to be ripped in order to reduce the bulk density of the soil so that appropriate indigenous vegetation can become established at the site.
- If the recommendations mentioned in the Aquatic Assessment Report, wetland report, BAR and site specific EMPr attached in **Appendix G and F** are stringently implemented, the impacts on nearby aquatic habitat, wetlands and channels will be curtailed or prevented.

Cumulative impacts:

- Provincial & Local Government must ensure regular routine maintenance, maintenance works and repair of damaged roads; and watercourse crossings to avoid further damage to vehicle, death or injury to pedestrians, and an increase in traffic accidents and congestion including avoidance on ecological impacts, degradation, pollution both at the P187 and downstream of its river crossings etc.
- Establishment of emergency response procedures and services to deal with containment and clean-up of hazardous spills during road accidents and breakdowns.
- Maintenance of roadside vegetation cover, rehabilitation of the site, planting of indigenous trees / shrubs at every 50m intervals. 5 indigenous trees must be planted for every 1 (one) that is removed.

No-go alternative (compulsory)

Direct impacts:

- The No-go alternative would leave the existing Road P254/1 in its current degraded and dangerous condition. At sharp bends and steep gradients, deformation to the shape of the road surface and formation of potholes would continue to occur; making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance. Severe erosion due to increased surface flow velocity of storm water runoff would continue to pose a serious threat and would continue to degrade the immediate and downstream environment as result of inadequate drainage systems.
- Elevated dust on P254/1 gravel road will continue to cause a health and environmental risk.
- The No-Go alternative would not require any construction work or have any detrimental impacts on the surrounding landowners, streams, rivers and wetlands. Vegetation, flora and fauna in the vicinity would not be negatively impacted. But the threat to biodiversity and water resources as a result of continuing encroachment of alien invasive species and the pollution of the

water resource will remain.

- Further, no temporary job opportunities or skill development will happen for the local community during the construction phase.

Indirect impacts:
None

Cumulative impacts:

- Continued encroachment of alien invasive species.
- Continued erosion as a result of a lack of stormwater management
- Continued degradation of sensitive area such as the adjacent wetlands and riverine as a result of a lack of a rehabilitation plan.
- Traffic accidents

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) Not applicable

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

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

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:
It is unlikely that the road P254/1 and existing bridges / culvert structure crossings will be decommissioned as they are needed to facilitate movement of motorists and pedestrians. However, should the proposed development be decommissioned for whatever reason, a Decommissioning Plan must be prepared and implemented in order to mitigate and manage potential negative impacts on the receiving environment. This Plan must be review and approved by the relevant Environmental

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Authority prior to decommissioning activities commencing.

Indirect impacts:

Appropriate mitigation measures mentioned above on the construction and operational phase must be implemented to minimise adverse impacts. Should the decommissioning take place, KZN Department of Transport must appoint a suitably qualified ECO to oversee the decommissioning activities and to monitor compliance with the Decommissioning Plan.

Cumulative impacts:

N/A

Alternative S2

Direct impacts:

N/A

Indirect impacts:

N/A

Cumulative impacts:

N/A

Indicate mitigation measures to manage the potential impacts listed above:

Alternative S1	Alternative S2
<p>The Decommissioning Plan must prevent environmental impacts associated with decommissioning of project infrastructure and must address a site specific, efficient and effective rehabilitation plan and program. The following management actions must be adhered to:</p> <ul style="list-style-type: none"> • Undertake assessment of the end land use to determine what infrastructure will be removed or retained. • Any specific requirements to prevent pollution during demolition of infrastructure must be identified prior to the commencement of the demolition and rehabilitation activities. • Prior to decommissioning of the structures such as culverts, bridges and stormwater pipes, effective and safe disposal requirements must be identified prior to the commencement of such decommissioning. • Equipment, structures, and building material that can be reused must be identified prior to the commencement of rehabilitation activities. 	<p>No alternative assessed.</p>

No-go alternative (compulsory)

Direct impacts:

Indirect impacts:

Cumulative impacts:

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) Not applicable

Direct impacts:

Indirect impacts:

Cumulative impacts:

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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
<ul style="list-style-type: none"> • An independent Environmental Control Officer (ECO) and Environmental Site Officer (ESO), who are suitably experienced environmental management of road construction impacts must be appointed prior to commencement of any construction activities to ensure that the environmental conditions and the EMPr are implemented by the Contractor on site. • Plant permits must be obtained from relevant authorities prior to any construction commencing. • Once pegged, the route must be inspected by an independent Environmental Control Officer (ECO) with relevant experience and knowledge for vegetation and rehabilitation and all conservation-important species identified must be translocated prior to any construction activities. • The ECO will be required to conduct twice-monthly site visits –for the first 2 (two) months whilst site preparation is underway and during periods of high construction activity e.g. initial breaking ground, working within watercourses etc.; it may be necessary to increase these visits. Twice monthly visits must be two weeks apart. • The ESO will be required to monitor the activities on site on a daily basis and will report back to the ECO. • Further post construction audits are recommended every two months for the first year to ensure that all rehabilitation measures are successful. And thereafter twice a year during the operational phase for a period of 5 years. • Indigenous trees removed during construction must be replaced at a ratio of 1:5 (5 trees must be planted for every 1 tree removed) and protected trees at a ratio of 1:10 (10 trees must be planted for every 1 tree removed). • An invasive alien plant control programme must be implemented to eradicate the existing alien invasive plants/trees and to prevent the introduction and spread of these species as per the legislative requirements specified under the Conservation of Agricultural 	<p>No alternative assessed.</p>

<p>Resources Act, 1983 amended in 2001 and the National Environmental Management: Biodiversity Act 2004 (Act No, 10 of 2004). The implementation of the invasive alien control programme must be for a period of 10 years.</p> <ul style="list-style-type: none"> • Monitoring re-vegetation progress includes management of alien plant control must be as follows: <ul style="list-style-type: none"> ○ Recovery of disturbed areas must be monitored for the first 6 months to assess the success of rehabilitation actions. ○ Any areas that are not progressing satisfactorily must be identified (e.g. on a map) and action must be taken to actively re-vegetate these areas. ○ The ECO must assess the need / desirability for further monitoring and control after the first 12 months and include any recommendations for further action to the relevant environmental authority (EDTEA, DWS). ○ The use of herbicides in IAP control will require an investigation into the necessity, type and methodology to be used, effectiveness and impacts of the agent on all relevant eco-systems. • Any soil erosion in rehabilitated areas must also be addressed through appropriate actions. 	
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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)

The proposed project (alternative 1: preferred) according to the Engineering report compiled by Samani Consulting (2014) involves the upgrading of the existing Road P254/1 from a gravel base to a type 3 blacktop. The new road will be 8.5m wide over a length of approximately 28km with full surface drainage. In addition old culverts and dilapidated stormwater structure will be upgraded to better handle the flood occurrences. The design speed will be 60km/hr with the minimum horizontal radius of 110m and a minimum K value of 16. At natural water courses and stream crossings, pipe crossings or low level causeways using portal culverts will be constructed with associated inlet and outlet structures.

All storm water runoff from the site must be supplemented by soft engineering and the use of Sustainable Drainage Systems (SUDS).

Considering one of the major objectives of the P254/1 road upgrade design is to improve management of stormwater flow related to the road, the upgrade is, in itself, a mitigation measure to the environmental problems associated with the current road.

The primary concerns identified for the project, which will require careful management, are:

- disturbance and degradation of wetland areas;
- impact to aquatic and riparian habitat;
- direct impacts to vegetation;
- hydrological impacts (flow-related modifications);
- erosion and sedimentation risk;
- bank instability;
- pollution of water resources and soil; and
- Spread of Alien Invasive Species.
- Disturbance of fauna;
- Elevated dust level;
- Noise pollution; and
- Road safety related issues.

These negative impacts would be mainly limited to the construction phase and possibly the early stages of rehabilitation; and will therefore be of a temporary nature. Whilst these impacts can be rated as significant especially on the hydrological and aquatic /riverine areas they can be mitigated to an acceptable level provided that the mitigation measures recommended in this BAR and the accompanying EMP are implemented effectively and rehabilitation of the site is undertaken. A full impact significance assessment is provided in **Appendix G** highlighting potential main impacts during pre-construction, construction and operational phase.

The overall significance of positive environmental impacts is beneficial as it will result to the following:

- The flow regime of the receiving rivers and wetlands will be improved resulting in a more natural hydrological response.
- The road upgrade will include an efficient runoff and drainage system that adopts the principle of increasing surface roughness and infiltration thus reducing the impact of surface runoff.
- Potential benefits to the aquatic environment are favourable, particularly in terms of sedimentation and modified hydrology of the rivers and wetlands, which have the greatest potential improvement from the current road situation due to expected significant control in surface runoff and soil erosion to the environment.
- Removal of alien vegetation, which is a threat to water security as they consume hundreds of litres of water per day and destroy indigenous vegetation by impacting on the ecological integrity of an area.

Socio-economically the development would have long term positive impacts during its operational phase by generating direct and indirect economic impacts to the local and regional economy; and by contributing towards the local socio-economic environment through the addition of increased mobility, improved safety of road users (motorists and pedestrians) that would utilise the road, improved access on the market and transport logistics for agricultural products, reduction in travel times, dust level and erosion risks.

Alternative S2

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Alternative A1 (preferred alternative)

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Alternative A2

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No-go alternative (compulsory)

- The No-go alternative would leave the existing Road P254/1 in its current degraded and dangerous condition. At sharp bends and steep gradients, deformation to the shape of the road surface and formation of potholes would continue to occur; making driving conditions at these points potentially dangerous due to poor tyre traction and poor skid resistance. Severe erosion due to increased surface flow velocity of storm water runoff would continue to pose a serious threat and would continue to degrade the immediate and downstream environment as result of inadequate drainage systems.
- Elevated dust on P254/1 gravel road will continue to cause a health and environmental risk.
- The No-Go alternative would not require any construction work or have any detrimental impacts on the surrounding landowners, streams, rivers and wetlands. Vegetation, flora and fauna in the vicinity would not be negatively impacted. But the threat to biodiversity and water resources as a result of continuing encroachment of alien invasive species and the pollution of the water resource will remain.
- Further, no temporary job opportunities or skill development will happen for the local community during the construction phase.

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?

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

YES	

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:

Based on the balance of social, economic and environmental considerations, the impacts that will be caused by the proposed upgrade of Road P254/1 development are considered to be within acceptable limits of change, as long as the appropriate mitigation measures outlined in this report and the site specific EMPr attached in Appendix are implemented.

The following conditions should form part of the Environmental Authorisation should a positive decision be granted by the Competent Authority/ies:

- All the mitigation measures recommended in this report, specialist studies, and the site specific EMPr must be implemented and made a condition of the authorisation. See EMPr in **Appendix G**
- Financial provision must be set aside prior to construction commencing for the

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implementation of the rehabilitation of the disturbed ecosystems after completion of construction activities including monitoring, auditing and maintenance during operational phase of the development.

- The Proponent must appoint an independent, qualified and suitably experienced ECO with relevant experience and knowledge for vegetation and rehabilitation for the construction and rehabilitation phases of the road construction project to ensure compliance with the provision of the EMPr, Environmental Authorisation and Water Use Licence.
- Due to the size of the project and its varied aspects, it is recommended that an independent Environmental Site Officer (ESO) be appointed to implement the EMPr and monitor the activities on site on a daily basis.
- All parties involved in the construction and ongoing maintenance of the road (including contractors, engineers, and administrators) are, in terms of NEMA's "Duty of Care" and "Remediation of Damage" principals (Section 28), required to prevent any pollution or degradation of the environment, be responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.
- Construction activity must take place during the winter months as this is the low-flow time with respect to streams, rivers and wetlands.
- A geotechnical investigation must be completed to verify ground stability especially in and around watercourses and on steep slopes.
- All Municipal water pipelines servitude and clearance requirements must be agreed to in writing prior to construction commencing. Details of any agreed relocations or temporary disruptions in service must be submitted to the competent authority.
- Surrounding landowners, business owners and I&APs must be notified of the start of the construction phase as well as the progress of the various phases of the development in order for them to make the necessary arrangements.
- All conservation-important species identified must be translocated prior to any construction activities to suitable areas along a relocation plan.
- Plant permits must be obtained from relevant authorities prior to any construction commencing.
- Areas affected by construction activities in the proximity of the watercourses must be stabilised and rehabilitated so as per the recommendations from the vegetation report, wetland delineation and rehabilitation report to prevent degradation of the aquatic environment.
- Removal of alien invasive plants must occur with specific follow-up control measures, and reclamation and management of soil erosion along the proposed road alignment (this is an ongoing requirement in terms of national legislation).
- A stormwater control plan must be implemented to provide adequate drainage to manage stormwater and reduce erosion potential prior to any construction activities commencing on the site. This is especially important in more steeply sloped areas.
- The use of soft engineering and Sustainable Urban Drainage Systems (SUDS) must be implemented to manage stormwater drainage and road drainage system. This must include open, grass-lined channels, swales and basins, infiltration trenches, retention pond and filter drains, pond or wetland.
- All upgrade of water crossings must only be undertaken during the dry season due to the potential for high flow rates in the summer months from increased rainfall which will exacerbate erosion potential.
- Measures to protect slopes against erosion or to prevent river bank erosion and to stabilise stream banks must be applied such as coarse rock pack, riprap and gabions including soft

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engineering techniques such as geocells, geotextiles or geofabric bags (e.g. Bidim, MacMat, Sealmac), soil savers; soil cells.

- Stabilise existing erosion associated with any large drains running adjacent to the road before entering the watercourse. Such drains must now end in retention ponds and not enter the watercourses directly.
- Formalise and rehabilitate the road drainage discharging into the watercourse and in-channel culverts. This must be done in a manner that reduces the volume and velocity of flows and sediment reaching the channel through increased retention, detention and infiltration (SUDS).
- Discharge points must be set back from the river/stream channel and/or wetland and must end in a retention pond so as to allow for natural groundwater seepage thereby preventing direct stormwater impacts on the natural receiving environment.
- Culvert size (height and width) must be appropriate to handle anticipated flow volumes for all stream or river system.
- The culvert must be set at the correct elevation, the slope of the culvert must follow the slope of the channel, and use embedded culverts which lie below the level of the channel are recommended to lower the risk of erosion and allow for aquatic faunal movement through the culvert.
- The base of the culvert must have a minimum of 750mm stone base to allow water to flow under the concrete base.
- There shall be no mining of soil/sand required for construction purposes from the banks of rivers, channels, or wetlands. Sand must be brought in, if needed for construction purposes. This must also be stockpiled away from the river's and wetland's edge.
- Increases in the turbidity of the river/channel must be monitored and controlled. Ways to control turbid water include passing it through sediment curtains.
- Implement appropriate topsoil management practices (stripping, stockpiling and reuse during rehabilitation of disturbed areas).
- Disturbed sites must be rehabilitated as soon as construction in an area is complete or near complete and not left until the end of the project to be rehabilitated.
- All soil stockpiles (in terrestrial areas) must be protected from erosion, stored on flat areas, and be surrounded by appropriate berms and silt fences.
- If water is temporarily diverted or dammed; minimal flow must be maintained and natural flow patterns must be restored after construction has been completed, and the channel/wetland rehabilitated/restored to their original configurations as soon as construction is completed.
- Water diversions must be temporary and only one diversion may be made at a time.
- In terms of section 21 of the National Water Act of 1998 (Act No. 36 of 1998) a Water Use License must be granted by the Department of Water and Sanitation (DWS) for this project prior to construction activities commencing.
- The relevant borrow pit permit must be obtained for utilising the existing borrow pit sites along the road section in accordance with the regulations pertaining to the Minerals and Petroleum Resources Development Act (Act No.28 of 2002). Should such a permit not be available this borrow pit may not be used. The approved EMPr – as per the Department of Mineral Resources - for this borrow-pit must be lodged with the ECO.
- All construction related materials must be sourced from an approved supplier and copies of all permits must be given to the ECO prior to construction commencing.
- AMAFA must be contacted if any heritage objects are identified during earthmoving activities and all development must cease until further notice. Construction activity may

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only re-commence following written approval from AMAFA.

- Development including access roads and stock pile areas must be restricted within the existing servitude to avoid inadvertent damage or disturbance to heritage resources.
- No structures older than sixty years or parts thereof are allowed to be demolished altered or extended.
- No stockpiling of any materials may take place adjacent to the river or wetlands.
- Excavating in wetlands to intercept groundwater or diffuse surface flows is strictly prohibited.
- The construction zone must be clearly demarcated prior to the commencement of construction activities and maintained throughout the construction phase to ensure that construction vehicles do not unduly disturb wetland and riparian areas.
- The use of equipment/plant operating within watercourses (wetlands and rivers) is discouraged. Work must be undertaken by hand.
- All waste generated during the lifespan of the project is to be disposed of at a suitably permitted landfill site that has capacity to take such waste. Letters of confirmation that the landfill site has capacity must be received from the local authority under whose jurisdiction the landfill falls. Written Municipal permissions as well as weigh-bills must be retained on site by the contractor for record keeping purposes.
- All waste generated during construction is to be disposed of as per the Environmental Management Programme contained in Appendix F.
- No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the wetland.
- Portable toilets must be placed outside of the 1:100year flood line from streams or 30m away from the temporary boundary of the wetland whichever is the greatest.
- Do not locate the construction camp, lay down areas, batching plants, storage facilities or any depot for any substance which causes or is likely to cause pollution within a distance of 50m of the watercourses or outside of the 100-year flood line.
- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area immediately rehabilitated.
- Implement appropriate regularly operation and maintenance of construction equipment machinery/plant to avoid petrochemical products from polluting the soil.
- Provide drip-trays, at all times, beneath standing machinery/plant.
- Washing and cleaning of equipment (i.e. paint brushes, containers, wheelbarrows, spades, picks) or labourers clothes must not be undertaken in or adjacent to wetlands or rivers/streams.
- Management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the culverts.
- All waste generated during construction is to be disposed of at a suitably permitted landfill site that has capacity to take such waste. Letters of confirmation that the landfill site has capacity must be received from the local authority under whose jurisdiction the landfill falls. In addition the following recommendations are made to reduce the amount of waste needing disposal:
 - Existing road surfaces must be re-milled and reused as much as possible.
 - Old materials such as pipes and culverts to be returned to KZNDOT after completion of construction activities.
 - Excess old road material must be offered to the Local Authorities for them to reuse

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where needed.

- Materials sourced from the site (top soil) must be used for the site rehabilitation and landscaping post construction.
- Recycling must be undertaken where possible to reduce the amount of waste sent to the landfill site.

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