

Level 1
BBBEE



HANSLAB


Environmental Consultants


Draft Basic Assessment Report (BAR):


DM/0020/2021 KZN/EIA0001600/2021

The Proposed Upgrade of 500m of Street 106586 and Drainage Infrastructure, Ntuzuma, eThekwini Municipality.

Applicant: eThekwini Municipality


 031 563 1978

 www.hanslab.co.za

 P.O. BOX 2135

Umhlanga Manors,

4021

 shriya@hanslab.co.za



edtea

Department :
Economic Development, Tourism and
Environmental Affairs

PROVINCE OF KWAZULU-NATAL

(For official use only)


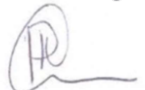
File Reference Number:

Application Number:

Date Received:

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

DOCUMENT CONTROL

Report Title		Draft Basic Assessment Report: The Proposed Upgrade of 500m of Street 106586 and Drainage Infrastructure, Ntuzuma, eThekweni Municipality.			
Report Reference		Ntuzuma/DBAR/01	Responsible Person	Mbali Nkosi	
Client Name		eThekweni Municipality	Client Contact Details	Mbali.Nkosi@durban.gov.za	
Revision	Date	Revision Details/ Status	Author	Review No.01	Review No.02
01	19/07/21	Draft BAR	Bhavisthra Ramlagan	Nokukhanya Gasa	N/A
Current Revision		01			
Date		19 July 2021			
APPROVAL					
Responsibility	Name	Qualification	Contact Details	Signature	
Author	Bhavisthra Ramlagan	BSc (Hons) Environmental Monitoring & Modelling	bhavisthra@hanslab.co.za Tel: 031 536 8310		
Reviewer 01	Nokukhanya Gasa	BSc (Hons) Environmental Management	nokukhanya@hanslab.co.za Tel: 031 563 1978		

PURPOSE OF THIS DOCUMENT

This Draft Basic Assessment Report (DBAR) is available for a commenting period of 30 days (excluding Public Holidays) from **26 July 2021 until 27 August 2021**. The objective of circulating the Draft Basic Assessment Report into the public domain will provide an opportunity for all stakeholders and Interested and Affected Parties (I&AP's) to provide comments and raise any concerns/issues regarding the proposed project. All state departments and I &AP's are reminded that in terms of EIA Regulations (2014) as amended, all state departments administering a law relating to the matter affecting the environment must submit comments within 30 days to Hanslab Pty (Ltd). Should no comments be received within the 30-day commenting period, according to sub-regulation 3(4) of the EIA Regulations (2014), it will be taken that the state department has no comments on the proposed project. This Draft Basic Assessment Report outlines the following:

- A description of the project, including project motivation;
- A description of the environment affected by the project to aid informed decision making;
- The Public Participation Process to be followed;
- Assessment of impacts for the planning, construction and operational phases of proposed the development;
- Recommendations to avoid or mitigate potential negative impacts and enhance the positive impacts of the proposed upgrade.

ABBREVIATIONS

BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
DWS	Department of Water and Sanitation
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDTEA	Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
KARI	KZN Amafa & Research institute
NEMA	National Environmental Management Act (Act 107, 1998)
NWA	National Water Act
OHS	Occupational Health and Safety
P	Passenger Car
PES	Present Ecological Sensitivity
PM	Project Manager
PPP	Public Participation Process
SDF	Spatial Development Framework
SU	Single Unit Truck
SWMP	Stormwater Management Plan
VEGRAI	Vegetation Response Assessment Index
WULA	Water Use License Application
WUL	Water Use License

GLOSSARY OF TERMS

DEFINITION	MEANING
APPLICANT (<i>EIA Regulations, 2014</i>)	Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in sections 24(5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).
DESIGN SPEED (<i>TRH 17, 1998</i>)	The speed selected for the purposes of the design correlation of those features of a road (such as horizontal curvature, vertical curvature, site distance and superelevation).
DEVELOPMENT (<i>EIA Regulations, 2014</i>)	The building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pts, that is necessary for the undertaking of a listed or specified activity.
DEVELOPMENT FOOTPRINT (<i>EIA Regulations, 2014</i>)	Any evidence of physical alteration as a result of the undertaking of any activity.
ENVIRONMENT (<i>National Environmental Management Act, 1998</i>)	The surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
ENVIRONMENTAL IMPACT ASSESSMENT (<i>EIA Regulations, 2014</i>)	Systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and S&EIR.
ENVIRONMENTAL MANAGEMENT PROGRAMME (<i>EIA Regulations, 2014</i>)	A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.
INTERESTED AND AFFECTED PARTY (<i>EIA Regulations, 2014</i>)	Any person or groups of persons who may express interest in a project or be affected by the project, positively or negatively.
KEY STAKEHOLDER (<i>EIA Regulations, 2014</i>)	Any person who acts as a spokesperson for his/her constituency and/or community/organisation, has specialised knowledge about the project and/or area, is directly or indirectly affected by the project or who considers himself/herself a key stakeholder.
OPERATING SPEED (<i>TRH 17, 1998</i>)	The highest running speed at which a driver can travel on a given road under favourable weather and prevailing traffic conditions, without at any time exceeding the design speed.
STAKEHOLDER (<i>EIA Regulations, 2014</i>)	Any person or group of persons who's live(s) may be affected by a project.

TERM	MEANING
STUDY AREA <i>(EIA Regulations, 2014)</i>	Refers to the entire study area encompassing all the alternatives as indicated on the study area or locality map.
WATERCOURSE <i>(EIA Regulations, 2014)</i>	Means: <ul style="list-style-type: none"> <i>a) a river or spring</i> <i>b) a natural channel in which water flows regularly or intermittently</i> <i>c) a wetland, pan, lake or dam into which , or from which water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No.36, 1998); and a reference to a watercourse included, where relevant, its bed and banks; and</i> <p>“wetland” means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.</p>

EXECUTIVE SUMMARY

SECTION A : PROJECT DESCRIPTION

Hanslab (Pty) Ltd. was appointed by the eThekweni Municipality (Applicant) as the Environmental Consultant for the proposed development. The project involves the upgrade of a portion of Street 106586 located in Ntuzuma C with an associated culvert.

The proposed upgrade of Street 106586 will involve conversion of the gravel surface road to an asphalt surface road as well as the construction of a concrete culvert over an existing Umhlangane River tributary. The upgrade will impact on the Umhlangane River Tributary, 100-year flood plain and a wetland through which the proposed concrete culvert will cross.

SECTION B : SITE/ AREA/ PROPERTY DESCRIPTION

Province	KwaZulu-Natal
District Municipality	eThekweni Metropolitan Municipality
Local Municipality	N/A
Ward Number(s)	45

The larger study area (falling within quaternary catchment U20M, which is drained by the uMgeni River) is characterised by summer rainfall patterns with mean annual precipitation of 975mm, with the bulk of the rainfall occurring between October and March (summer months). These high intensity rainfall conditions are conducive to high levels of surface runoff and subsequent erosion where soils are shallow, occur on steep slopes or are overgrazed. The wettest time of the year is January with an average of 120mm.

Geology underlying the larger study area is made up of elements from Ecca and Beaufort Groups (Karoo Supergroup) with Jurassic dolerite present in places. The project area is dominated by blue-grey shales which are derived from the Volksrust Formation. These shales are a common and widespread geological feature in northern KZN. They are often close to the surface, are impermeable and highly erodible. Rocky outcrops within the site were dominated by dolerite and Karoo sandstones

The entire development site is characterised by the KwaZulu-Natal Coastal Belt Thornveld, a terrestrial vegetation type with a national and provincial threat status of Vulnerable. No azonal vegetation type was flagged as present the 500m regulated area. The study area is not critical for

the maintenance of any conservation important biodiversity as the entire 500m regulated area was not classified as a Critical Biodiversity Area (CBA) or an Ecological Support Area (ESA).

SECTION C: PUBLIC PARTICIPATION

The Basic Assessment Report will be circulated to all stakeholders for a period of 30 days. All comments will be incorporated into the Final Basic Assessment Report and submitted to the KZN Department of Economic Development, Tourism and Environmental Affairs for approval. **Refer to Appendix E.1 for the Comments and Responses Report.**

SECTION D : IMPACT ASSESSMENT

Table 1: Summary of impacts – Planning Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Logistic arrangement	21	12
2	Planning and Design of preferred layout	32	0
3	Environmental Impacts	32	14
4	Wetland Disturbance	21	12
5	Social Aspects	36	0
6	Human and vehicle safety	28	5
	Total	28,33	7,17
Alternative 2 (Not Preferred)			
1	Alternative Radii	44	21
2	Low-Level River Crossing	36	20
3	Environmental Impacts	32	14
4	Alien Vegetation	24	0
5	Wetland Disturbance	21	12
6	Social Aspects	36	0
	Total	32,17	11,17
No-go alternative			
1	Human and vehicle safety	60	12
2	Alien vegetation	48	14
3	Job opportunities	36	14
	Total	48,00	13,33

Table 2: Summary of impacts – Construction Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Loss of Freshwater Habitat & Biota (Afzelia, 2020)	28	18
2	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	32	18
3	The upgrade of the proposed road and installation of the culvert (Positive)	56	0
4	Water and Soil Pollution Impact - (Afzelia, 2020)	18	10
5	Spillages and Spill Management	36	18
6	Storage and Handling of Waste	48	12
7	Ablution Facilities	44	16
8	Removal of Vegetation	24	8
9	Faunal disturbance/ interaction	30	8
10	Noise Pollution	33	12
11	Visual Impacts	27	12
12	Air Pollution	33	12
13	Cultural and Natural heritage	48	16
14	Socio-cultural dynamics	33	10
	Total	35,15	12,31
No-go Alternative			
1	The project will not be initiated	60	16
2	Biophysical Impacts	52	16
3	Social Impacts	40	16
	Total	50,67	16,00

Table 3: Summary of impacts – Operational Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	18	12
2	Water and Soil Pollution Impact	18	8
3	Upgraded crossing and new culvert	44	0
	Total	26,67	6,67
No-go Alternative			
1	Existing infrastructure	40	14
	Total	40,00	14,00

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER/ SPECIALISTS/ APPLICANT

Hanslab Environmental Consultants (Pty) Ltd. provides clients with a blend of traditional Environmental and Engineering Solutions complemented with “new school” dynamics and tools. We are determined to be the benchmark of quality within our industry by being the most innovative, diversified Environmental Specialists in South Africa.

Company Mission

Our goal is to ensure our clients are provided with the highest quality of services and to maintain high levels of professional ethics.

Company Vision

Through the implementation of modern technology and scientific innovation, we aim to provide our clients with tailor-made solutions

The company works closely with a trusted and accredited professional network of leading specialists, ensuring that a wealth of knowledge and innovation is brought to each customer experience. The company enjoys a staff complement of committed, highly trained, specialised, and skilled employees, most of who are from previously disadvantaged backgrounds.

The core project team members that are involved in this Basic Assessment Application Process are provided below.

Table 4: Details of the Environmental Assessment Practitioner (EAP)

EAP	ENVIRONMENTAL EXPERIENCE	CONTACT DETAILS
Ms. Bhavisthra Ramlagan	>5 years	Hanslab (Pty) Ltd Tell: (031) 563 1978 E-mail: bhavisthra@hanslab.co.za
Ms. Nokukhanya Gasa	>10 years	Hanslab (Pty) Ltd Tell: (031) 563 1978 E-mail: nokukhanya@hanslab.co.za

Table 5: Details of the Specialists

SPECIALIST DISCIPLINE	COMPANY	NAME	CONTACT DETAILS
Wetland Specialist	Afzelia Environmental Consultants	Brian Mafela	Brian@afzelia.co.za
Heritage Specialist	Umlando: Archaeological Surveys & Heritage Management	Gavin Anderson	umlando@gmail.com

Table 6: Details of the Applicant

APPLICANT	CONTACT PERSON	CONTACT DETAILS
eThekwini Municipality	Ms. Mbali Nkosi	Mobile: 071 185 9356 Email: Mbali.Nkosi@durban.gov.za

TABLE OF CONTENTS

SECTION A: ACTIVITY INFORMATION	16
A-1. PROJECT TITLE	16
A-2. PROJECT DESCRIPTION	16
A-3. LISTERED TRIGGERED ACTIVITIES	17
A-4. FEASIBLE AND REASONABLE ALTERNATIVES	22
A-4.1. Site/ Route Alternatives	22
A-4.2. Design Alternatives	22
A-5. NO-GO ALTERNATIVE	23
A-6. PHYSICAL SIZE OF THE ACTIVITY	24
A-6.1. Physical Size	24
A-7. SITE ACCESS	24
A-8. AERIAL MAP	24
A-9. LOCALITY MAP	24
A-10. SENSITIVITY MAP	25
A-11. SITE PHOTOGRAPHS	25
A-12. CIVIL DESIGN INFORMATION	25
A-13. ACTIVITY MOTIVATION (NEEDS AND DESIRABILITY)	25
A-13.1. Socio-Economic Motivation	25
A-13.2. Environmental Motivation	26
A-14. APPLICABLE LEGISLATION, POLICIES AND GUIDELINES	28
A-15. WASTE, EFFLUENT AND NOISE MANAGEMENT	30
A-15.1. Solid Waste Management	30
A-15.2. Liquid Effluent	30
A-15.3. Air Emissions	31
A-15.4. Noise Generation	31
A-16. WATER USE	31
SECTION B: SITE/ AREA/ PROPERTY DESCRIPTION	32
B-1. PROPERTY DESCRIPTION/ PHYSICAL ADDRESS	32
B-2. BASELINE BIOPHYSICAL CONDITIONS	32
B-2.1. Gradient of the Site	32
B-2.2. Temperature/ Climate	32
B-2.3. Geology/ Topography	32
B-2.4. Vegetation	33
B-2.6. Catchment Characteristics	33

B-3. SPECIALIST STUDIES	35
B-3.1. Wetland & Riparian Habitat Impact Assessment	35
B-3.2. Geotechnical Investigation	39
B-4. SOCIO-ECONOMIC CHARACTERISTICS OF THE STUDY AREA	41
B-4.1. Cultural and/or Historical Features	41
B-4.2. Socio-Economic Value	41
SECTION C: PUBLIC PARTICIPATION	43
C-1. ADVERTISEMENT AND SITE NOTICES	43
C-2. WARD COUNCILLOR/ COMMUNITY MEETING	43
C-3. KEY STAKEHOLDERS	44
C-4. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES	44
C-5. STAKEHOLDER ENGAGEMENT	44
C-5.1. Department of Economic Development Tourism and Environmental Affairs (EDTEA) .	44
C-6. COMMENTS AND RESPONSES	44
SECTION D: IMPACT ASSESSMENT	46
D-1. PREFERRED ROUTE/ TECHNOLOGY ALTERNATIVE	46
D-2. RISK ASSESSMENT METHODOLOGY	46
D-3. RANKING SCALES FOR ENVIRONMENTAL RISK ASSESSMENT	47
D-3.1. Risk Assessment Methodology	47
D-3.2. Ranking scales for environmental risk assessment	48
D-4. POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES	48
D-4.1. Planning/ Design Phase	49
D-4.2. Construction Phase	51
D-4.3. Operational Phase	51
D-5. SUMMARY OF IMPACTS	52
SECTION E: ENVIRONMENTAL IMPACT STATEMENT	54
E-1. PREFERRED ALTERNATIVE	54
E-2. ALTERNATIVE NO.02	54
E-3. NO-GO ALTERNATIVE	55
SECTION F: RECOMMENDATIONS	56
F-1. EAP RECOMMENDATIONS	56
SECTION G: CONCLUSION	57
REFERENCES	58
APPENDICES	59
ANNEXURE 1 – DETAILED IMPACT ASSESSMENT	60

LIST OF FIGURES

Figure 1: Aerial Map of the proposed upgrade (Source: ArcGIS version 10.5.1, 2019)	18
Figure 2: Locality Map of the proposed upgrade (Source: ArcGIS version 10.5.1, 2019).....	19
Figure 3: Durban’s Systematic Conservation Area map for the study area (Source: Afzelia Environmental Consultant, 2020).....	20
Figure 4: Watercourse delineation and classification map. (Source: Afzelia Environmental Consultants, 2020)	21
Figure 5: Priority Areas for Back to Basics Program (Source: eThekwini IDP, 2020/21)	26
Figure 6 Quaternary catchment of the study area. (Afzelia, 2020).	34
Figure 7: Watercourse delineation and classification map (Afzelia, 2020)	35
Figure 8: Site Plan For Proposed Culvert On 106586 Str, Ntuzuma (Source: eThekwini Preliminary Geotechnical Assessment, 2019)	40

LIST OF TABLES

Table 1: Summary of impacts – Planning Phase.....	9
Table 2: Summary of impacts – Construction Phase	10
Table 3: Summary of impacts – Operational Phase.....	10
Table 4: Details of the Environmental Assessment Practitioner (EAP).....	11
Table 5: Details of the Specialists.....	12
Table 6: Details of the Applicant	12
Table 7: Coordinates of the proposed upgrade associated with the development.	16
Table 8: Listing Notice No.01 of GNR 327, Listed Activity No.19 (EIA Regulations, 2014 as amended). 17	
Table 9: Activity within Tributary along 106586 Road.....	24
Table 10: Showing the Applicable Legislation/ Policies/ Guidelines.....	28
Table 11: General Characteristics and Classification of Artificial Wetland Units AW1 and AW2 (Afzelia, 2020).....	36
Table 12: General Characteristics of Riparian Habitat R1 and Classification of the Associated River (Afzelia, 2020)	36
Table 13: Functional / EcoServices Assessment results for Artificial Wetland Units AW1 and AW2.....	37
Table 14: EIS assessment results for Artificial Wetland Units AW1 and AW2.....	37
Table 15: PES assessment results for Riparian Habitat R1.....	38
Table 16: EIS assessment results for Riparian Habitat R1.	38
Table 17: Showing PPP information.....	43
Table 18: Key stakeholders involved in the Public Participation Process.	44
Table 19: Indicating the impacts associated with the construction/ operational phase of the development. 51	
Table 20: Summary of impacts – Planning Phase.....	52
Table 21: Summary of impacts – Construction Phase	53
Table 22: Summary of impacts – Operational Phase	53

SECTION A: ACTIVITY INFORMATION

A-1. PROJECT TITLE

The Upgrade of Street 106586 in Ntuzuma, North of Durban in KwaZulu-Natal.

A-2. PROJECT DESCRIPTION

Hanslab (Pty) Ltd was appointed by eThekweni Municipality (Applicant) to undertake the Basic Assessment Process to obtain an Environmental Authorisation for the Upgrade of Street 106586 in Ntuzuma, North of Durban in KwaZulu-Natal (refer to Figure 2 – Locality Map).

The proposed upgrade of Street 106586 will involve converting the gravel surface road to an asphalt surface road (7.38m x 500m) and constructing a concrete culvert over a tributary of the Umhlangane River. The upgrade will impact the Umhlangane River Tributary, 100-year flood plain and a wetland through which the proposed concrete culvert will cross. The proposed upgrade and associated structures trigger listed activities within the EIA Regulations, 2014 (as amended), constituting an Application for an Environmental Authorisation. The original gravel road is adjacent to a steel pedestrian bridge, and a stream runs across the road. There are also existing properties located close to the existing track.

The details of the structures can be found below.

Table 7: Coordinates of the proposed upgrade associated with the development.

No.	Structure	Location	Physical Footprint
01	Culvert structure	29° 44' 43.54''S; 30° 56' 15.05''E	5.76m ²
02	500m road upgrade	Start: 29° 44' 34.97'' S; 30° 56' 3.08'' E End: 29° 44' 45.85'' S; 30° 56' 16.92''E	3690m ² (Linear)

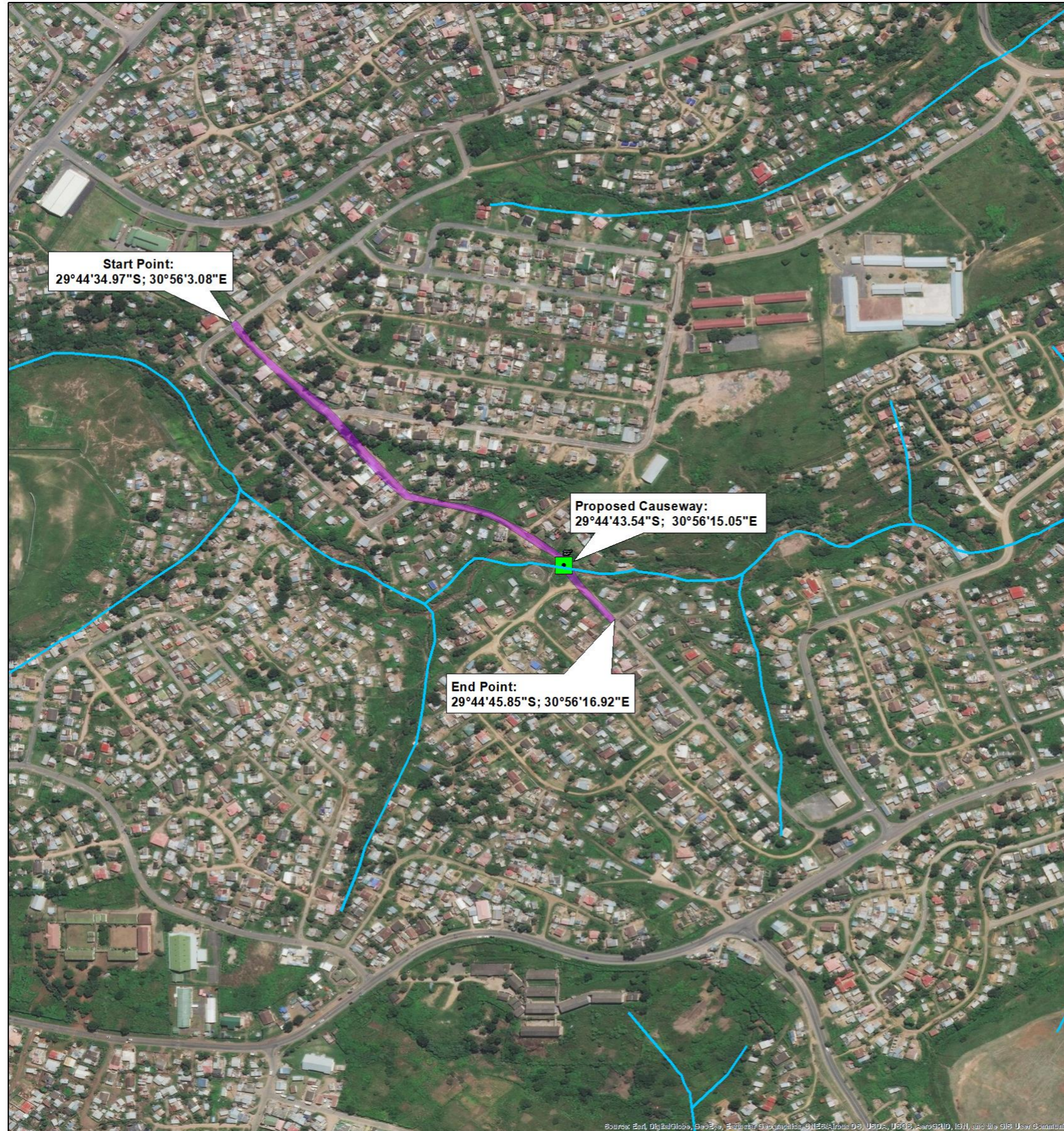
The proposed development is located in a densely populated, lower-income, urban area. This can be seen in the Aerial image (Figure 1)

Figure 3: Durban's Systematic Conservation Area map for the study area and Figure 4: Watercourse delineation and classification map outlines the environmental sensitivities of the site.

A-3. LISTERED TRIGGERED ACTIVITIES

Table 8: Listing Notice No.01 of GNR 327, Listed Activity No.19 (EIA Regulations, 2014 as amended)

No. and date of relevant notice	Activity No(s) (in terms of the relevant notice)	Description of each listed activity
GNR 327, Listing Notice 1 of 2014	Activity 19 as amended on the 07 April 2017. <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</i>	Relating to the development of a culvert in the Umhlangane River tributary, it is anticipated that approximately 20m ³ of soil will be removed.



Map: Aerial Map
Project: Street 106856
Scale: 1:3 000

Legend

- Proposed route: Street 106856
- Proposed Concrete Causeway
- Watercourses

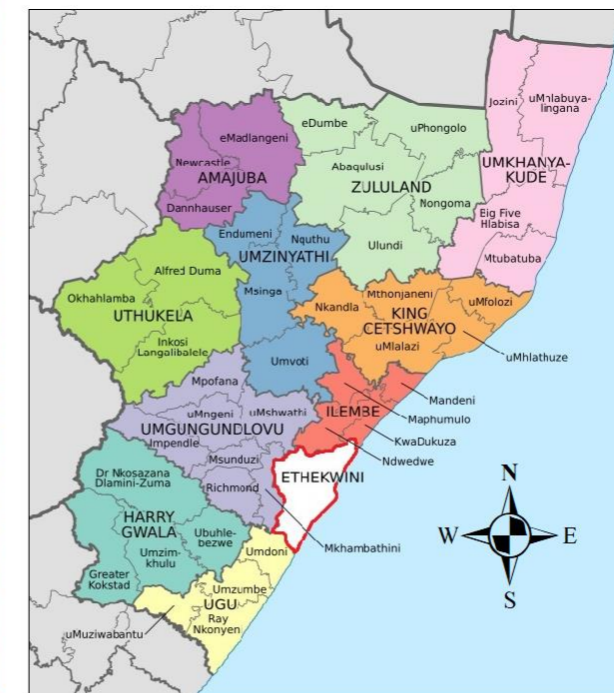
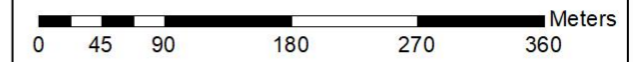


Figure 1: Aerial Map of the proposed upgrade (Source: ArcGIS version 10.5.1, 2019)



Map: Locality Map
Project: Street 106586
Scale: 1:20 000

Legend

- Proposed route: Street 106586
- Proposed Concrete Causeway

Meters



Figure 2: Locality Map of the proposed upgrade (Source: ArcGIS version 10.5.1, 2019)
Street 106586, Ntuzuma, eThekweni Municipality. Draft BAR
Page 19 of 60



Figure 3: Durban's Systematic Conservation Area map for the study area (Source: Afzelia Environmental Consultant, 2020)

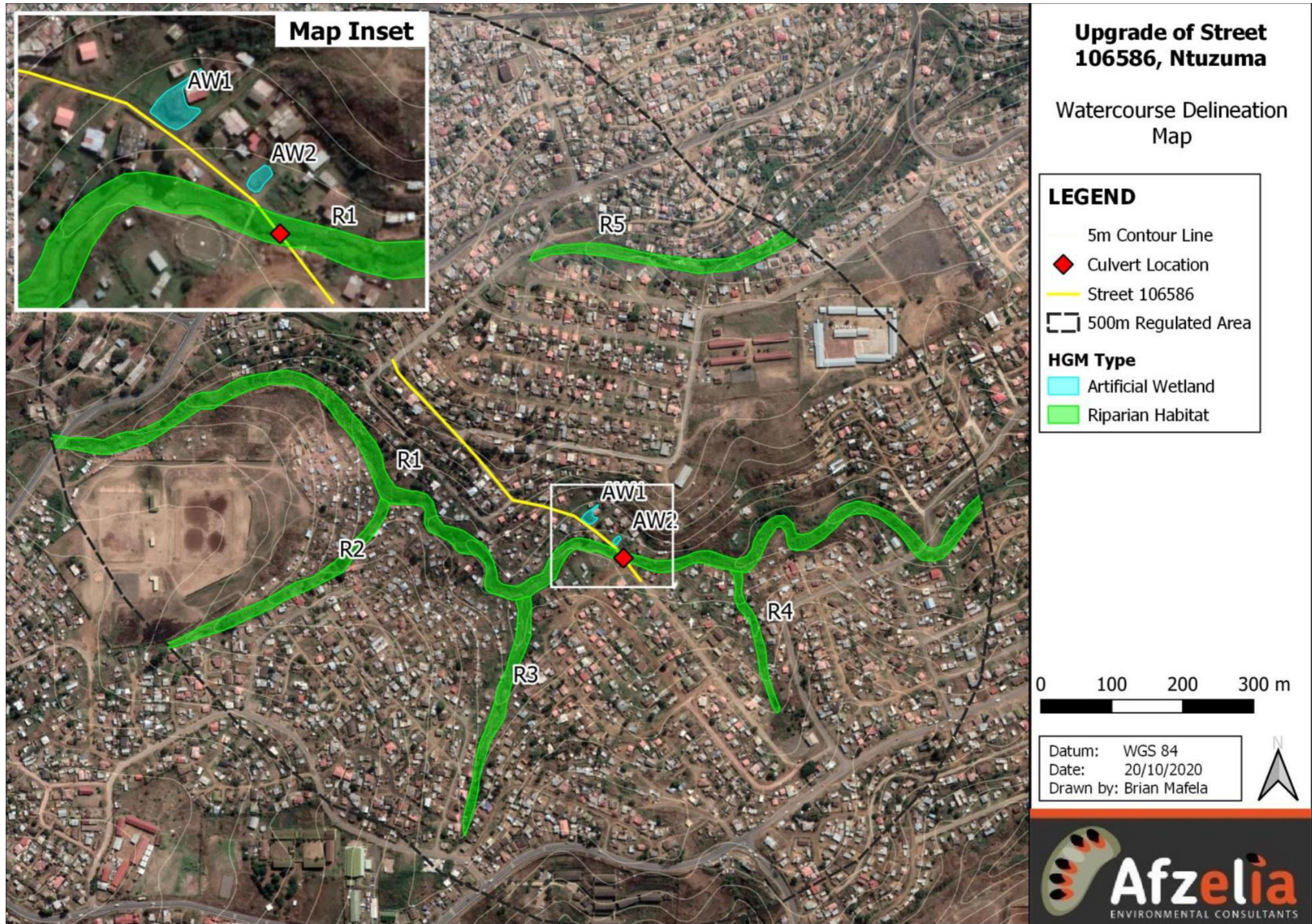


Figure 4: Watercourse delineation and classification map. (Source: Afzelia Environmental Consultants, 2020)

A-4. FEASIBLE AND REASONABLE ALTERNATIVES

Alternatives are defined in the EIA Regulations as “*different means of meeting the general purpose and requirements of the activity*”. In terms of the NEMA EIA Regulations (2014), as amended, alternatives must be assessed and evaluated by the EAP at a scale and level that enables adequate comparison with the proposed development. The EAP must provide opportunities for stakeholder input in terms of the identification and evaluation of alternatives. When considering alternatives, the criterion to be considered is “*any feasible and reasonable alternatives to the activity and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment*”.

Alternatives that have been considered for the proposed development are as follows:

A-4.1. Site/ Route Alternatives

Site Alternatives – The Applicant has not investigated any route alternatives. The proposed road is existing, and the applicant intends to upgrade it. This development aims to upgrade the existing road to an acceptable standard for effective public use. **Therefore, no site alternatives have been considered.**

A-4.2. Design Alternatives

A-4.2.1 Alternative 1 (Preferred)

According to the Design Report (compiled by eThekweni Municipality, 2021), the road is a Class D from the eThekweni Municipality’s Catalogue., therefore a geometric design suitable for a Class D road will be used. However, a pavement design ideal for a Class C road with design reliability of 80% (TRH4) will be applicable to this road.

Horizontal curves are required on this road as the space for construction has been taken up by residential buildings, therefore, the road cannot have a straight alignment. Three horizontal curves are required on the road, one isolated curve and a pair of reverse curves.

This preferred design uses radii that are smaller than those specified in the guidelines. This is done so that the alignment can have smooth curves and not abrupt transitions. Curve one has a radius of 50 metres. Curves two and three have equal radii, also of 50 metres. Because they are reverse curves and should have equal radii for the driver’s comfort, these radii are too tight and do not allow the

driver to drive comfortably at the design speed. In order to enable the driver to drive safely on the road, the design speed has to be reduced by introducing speed humps along the length of the road. This horizontal design was therefore used as the preferred design because of its feasibility.

A culvert, a road structure that is not permitted to be inundated under flood conditions, was selected as the more appropriate conduit to use in this tributary.

A-4.2.2 Alternative 2 (Not Preferred)

The alternative design that considered a minimum radius of 112 metres was calculated, and an absolute minimum radius of 110 metres (TRH17) was used for each of the three curves. The position of the tangents within the road reserve follows the existing gravel road pattern because of limited space. The minimum radius (110 metres) of the horizontal curves was too big to fit in between the tangents of the road. It, therefore, becomes a straight line instead of a curve because it is too big. A radius of 110metres deviates the road path by a considerable amount from its original course.

A Low-Level River Crossing, a road structure that could be submerged under flood conditions was considered as the capital requirement lower than that of a culvert. However, the low-level crossing was not the optimum option because of the risk associated with road users attempting to use the crossing during its periods of inundation. Although its initial capital requirement for construction may be lower than that of a culvert, in the long run, the required maintenance after floods to repair and remove debris surpasses the value of the initial investment.

A-5. NO-GO ALTERNATIVE

The No-Go Alternative considers the option/ case where no form of an upgrade will be undertaken. As a result, the existing gravel road will not be upgraded. This would imply that no activities will occur within the tributary and that there would be no significant impacts on the surroundings and the receiving environment.

However, if the existing conditions persist, there will be significant impacts on the future environment. Furthermore, there will be limited access to the households located around this development area and further deterioration to the tributary will continue. The construction phase aims to address the difficulties being faced by the community, and it also aims to improve the stormwater management as well as rehabilitation of the tributary. The Rehabilitation/Operational

Phase of the project aims to address issues related to the alien invasive species within the area and management of the road upgrade and associated structures. **No development would imply that the community will not benefit from such management activities, and the environment remains in its exiting conditions, and no improvements or adverse impacts will occur.**

A-6. PHYSICAL SIZE OF THE ACTIVITY

A-6.1. Physical Size

Table 9: Activity within Tributary along 106586 Road

Alternative	Size of the Activity
Alternative A1 – Preferred Alternative (Smaller radii and concrete culvert)	Culvert: 5.76m ² Road: 3240m ² (Linear)
Alternative A2 (Larger radii and low-level crossing)	Crossing: approx. 15m ² Road: 3240m ² (Linear)

A-7. SITE ACCESS

The site can be accessed by travelling via the N3, at interchange 165, EB-Cloete, keep left and follow signs for N2 towards Stanger. Take the Queen Nandi Drive exit and keep left. Follow signs for M45/Nandi Drive, turn left onto Malendela Rd/M21. At the roundabout, take the 2nd exit onto Undlondlo Rd. Continue onto Richmond Main Rd for about 1.1km. Continue straight onto Ingebo Dr for about 1.8km. Turn right onto Ihucu Dr. Turn left onto 106593 St. Turn left onto 106589 St. Turn right onto 106586 St.

A-8. AERIAL MAP

An aerial map provides the reader with a general layout of the proposed route in relation to the surrounding areas. Furthermore, it also illustrates general characteristics of the surrounding environment, such as the Topography and any associated Rivers/Wetlands. **Refer to Appendix A.1 for the Aerial map of the Proposed Road/ Structural Upgrade.**

A-9. LOCALITY MAP

A locality map provides the reader with a visual representation of information in a geographical context. It illustrates the transport networks, as well as rivers and drainage lines.

Refer to Appendix A.2 for the Locality map of the Proposed Road/ Structural Upgrade.

A-10. SENSITIVITY MAP

A sensitivity map provides the reader with the environmentally sensitive areas in relation to the proposed development. It also includes the riparian areas/ buffers associated with each area.

Refer to Appendix A.3 for the SANBI map of the Proposed Road/Structural Upgrade.

A-11. SITE PHOTOGRAPHS

Site photographs serve to record the surrounding environment and development footprint.

Refer to Appendix B for the site photographs taken during the initial site visit of the Proposed Road/ Structural Upgrade.

A-12. CIVIL DESIGN INFORMATION

Appendix C provides the civil design information for the proposed road upgrade, the contents have been presented as follows:

Appendix C.1: Signed engineering and SWMP report

Appendix C.2: Signed long-section drawings

Appendix C.3: Signed plan drawings

Appendix C.4: Signed x-section drawings

A-13. ACTIVITY MOTIVATION (NEEDS AND DESIRABILITY)

The Guideline Document on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 has been consulted to inform and provide structure for the Need and Desirability section outlined below.

The concept of “need and desirability” relates to, amongst others, the nature, scale, and location of the development being proposed, as well as the appropriate land use. Need and desirability are interrelated, and the two have been considered in an integrated and holistic manner.

A-13.1. Socio-Economic Motivation

The Back to Basics program was highlighted in the eThekweni Municipality IDP (2020/21 update). This programme has been established to assist municipalities in achieving an acceptable level of service delivery. Four (4) priorities are highlighted in this programme:



Figure 5: Priority Areas for Back to Basics Program (Source: eThekweni IDP, 2020/21)

The upgrade of this proposed road in Ntuzuma will coincide with Priority 1. The upgrade of this road will allow for a more convenient and safer access road to the Ntuzuma C Township.

The upgrade of this road will also allow for improved access to public facilities out of Ntuzuma, such as schools, clinics and places of economic activity within the areas. This will increase the opportunities in the area whilst also contributing to the social and economic upliftment. The project's construction phase will create employment opportunities and lead to skills development within the local community.

Strategic Goal 4 of the KwaZulu-Natal Provincial Growth and Development Strategy and Plan: 2012 to 2030 is “to provide infrastructure for the social and economic growth and development needs of KZN”. This upgrade will allow the Ntuzuma C area to be augmented for social and economic growth by improving access in and out of the community.

A-13.2. Environmental Motivation

The proposed development may cause some disturbance to the physical environment. It should be noted that two artificial wetlands are likely to be impacted by this development. However, these wetlands provide limited ecosystem services and are of low EIS, whilst the riparian habitat was assessed as seriously modified (E PES Class) and of low EIS.

The proposed development will also assist with control of the stormwater run-off. The construction phase will also be linked with the removal of various alien invasive species, promoting the growth of indigenous vegetation within the area.

The intent of this development in accordance with the surrounding development that has already been established, and there is no significant impact anticipated on the environment for this development.

A-14. APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

Table 10: Showing the Applicable Legislation/ Policies/ Guidelines

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY	DATE
National Environmental Management Act, 1998 (Act No 107 of 1998)	Environmental Authorisation is required in terms of Regulation GNR. 983 of Dec 2014 (included within NEMA 107 of 1998)	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	1998
Environmental Impact Assessment Regulations 2014 (GNR 982 – 985 of December 2014) as amended on the 07 April 2017	Environmental Authorisation required to undertake listed activities triggered by the proposed development.	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	1998
Constitution of Republic of South Africa (Act No 108 of 1996)	The project falls within the boundaries of South Africa	Republic of South Africa	1998
National Heritage Resources Act (Act No 25 of 1999)	Any possible artefacts which could be of cultural or historical significance must be identified.	SAHRA /AMAFA	1999
National Environmental Biodiversity Act 10 of 2004	Damaging of, disturbance to or destroying of indigenous plant or animal species during the clearing of the site.	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	2004
Integrated Environmental Management Information Series 5: Impact Significance (2002)	Guideline considering during the identification and evaluation of potential impacts associated with the proposed development, and the reporting thereof in this Basic Assessment Report	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	2002
National Water Act, Act 36 of 1998	Legislation consulted during the impact assessment process to determine the legal requirements relating to water resources management and the water-use authorisation requirements applicable to the proposed development.	KZN Department of Water and Sanitation (DWS)	1998

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY	DATE
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)	To provide for the health and safety of persons at work and the health and safety of persons about the use of plant and machinery	Department of Labour	1993
National Environmental Management: Waste Act (No 59 of 2008)	To provide for specific waste management measures and the remediation of contaminated land.	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	2008
Hazardous Substances Act (No 15 of 1973) and regulations	To provide for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances	KZN Department of Economic Development, Tourism & Environmental Affairs (EDTEA)	1973
Planning And Land Use Management By-Law	To provide for the Municipal Spatial Development Framework and the land use scheme of the Municipality.	eThekwini Metropolitan Municipality	2016
Tariff By-Law	To provide for the adoption and implementation of a tariff policy; for the general power to levy and recover fees, charges and tariffs and for matters incidental thereto.	eThekwini Metropolitan Municipality	2013
Stormwater Management By-Law	To provide for the regulation of stormwater management systems; to provide for measures to adapt to climate change and densification of built-up areas; to protect and preserve the natural environment; to provide for developments being done in a safe and sustainable manner with regard to rainfall and stormwater; to provide for a sustainable environment while pursuing economic development; and to provide for matters incidental thereto	eThekwini Metropolitan Municipality	2017

A-15. WASTE, EFFLUENT AND NOISE MANAGEMENT

A-15.1. Solid Waste Management

Will the activity produce solid construction waste during the construction/initiation phase?	YES X	NO
If YES, what estimated quantity will be produced per month?	Approx. 5 m ³	

How will the construction solid waste be disposed of?

All solid waste produced during construction will be kept in designated areas/construction campsite and disposed of by the contractor at the registered local landfill site. The contractor must provide the competent authority with disposal certificates from a registered landfill site via the ECO.

Where will the construction solid waste be disposed of?

The following landfill sites are available to accept building rubble: Bisasar Landfill Site and Marianhill Landfill Site. Depending on the frequency of disposal, the applicant may choose any of the local landfill sites for the disposal of construction waste.

Will the activity produce solid waste during its operational phase?	YES	NO X
If YES, what estimated quantity will be produced per month?	N/A	
Can any part of the solid waste be classified as hazardous in terms of the NEM: WA?	YES	NO X
Is the activity that is being applied for a solid waste handling or treatment facility?	YES	NO X

A-15.2. Liquid Effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	NO X
--	-----	---------

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES	NO X
---	-----	---------

A-15.3. Air Emissions

Will the activity release emissions into the atmosphere other than exhaust emissions and dust associated with construction phase activities?	YES	NO X
If YES, is it controlled by any legislation of any sphere of government? N/A	YES	NO

A-15.4. Noise Generation

Will the activity generate noise?	YES X	NO
If YES, is it controlled by any legislation of any sphere of government?	YES	NO X
<p>Describe the noise in terms of type and level:</p> <p>Noise will only be generated during the construction phase (from operating machinery, generators etc.) The level of the noise generated will be low and below 70 decibels threshold limit. No noise will be generated during the operational phase; therefore, the impact is temporary in nature and can be minimised with affective monitoring by the ECO. Although there is existing regulations regarding noise control, owing the nature of this development it will not be applicable.</p>		

A-16. WATER USE

Municipal	Water board	Groundwater	River, stream, dam or lake	Other X	The activity will not use water
<p>The eThekweni Municipality has been granted a General Authorisation (Ref: 21/2/1/U418/4/5/13) for the upgrade of this road and associated culvert from the Department of Water and Sanitation. Please see Authorisation in Appendix G.5 Water for use during the construction phase will sourced from the municipality as confirmed with eThekweni Municipality.</p>					

SECTION B: SITE/ AREA/ PROPERTY DESCRIPTION

B-1. PROPERTY DESCRIPTION/ PHYSICAL ADDRESS

Province	KwaZulu-Natal
District Municipality	eThekwini Metropolitan Municipality
Local Municipality	N/A
Ward Number(s)	45

B-2. BASELINE BIOPHYSICAL CONDITIONS

B-2.1. Gradient of the Site

Flat	1:50 – 1:20 X	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7.5	1:7.5 – 1:5	Steeper than 1:5
------	------------------------------	-------------	-------------	-----------------	-------------	---------------------

B-2.2. Temperature/ Climate

The larger study area is characterised by summer rainfall patterns with mean annual precipitation of 975mm, with the bulk of the rainfall occurring between October and March (summer months). These high-intensity rainfall conditions are conducive to high levels of surface runoff and subsequent erosion where soils are shallow, occur on steep slopes or are overgrazed. The wettest time of the year is January, with an average of 120mm. The seasonality of precipitation is a driving factor behind the hydrological cycles of water resources within the area. Typically, watercourses have a higher flow rate during the summer months. Temperatures vary with an average temperature ranging from 13.2°C in June to 24.1°C in February (Mucina & Rutherford, 2006; Climatological data BRU Sb1- Tugela-Mooi).

B-2.3. Geology/ Topography

Water resources in South Africa are the products of the erosional and depositional processes and the presence of geological influences controlled by the variable environment across the country. South Africa is a semi-arid country with differences in rainfall patterns, topography, and geology. The geological characteristics of an area influence the topography, soil types and textures, vegetation communities and faunal assemblages present. These all determine the types and locations of wetland and watercourse systems within the landscape.

Geology underlying the larger study area is made up of elements from Ecca and Beaufort Groups (Karoo Supergroup) with Jurassic dolerite present in places. These areas are characterised by mudstones, shales, and fine-grained sandstones (Alfred Duma Local Municipality IDP).

The project area is dominated by blue-grey shales, which are derived from the Volksrust Formation, these shales are a common and widespread geological feature in northern KZN. They are often close to the surface, are impermeable and highly erodible. Rocky outcrops within site were dominated by dolerite and Karoo sandstones.

B-2.4. Vegetation

The entire development site is characterised by the KwaZulu-Natal Coastal Belt Thornveld, a terrestrial vegetation type with a Vulnerable national and provincial threat status (Skowno et al. 2019; Jewitt 2018). No azonal vegetation type was flagged as present in the 500m regulated area (Afzelia, 2020).

A review of the KZN Biodiversity Sector Plan (BSP) dataset revealed that the entire 500m regulated area was not classified as a Critical Biodiversity Area or an Ecological Support Area. This means the study area is not critical for the maintenance of any important conservation biodiversity. Review of the DMOSS dataset revealed the 500m regulated area as transformed and lacking conservation important open spaces (Afzelia, 2020)

The instream habitat was identified as an emergent herbaceous vegetation community characterised by *Cyperus latifolius*, *Persicaria spp.*, *Commelina erecta*, *Colocasia esculenta* and clumps of *Typha capensis*. The riparian vegetation is a degraded secondary grassland with a high abundance of weeds and alien species. Common species recorded include *Cynodon dactylon*, *Achyranthes aspera*, *Tithonia diversifolia*, *Arundo donax*, *Solanum mauritianum* and *Ricinus communis* (Afzelia, 2020).

B-2.6. Catchment Characteristics

As per the Afzelia Wetland Assessment report compiled in November 2020, *‘the study area falls within quaternary catchment U20M, which the uMgeni River drains. The proposed concrete culvert will be built over the upper reaches of the Matafana River, a right-bank tributary of the Gobhogobho River. The Gobhogobho River feeds the Piesang River, which feeds the Seekoispuit, which discharges into the uMgeni River. The confluence between the uMgeni and Seekoispuit*

River is about 24km downstream of the development site.’ The image below depicts the local drainage network.

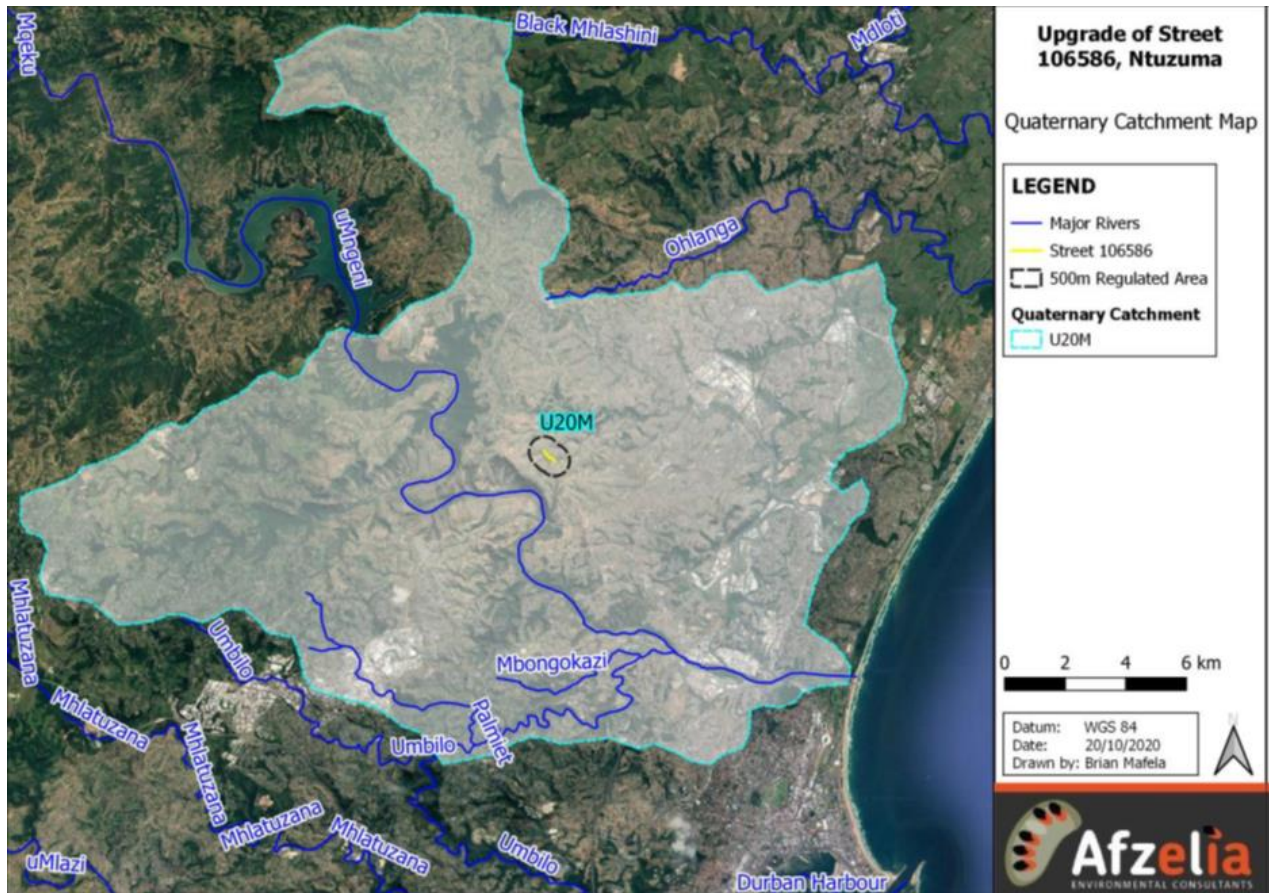


Figure 6 Quaternary catchment of the study area. (Afzelia, 2020).

B-3. SPECIALIST STUDIES

B-3.1. Wetland & Riparian Habitat Impact Assessment

Afzelia Environmental Consultant undertook a wetland assessment in November 2020.

B.3.1.2. Wetland Delineation

Seven watercourses were identified within a 500m regulated area around the proposed development site. This is inclusive of 2 artificial wetland habitats (Units AW1 and AW2) and 5 riparian habitats (Units R1, R2, R3, R4 and R5). Only three were deemed to be impacted by the development from these watercourses: 2 artificial wetlands (AW1 and AW2) and riparian habitat R1. (Afzelia, 2020). The tables below are adapted from the study conducted by Afzelia and explain the characteristics of the watercourses that are anticipated to be impacted.

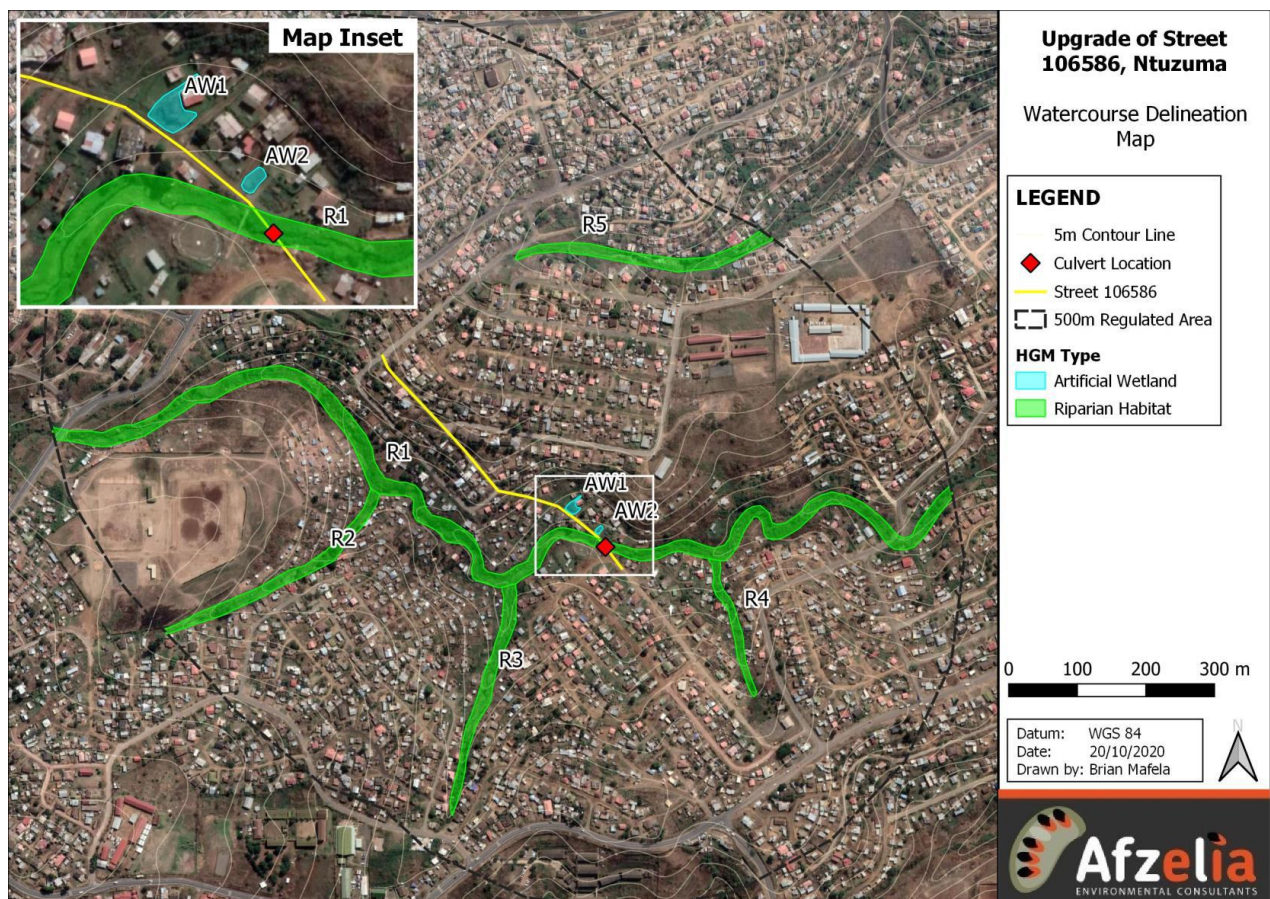


Figure 7: Watercourse delineation and classification map (Afzelia, 2020)

Table 11: General Characteristics and Classification of Artificial Wetland Units AW1 and AW2 (Afzelia, 2020)

HGM ID	AW1 and AW2	HGM Type	Artificial Wetland	Size	0.01 – 0.03 Ha
Aspect	Description				
General Description	Wetland Units AW1 and AW2 were classified as artificial wetlands because they owe their existence to ongoing anthropogenic impacts. Both occur in highly disturbed areas characterised by poor drainage. Key impacts that have led to the development of these wetlands include poor management of greywater and stormwater along with potential leakage of potable water pipelines.				
Hydrology	Water inputs are mainly in the form of overland flows from neighbouring homesteads and leaking potable water pipelines. Water moves through the wetland as both subsurface and surface flows and exits as overland flow and evaporation.				
Soil	Both wetlands were characterised by sandy loam with a light grey soil matrix and distinct orange mottles and both comprised a mix of permanently and seasonally saturated soils.				
Vegetation	The wetlands were characterised by monotypic stands of <i>Typha capensis</i> , a bulrush that grows only in wetland habitats and typically within the seasonal to permanent zone of the wetland habitat.				

Table 12: General Characteristics of Riparian Habitat R1 and Classification of the Associated River (Afzelia, 2020)

HGM ID	R1	HGM Type	Riparian Habitat	Size	3.03 Ha
Aspect	Description				
General Description	Riparian Habitat R1 is a riparian habitat associated with the Matafana River, a right bank tributary of the Gobhogobho River which feeds the Piesang River. The longitudinal zone of the Matafana River under investigation is the Upper Foothills. The river reach has a longitudinal slope of 1.7% which considered moderately steep. The width and depth of the river channel was estimated at 5-7m and 2-3m, respectively.				
Hydrology	Water inputs are main in the form of overland flows from upstream. Flows are perennial and largely confined to the active channel.				
Soil	The river banks were characterised by a loamy substratum whilst the river bed was dominated by a mix of fine and coarse sand.				
Vegetation	The instream habitat was identified as emergent herbaceous vegetation community characterised by <i>Cyperus latifolius</i> , <i>Persicaria spp.</i> , <i>Commelina erecta</i> , <i>Colocasia esculenta</i> and clumps of <i>Typha capensis</i> . The riparian vegetation is a degraded secondary grassland with a high abundance of weeds and alien species. Common species recorded include <i>Cynodon dactylon</i> , <i>Achyranthes aspera</i> , <i>Tithonia diversifolia</i> , <i>Arundo donax</i> , <i>Solanum mauritianum</i> and <i>Ricinus communis</i> .				

Artificial wetlands lack the reference condition from which to measure the level of similarity; therefore, a PES assessment could not be undertaken for Wetland Unit AW1 and AW2

B.3.1.2. Functionality Assessment (Afzelia, 2020)

The wetland functionality in terms of providing ecosystem services was assessed using the WET-EcoServices Level 2 Assessment tool (Kotze et al., 2007). The tool accounts for wetland attributes and observed impacts to estimate the level of ecosystem service supply.

Only 3 ecosystem services were identified as the most notable services provided by artificial wetlands AW1 and AW2. These include phosphate trapping, sediment trapping and nitrate removal. The supply of these services is attributed to high soil saturation rates, high and dense vegetation cover provided by bulrushes, low longitudinal slope and high sources of pollutants and sediment within the catchment of the wetlands

Table 13: Functional / EcoServices Assessment results for Artificial Wetland Units AW1 and AW2.

Ecosystem Services		Functional / EcoServices Scores & Ratings	
Regulating & Supporting Benefits	Flood attenuation	0.8 Low	
	Streamflow regulation	1.2 Moderately-Low	
	Water Quality Enhancement Benefits	Sediment trapping	1.8 Moderate
		Phosphate trapping	1.6 Moderate
		Nitrate removal	2.0 Moderate
		Toxicant removal	1.3 Moderately-Low
		Erosion control	1.5 Moderately-Low
Carbon storage	1.2 Moderately-Low		
Maintenance of biodiversity		0.7 Low	
Provisioning Benefits	Water supply for human use	1.3 Moderately-Low	
	Natural resources	0.5 Very Low	
	Cultivated foods	0.0 Very Low	
Cultural Benefits	Cultural significance	0.0 Very Low	
	Tourism and recreation	0.3 Very Low	
	Education and research	0.8 Low	

B.3.1.3. Ecological Importance and Sensitivity Assessment (Afzelia, 2020)

Ecological importance (EI) of a wetland is an expression of its importance to the maintenance of ecological diversity and functioning on a local and wider scale, whilst ecological sensitivity (ES) (or fragility) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience) (Resh et al. 1988; Milner, 1994).

The ecological importance and sensitivity (EIS) score of 0.83 for both artificial wetlands (AW1 and AW2) indicated that the wetlands are of low EIS.

Table 14: EIS assessment results for Artificial Wetland Units AW1 and AW2.

EIS Components		EIS Rating & Category	Impact Description
EI	ES		
0.70	0.83	0.83 Low EIS	EIS: Low The poor score can be attributed to high urbanisation which has driven away aquatic species likely to have used the wetlands. Due to being artificial in nature, the wetlands do not represent any threatened vegetation type and also lack conservation important species being assessed as of low conservation importance and low sensitivity.

B.3.1.4. Present Ecological State Assessment for the Riparian Habitat (Afzelia, 2020)

The habitat integrity of a river refers to the maintenance of a balanced composition of physico-chemical and habitat characteristics on a temporal and spatial scale comparable to the characteristics of natural habitats of the region (Kleynhans, 1996). The assessment of habitat integrity is based on an interpretation of the deviation from the reference condition (Kleynhans et al. 2008).

Riparian Habitat R1 was assessed as ‘seriously modified’ (E PES Class) in terms of the PES.

Table 15: PES assessment results for Riparian Habitat R1.

Instream	Riparian	PES Score & Rating	Impact Description
45/100	28/100	37% E Class	PES: Seriously Modified Key impacts recorded include: (i) altered flow patterns owing to significantly increased flood peaks within the catchment, (ii) significant bank and channel modification including infilling, (iii) high water quality impacts resulting from use of pit latrines on the banks of the river and discharge of grey water into the river via stormwater channels, (iv) increased invasive alien plant infestation, and (v) limited solid waste pollution.

B.3.1.5. Ecological Importance and Sensitivity Assessment for the Riparian Habitat (Afzelia, 2020)

The ecological importance of a river is an expression of its importance to the maintenance of ecological diversity and functioning on a local and wider scale, whilst ecological sensitivity (or fragility) refers to the system’s ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience) (Resh et al. 1988; Milner, 1994). Riparian Habitat R1 was found to be of low EIS.

Table 16: EIS assessment results for Riparian Habitat R1.

EIS Rating & Category	Rationale
1.00 Low EIS	EIS: Low A score of 1.00 indicates that Riparian Habitat R1 is of low EIS. This is attributed to high levels of degradation driven by anthropogenic impacts. High levels of degradation have created a habitat that is unsuitable for most native aquatic species hence high levels of weeds and alien plant species. This is likely to be the same with faunal species. As such the riparian habitat has been deemed to be of low conservation importance and sensitivity.

B.3.1.6. National Freshwater Ecosystem Priority Area

The development site falls within sub-catchment No. 4543, which has been identified as a non-prioritised catchment. This is according to the National Freshwater Ecosystem Priority Areas (NFEPAs) GIS dataset. A non-prioritised catchment means that all rivers within the sub-catchment are not critical for the maintenance of river ecosystems and threatened/near-threatened fish species (Driver et al., 2011). According to Afzelia, 2020, this is largely due to high levels of urbanisation within the sub-catchment. In additions, no prioritised wetlands were identified within the 500m regulated area of the development footprint.

Please refer to **Appendix D1** for the Wetland Impact Assessment Report.

B-3.2. Geotechnical Investigation

eThekwini Municipality conducted a Preliminary Geotechnical Assessment in November 2019. The report mentioned that the site is located at the junction of Natal Group sandstone in the northwest and Dwyka Group tillite bedrock in the southeast. The contact is a faulted one, so subsoil material in that vicinity may be disturbed. The rocks visible on site do not tie in exactly with the map as medium and large, hard rock tillite boulders and outcrop are visible in the riverbed upstream (west) of the site, where theoretically there should be sandstone. Nonetheless, neither rock type is problematic in this setting; either will be a stable, competent founding medium. No outcrop is visible at the proposed culvert's immediate location, but it is expected to be underlain by tillite (contrary to the geology map).

It is inferred that bedrock is relatively shallow at about half a metre below stream level. The founding will thus be shallow, requiring limited excavations to achieve competent rock. In keeping with the leaking services prevalent in this area, there is long term seepage working its way down the side of 106586 Street from the west. This is probably from leaking clean water connections, but it may also contain sewage in the absence of a formal sewer system on the northern side of the stream. Over time, vegetation along the road edge has become lush green and the ground very soggy under-foot. This long-term seepage may have caused some weakening of the shallow subsoils, and this must be taken into account during construction if excavations encounter wet soils. Local lateral support may be required if the soils do not dry out sufficiently and fast enough.

Whether sandstone or tillite, the stream course does not appear to be suffering unduly from erosion, even where the banks are denuded of vegetation, so siltation downstream during construction should not be excessive

Refer to **Appendix D.3.** for the Geotechnical Investigation Report.

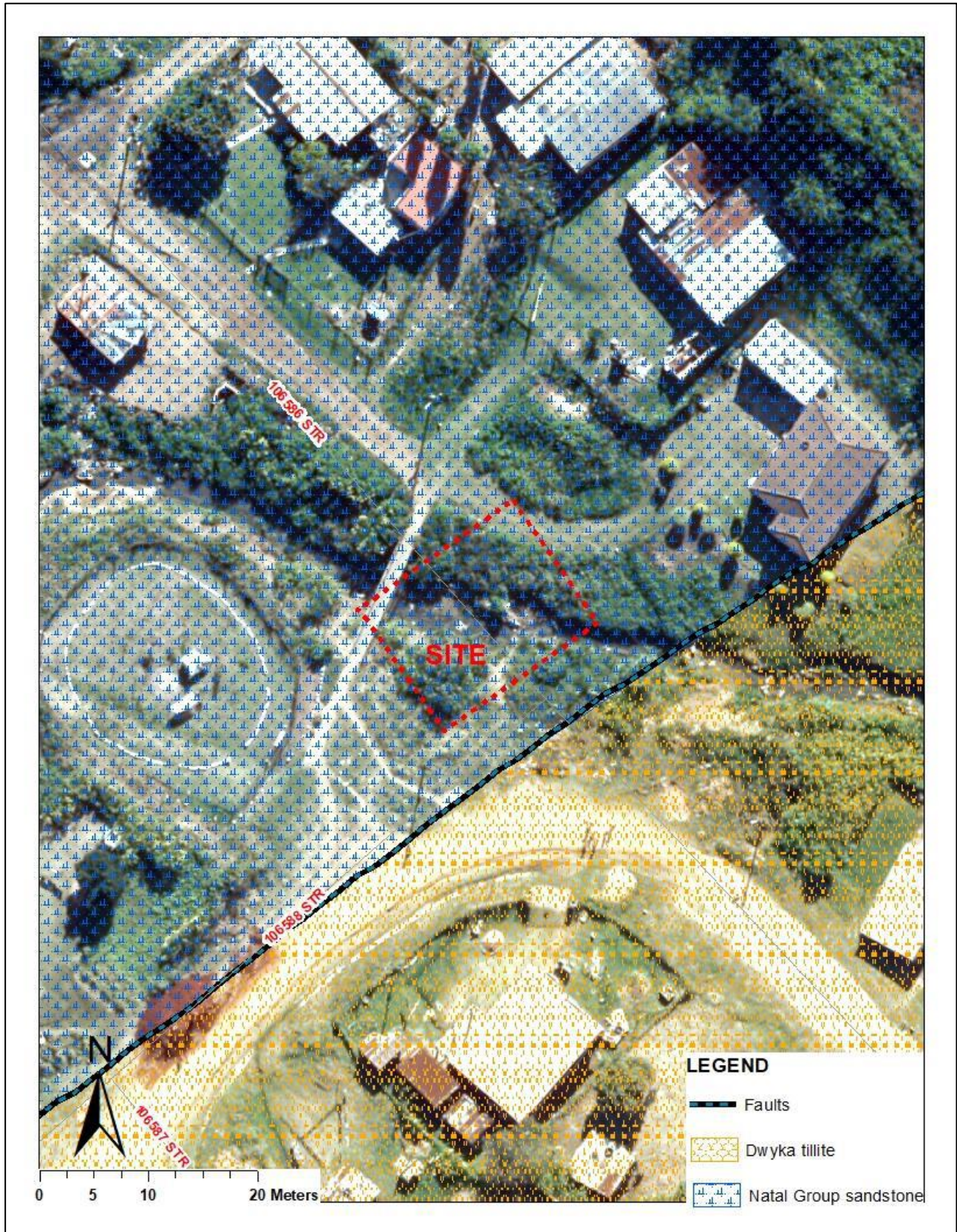


Figure 8: Site Plan For Proposed Culvert On 106586 Str, Ntuzuma (Source: eThekwini Preliminary Geotechnical Assessment, 2019)

B-4. SOCIO-ECONOMIC CHARACTERISTICS OF THE STUDY AREA

B-4.1. Cultural and/or 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 paleontological sites, on or close (within 20m) to the site?	YES	NO X
If yes, explain:		
Will any building or structure older than 60 years be affected in any way?	YES	NO X
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO X

According to an HIA undertaken by Umlando: Archaeological Surveys and Heritage Management in November 2020:

“The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. The archaeological database indicates that there are archaeological sites in the general area. These sites include all types of Stone Age and Iron Age sites. No sites occur in the study area. The high density of development in the area has resulted in any archaeological sites being destroyed. No national monuments, battlefields, or historical cemeteries are known to occur in the study area. The 1937 and 1944 maps indicate that the area was previously grassland and that no buildings or settlements occur in the immediate area. The 2020 Google Earth Image shows that the area is highly developed. The study area is of no/low palaeontological sensitivity.”

B-4.2. Socio-Economic Value

Anticipated CAPEX value of the project on completion	R 9 000 000.00
What is the expected annual turnover to be generated by or as a result of the project?	<R 500 000.00
New skilled employment opportunities created in the construction phase of the project.	0
New skilled employment opportunities created in the operational phase of the project.	0

New un-skilled employment opportunities created in the construction phase of the project.	6
New un-skilled employment opportunities created in the operational phase of the project.	0
What is the expected value of the employment opportunities during the operational and construction phase?	R 420 000.00

B-4.3. Socio-Economic Profile

The proposed development is located within Ward 45 of the eThekweni Metropolitan Municipality. The following statistic information was sourced from WaziMap This ward currently has around 29 273 persons, with the population breakdown of the municipality being predominantly Black African (94,9%). Approximately 59% of the population are living in fully established housing. Approximately 44% of persons are employed and travelling to work on a daily basis. This is approximately 10% higher than the national average, with regards to school attendance, approximately 88% of children from this ward attend school.

SECTION C: PUBLIC PARTICIPATION

C-1. ADVERTISEMENT AND SITE NOTICES

The EIA Regulations (2014) as amended, in Chapter 6 of the public participation process under Subregulation 2(d) states that “an advertisement must be placed at least one provincial newspaper or national newspaper”. A newspaper article (English and Zulu) was published in the ezaseGagasini Metro under the Public Notices on the **06th-19th November 2020**. This notice provided an opportunity for the public to register as an Interested & Affected Party (I&AP). **(Refer to Appendix E.1 for newspaper advertisement).**

Table 17: Showing PPP information.

Publication Name	ezaseGagasini Metro
Date Published	06 th – 19 th November 2020
Site Notice Position	06 th November 2020
Date Placed	29°44'34.07"S 30°56'03.00"E 29°44'43.14"S 30°56'14.67"E

Sub-regulation 2(a) of the EIA Regulations (2014) under Chapter 6 of the public participation process states that a person conducting the Public Participation Process must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by— fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor (Sub-regulation 2). This process was adhered to by placing Site Notices at strategic points along the route to allow Interested and Affected Parties to register and comment on the proposed development. Site notices were placed strategically near the crossing (and subsequent EIA Trigger).

Refer to Appendix E.2 for the proof of placement of site notices.

C-2. WARD COUNCILLOR/ COMMUNITY MEETING

The elected ward councillor (Ward 45) was made aware of the proposed development via email and brief liaison, a meeting was held on 03 December 2020. During this meeting, the ward councillor was informed of the proposed construction and was briefed on the formal project description. Due to Covid-19 regulations, no formal community meeting was held. The ward councillor had no objections to the proposed development. A formal letter confirms that the ward councillor was made aware of the proposed development and was given 14 days to notify the community and/ or affected parties of the development.

Refer to Appendix E.3 for the ward councillor letter.

C-3. KEY STAKEHOLDERS

Table 18: Key stakeholders involved in the Public Participation Process.

Name	Title	Affiliation	Contact Details
Mr. Joseph Simon Khuboni	Ward Councillor	eThekwini Municipality	084 486 2369 joseph.khuboni@durban.gov.za
Ms. Natasha Brijlal	Senior Assessing Officer	EDTEA	031 366 7317 Natasha.Brijlal@kznedte.gov.za
Navika Govender	Directorate: Institutional Management Sub-Directorate: Water Quality Management	DWS	031 336 2726 083 386 7807 GovenderN1@dws.gov.za
Judy Reddy	Head: Transport	DoT	033 355 8600 judy.reddy@kzntransport.gov.za
Dominic Wieners	Conservationist	Ezemvelo KZN Wildlife	033 845 1999 Dominic.Wiener@kznwildlife.com
Bernadet Pawandiwa	Senior Heritage Officer	KwaZulu –Natal Amafa and Research Institute	bernadetp@amafapmb.co.za

C-4. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

No concerns/issues were received during the 14-day registration period. All registered I&APs have been included in the Stakeholder and I&AP Database (Appendix E.4). Any further comments received during the 30-day commenting period will be included in the Final Basic Assessment.

C-5. STAKEHOLDER ENGAGEMENT

C-5.1. Department of Economic Development Tourism and Environmental Affairs (EDTEA)

The KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) was consulted during the initial stages of the project. The pre-application meeting confirmed the Environmental Triggers in terms of the EIA Regulations, 2014 (as amended).

Refer to Appendix G.4 for the EDTEA Pre-application meeting minutes.

C-6. COMMENTS AND RESPONSES

A comments and responses report is included in Appendix E.7.

SECTION D: IMPACT ASSESSMENT

D-1. PREFERRED ROUTE/ TECHNOLOGY ALTERNATIVE

The impact assessment outlined below is based on the preferred alternative. Impacts that may result from the Planning/ Design, Construction and Operational Phases are discussed further in this section.

All mitigation measures have been outlined in specific detail in the Environmental Management Programme (EMPr), therefore, this section must be read in conjunction with the EMPr. All impacts outlined below relate to the activities applied for in the Environmental Application (i.e. Activity No. 19, EIA Regulations 2014, as amended). Due to the absence of a route alternative (as the proposed developments are site specific in nature), all impacts/mitigations are based on the proposed technology alternatives.

D-2. RISK ASSESSMENT METHODOLOGY

For the purposes of assessing impacts of the proposed development, the project will be divided into two phases from which impacting activities can be identified, namely:

- **Construction Phase:** All the construction related activities on site, until the contractor leaves the site.
- **Operational Phase:** All activities, including the operation and maintenance of the proposed development.

The activities arising from each of these phases will be included in the impact assessment tables. This is to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure.

The EIA Regulations, 2014 as amended, prescribes requirements to be adhered to and objectives to be reached when undertaking Impact Assessments. These are noted in the following sections contained within the EIA Regulations (2014 as amended):

- Regulation 982, Appendix 1, Section 2 and Section 3 – Basic Assessment Impact Requirements; and

Regulation 982, Appendix 2 and Appendix 3 – Environmental Impact Assessment Requirements. In terms of these Regulations, the following should be considered when undertaking an Impact Assessment:

- A description and assessment of the significance of any environmental impact including:
 - Nature of the impact;
 - Extent and duration of the impact;
 - The probability of the impact occurring;
 - The degree to which the impact can be mitigated.

The overall significance of an impact / effect has been ascertained by attributing numerical ratings to each identified impact. The numerical scores obtained for each identified impact have been multiplied by the probability of the impact occurring before and after mitigation. High values suggest that a predicted impact /effect is more significant, whilst low values suggest that a predicted impact / effect is less significant.

D-3. RANKING SCALES FOR ENVIRONMENTAL RISK ASSESSMENT

D-3.1. Risk Assessment Methodology

The following presents the assessment criteria used to evaluate the impacts resulting from the proposed development:

ENVIRONMENTAL SIGNIFICANCE - Is divided into three ranking categories and applies to each potential impact associated with all phases of the development (i.e. pre-construction, construction, operational, phases

SIGNIFICANT RATING = (M+ E+ D) X P

SIGNIFICANT POINTS	SIGNIFICANT RATING
0 – 15 points	Low Environmental significance
15 – 30 points	Low-Moderate Environmental significance
31 – 59 points	Moderate Environmental significance
60 – 80 points	Moderate-High Environmental significance

81 – 100 points

High Environmental significance

D-3.2. Ranking scales for environmental risk assessment

D-3.2.1. Ranking Scale

Probability (P)	Duration (D)
1 – very improbable	1 – very short duration (0-1years)
2 – improbable	2 – short duration (2-5 years)
3 – probable	3 – medium term (5 – 15 years)
4 – highly probable	4 – long term (>15 years)
5 – definite	5 – permanent/ unknown
Extent (E)	Magnitude (M)
1 – limited to the site	2 – minor
2 – limited to the local site	4 – low
3 – limited to the region	6 – moderate
4 – national	8 – high
5 – international	10 – very high

D-4. POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

Any activities associated with a natural system, whether historic, current, or proposed, will impact on the surrounding environment, usually in a negative way. In order to minimise these impacts, development planning should be based on ecological principles that promote sustainable development. The purpose of this phase of the study was to identify and assess the significance of the potential impacts and to provide a description of the mitigation required to limit the perceived impacts on the natural environment.

Negative impacts associated with this project include:

- Soil erosion, sedimentation and further degradation of the non-perennial B Section watercourse, and ephemeral A Section watercourse, particularly at the crossing points, which will have knock-on impacts downstream of the road;
- Pollution of the watercourse as a result of construction and operational activities;

- Encroachment of invasive alien species into the watercourses from the disturbance to the vegetation communities.

Several general and specific measures are proposed to mitigate these impacts on the water resources.

D-4.1. Planning/ Design Phase

The planning/design phase involves the processes prior to the construction phase. The following points should be noted:

- All method statements must be submitted to the Engineer for approval;
- All new construction method statements must be brought to the knowledge of the ECO;
- A site layout plan must include the location of the campsite, the siting of the campsite must be approved by the Engineer/ECO prior to construction;
- No-go areas must be demarcated by the ECO prior to construction;
- The construction EMPr must be brought to the attention of the contractor;
- Liaise with the local municipality and community structures for relevant permissions;
- Setup of offices, toilets, stockpiling material and fencing around offices and material stockpiles;
- The surveyor to include the exact position of works to commence for drainage structures;
- All parties to carry out in-loco confirmation of the extent of works, identify possible.

The summary of the planning/ design phase for the proposed project involves:

- Project contract & programme;
- Appointments & duties of project team;
- Method statements;
- Emergencies, non-compliance & communication;
- Construction plans & schedules;
- Environmental Induction Training;
- Establishing access roads;
- Campsite establishment;
- Establishing storage areas;
- Hazardous substances;
- Waste management

Please refer to the site specific EMPr (Appendix F) for the details of the planning/ design phase.

Table 19: Indicating the impacts associated with the construction/ operational phase of the development.

D-4.2. Construction Phase	
Impacts associated with compaction, siltation and pollution of the watercourse and loss of natural habitat	<ol style="list-style-type: none"> 1. Soil erosion, sedimentation and degradation of the watercourse; 2. Pollution of watercourses; 3. Loss of Freshwater Habitat & Biota 4. Alien Invasive species encroachment
Impacts associated with waste	<ol style="list-style-type: none"> 5. Spillages & spill management; 6. Storage/ handling of waste; 7. Ablution facilities
Impacts associated with flora and fauna	<ol style="list-style-type: none"> 8. Removal of vegetation; 9. Disruption to fauna and faunal habitats
Impacts associated with excavation and earthworks	<ol style="list-style-type: none"> 10. Noise pollution; 11. Visual impacts 12. Air pollution
Social Impacts	<ol style="list-style-type: none"> 13. Socio-cultural dynamics
D-4.3. Operational Phase	
Impacts associated with compaction, siltation and pollution of the watercourse + loss of natural habitat	<ol style="list-style-type: none"> 1. Siltation of freshwater ecosystems; 2. Degradation of Freshwater Habitat Impact 3. Pollution of watercourses; 4. Clearing of vegetation

D-5. SUMMARY OF IMPACTS

A detailed breakdown of the impacts associated with the development can be found in Annexure A of this Basic Assessment Report.

Table 20: Summary of impacts – Planning Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Logistic arrangement	21	12
2	Planning and Design of preferred layout	32	0
3	Environmental Impacts	32	14
4	Wetland Disturbance	21	12
5	Social Aspects	36	0
6	Human and vehicle safety	28	5
	Total	28,33	7,17
Alternative 2 (Not Preferred)			
1	Alternative Radii	44	21
2	Low-Level River Crossing	36	20
3	Environmental Impacts	32	14
4	Alien Vegetation	24	0
5	Wetland Disturbance	21	12
6	Social Aspects	36	0
	Total	32,17	11,17
No-go alternative			
1	Human and vehicle safety	60	12
2	Alien vegetation	48	14
3	Job opportunities	36	14
	Total	48,00	13,33

Table 21: Summary of impacts – Construction Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Loss of Freshwater Habitat & Biota (Afzelia, 2020)	28	18
2	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	32	18
3	The upgrade of the proposed road and installation of the culvert (Positive)	56	0
4	Water and Soil Pollution Impact - (Afzelia, 2020)	18	10
5	Spillages and Spill Management	36	18
6	Storage and Handling of Waste	48	12
7	Ablution Facilities	44	16
8	Removal of Vegetation	24	8
9	Faunal disturbance/ interaction	30	8
10	Noise Pollution	33	12
11	Visual Impacts	27	12
12	Air Pollution	33	12
13	Cultural and Natural heritage	48	16
14	Socio-cultural dynamics	33	10
	Total	35,15	12,31
No-go Alternative			
1	The project will not be initiated	60	16
2	Biophysical Impacts	52	16
3	Social Impacts	40	16
	Total	50,67	16,00

Table 22: Summary of impacts – Operational Phase

No.	Aspect	Score	
		Before Mitigation	After Mitigation
Preferred Alternative			
1	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	18	12
2	Water and Soil Pollution Impact	18	8
3	Upgraded crossing and new culvert	44	0
	Total	26,67	6,67
No-go Alternative			
1	Existing infrastructure	40	14
	Total	40,00	14,00

SECTION E: ENVIRONMENTAL IMPACT STATEMENT

E-1. PREFERRED ALTERNATIVE

According to the risk rating after all significant impacts were taken into consideration. For the Planning Phase the preferred activity is identified to have a **moderate environmental significance (28.33) before mitigation measures are implemented and an overall low environmental significance (7.17) after mitigation measures have been implemented.**

For the construction phase the preferred activity is identified to have a **moderate environmental significance (35.15) before mitigation measures are implemented and an overall low environmental significance (12.31) after mitigation measures have been implemented.**

For the operational phase, the preferred activity is identified to have a **low-moderate environmental significance (26.67) before mitigation measures are implemented and an overall low environmental significance (6.67) after mitigation methods have been implemented.**

The proposed activity has been carefully planned to cater for the improved needs and necessities of the community while being mindful of imposing the least negative environmental impacts. Specialist studies have identified site specific impacts of the development and have put forward mitigations that need to be implemented to minimise impact significance during construction, as well as the operational phase of the proposed project. Vegetation clearance will be restricted to alien invasive vegetation.

The proposed project will contribute to the rehabilitation of the site, following the rehabilitation plan outlined by the wetland specialist. The contractor with the assistance of the ECO will ensure that all mitigation measures outlined in the BAR and EMPr will be implemented, and monitoring must take place during the construction phase as to minimise any potential environmental degradation.

E-2. ALTERNATIVE NO.02

No alternative site or route has been identified as the route is existing.

The impacts of Alternative 2 were only considered in the Planning Phase as it was deemed that Alternative 1 is the preferred option. According to the risk rating after all significant impacts were taken into consideration, the alternate activity is said to have a moderate environmental significance

(32.17) before mitigation measures are implemented and an overall low environmental significance (11.17) after mitigation measures have been implemented.

This alternative does not consider the best road conditions and engineering for driver efficiency. In addition, the structure alternative structure of a low-level bridge could be submerged under flood conditions. In addition, in the long run, the required maintenance after floods to repair and remove debris surpasses the value of the initial investment.

E-3. NO-GO ALTERNATIVE

The No-Go Alternative would be to not upgrade the road and not develop the proposed culvert

The No-go Alternative has been considered and assessed. A Moderate to low positive impact (40) is anticipated for this development. The current situation is deemed unfavourable due to the current conditions along the footpath. Service delivery is a major concern within the community and these proposed upgrades will aid in addressing such issues. Therefore, the no-go alternative is not a feasible and reasonable option, as the proposed upgrade will have a net positive impact on the receiving environment.

SECTION F: RECOMMENDATIONS

F-1. EAP RECOMMENDATIONS

- The EMPr must be strictly adhered to and implemented during the construction and operational phases and must form part of the contract requirements within the project sphere.
- An ECO must be appointed by the applicant to undertake Environmental audits monthly and submit **monthly reports** to the Competent Authority.
- During the construction phase of the project, the contractor **must ensure that all** relevant information is furnished to the Department of Water and Sanitation.
- All mitigation measures and factors outlined in the BAR must be considered.
- The site engineer must ensure that proper storm water management takes place on site during the construction phase.
- Any pollution problems arising from the activity must be addressed immediately by the contractor with the assistance of the appointed ECO.
- All spillages must be cleaned immediately with appropriate tools and disposed at registered sites.
- Site rehabilitation must take place directly after construction ceases.
- Waste recycling must be encouraged among construction workers.
- Prior to construction all relevant permits must be obtained.
- Local labour must be recruited for the proposed construction where possible.
- Should cultural artefacts be found in close proximity of the site, construction must cease immediately, and the applicant must appoint a heritage specialist to submit a report to AMAFA. The construction will continue thereafter depending on specialist recommendations.
- The activities are in keeping with the land use of the surrounding area and it is therefore the EAP 's recommendation that the preferred option be approved.
- Based on the impacts identified in this assessment report and the subsequent mitigation measures proposed, it is the opinion of the Environmental Assessment Practitioner (EAP) that the said activities be authorized by the Competent Authority.

SECTION G: CONCLUSION

It is the opinion of the EAP that all potential impacts that could potentially occur during the construction and operational phase of the road construction and associated structures along the proposed upgrade have been identified and key impacts and their mitigation measures are provided in this report. There are no route alternatives as the existing road will be upgraded to a Gravel Road causing minimal negative impact to the environment. Most of the impacts will occur during the construction phase, and therefore is temporary in nature and extent. The EMPr has been compiled as to provide adequate mitigation measures for the proposed activities including the proposed structure upgrades along the road.

The construction would result in minor environmental impacts whilst promoting development in the area. The proposed upgrade with associated structure upgrades along the road from an environmental perspective, will result in an improved situation with reducing erosion and damage caused by storm water run-off. It is the EAP's opinion that **if all mitigations presented in the report are adhered to, there will be minimal impact to the receiving environment.** From an environmental perspective, the construction activities will result in an improved situation with less erosion and damage to the drainage line when compared to the existing structures. It is not logical to upgrade the existing road without constructing a proper crossing point, therefore both activities are recommended, provided the EMPr is strictly adhered to and an ECO is appointed during the construction phase.

Should the proposed construction of both the road and the structures at the water crossing point not go ahead, the site would be exposed to on-going erosion as well as major safety concerns for crossing the existing track during high rainfall periods. **The proposed construction has positive impacts with minimal environmental impacts.**

REFERENCES

- Afzelia Environmental Consultants (PTY) Ltd, 2020. Wetland & Riparian Habitat Impact Assessment: Proposed Upgrade Of Street 106586 Situated In Ntuzuma, Durban, Within The Ethekwini Metropolitan, Kwazulu-Natal
- Arc GIS version 10.5.1, 2020.
- Department of Transport GIS, 2020.
- Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. and Funke, N., 2011. Implementation manual for freshwater ecosystem priority areas. *Draft Report for the Water Research Commission*. Elliott, J. W. Jonathan W. Elliott. *International Journal of Construction Education and Research*, 12(1), 3-17.
- Mucina, L. and Rutherford, M.C., 2010. The vegetation of South Africa, Lesotho and Swaziland.
- eThekwini Municipality, 2019. Preliminary Geotechnical Assessment For Proposed New Culvert On Str 106586, Ntuzuma
- eThekwini Municipality, 2021. Engineering Design Report and Stormwater Management Plan for the construction of a Culvert 106586 Street
- Umlando: Archaeological Surveys and Heritage Management, 2020. Gavin Anderson. Letter Of Exemption For Street 106586, Inanda, KZN
- WaziMap. 2020. eThekwini Ward 45 (59500045) Online: <https://wazimap.co.za/profiles/ward-59500045-ethekwin-ward-45-59500045/> [Accessed: 12 November 2020]

APPENDICES

Appendix	Description
APPENDIX A - Maps	
A.1	Aerial Map
A.2	Locality Map
A.3	SANBI Map
APPENDIX B – Site Photographs	
B	Site Photographs
APPENDIX C – Civil Design Information	
C.1	Signed engineering and SWMP report
C.2	Signed long-section drawings
C.3	Signed plan drawings
C.4	Signed x-section drawings
APPENDIX D – Specialist Studies	
D.1	Wetland Impact Assessment
D.2	Heritage Assessment Letter
D.3	Geotechnical Report
APPENDIX E – Public Participation	
E.1	Newspaper Advertisement
E.2	Proof of Site Notices
E.3	Ward Councillor Notification Letter
E.4	I&AP and Stakeholder Database
E.5	Approved PPP Plan
E.6	Stakeholder and I&AP correspondence
E.7	Comments and Responses Report
APPENDIX F – Environmental Management Programme (EMPr)	
F	Environmental Management Programme (EMPr)
APPENDIX G – Other Information	
G.1	EAP Declaration Form
G.2	Specialist Declaration Form
G.3	Project Team Resumes
G.4	EDTEA Pre-Application meeting minutes
G.5	DWS General Authorisation
G.6	EDTEA Acknowledgment Letter

ANNEXURE 1 – DETAILED IMPACT ASSESSMENT

RATING SCALE

Probability (P)	Duration (D)
1 – very improbable	1 – very short duration (0-1years)
2 – improbable	2 – short duration (2-5 years)
3 – probable	3 – medium term (5 – 15 years)
4 – highly probable	4 – long term (>15 years)
5 – definite	5 – permanent/ unknown
Extent (E)	Magnitude (M)
1 – limited to the site	2 – minor
2 – limited to the local site	4 – low
3 – limited to the region	6 – moderate
4 – national	8 – high
5 – international	10 – very high

SIGNIFICANT RATING = (M+ E+ D) X P

SIGNIFICANT POINTS	SIGNIFICANT RATING
0 – 15 points	Low Environmental significance
15 – 30 points	Low-Moderate Environmental significance
31 – 59 points	Moderate Environmental significance
60 – 80 points	Moderate-High Environmental significance
81 – 100 points	High Environmental significance

PLANNING PHASE													
No.	Impact	Activity and nature of impacts	Impact Rating					Mitigation Measures	Impact Rating				
			Extent	Magnitude	Duration	Probability	Significance Points		Extent	Magnitude	Duration	Probability	Significance Points
Alternative 1 (Preferred Alternative)													
1	Logistic arrangement	Inappropriate resource planning, infrastructure design and incorrect site layout	1	4	2	3	21	Ensure planning of proper use of resources and appropriate infrastructure design; Evaluate designs and provide recommendations to limit and reduce potential negative environmental, social and economic impacts associated with the proposed activities; Assess current conditions of the site.	1	3	2	2	12
2	Planning and Design of preferred layout	Preferred layout will ensure reduce potential impacts to the wetland; Removal of invader plants in the riparian areas through proper identification and recommendation (Positive)	2	4	2	4	32	N/A					
3	Environmental Impacts	Degradation, resource consumption, pollution, etc	2	3	3	4	32	Implement Specialists Recommendation and provide technical input. Ensure liaison with authorities. Ensure development and implementation of EMPr and compliance to conditions of environmental requirements, licenses and authorisations.	2	2	3	2	14
4	Wetland Disturbance	Increased ecological disturbance to fauna and flora and wetland units	1	3	3	3	21	Temporary access roads must avoid identified sensitive areas. All disturbed sites must be rehabilitated as per the guidelines that were incorporated into the EMPr. Assess current conditions of the site. Adhere to Specialists recommendations and BA process / provide technical input. Include Specialist recommendation in EMPr. No- go areas must be identified and demarcated prior to construction and construction workers made aware of these areas.	1	2	3	2	12
5	Social Aspects	Increased job opportunities (positive)	2	3	4	4	36	N/A					
6	Human and vehicle safety	Safety concerns regarding access and crossing	1	3	3	4	28	Proceed with the development and implement rehabilitation recommendations	1	1	3	1	5
Alternative 2 (Not Preferred)													
1	Alternative Radii	Deviation of road path by 110m from existing road path resulting in an increased footprint	2	5	4	4	44	Implement the preferred alternative	2	2	3	3	21
2	Low-Level River Crossing	The potential of submersion during heavy rains is high; increased risk associated with road users attempting to use the crossing during its periods of inundation	2	6	4	3	36	Implement the preferred alternative	2	4	4	2	20

3	Environmental Impacts	Degradation, resource consumption, pollution, etc	2	3	3	4	32	Implement Specialists Recommendation and provide technical input. Ensure liaison with authorities. Ensure development and implementation of EMPr and compliance to conditions of environmental requirements, licenses and authorisations.	2	2	3	2	14
4	Alien Vegetation	Removal of Invasive alien species (IAPs). (Positive)	1	4	3	3	24	N/A					
5	Wetland Disturbance	Increased ecological disturbance to fauna and flora and wetland units	1	3	3	3	21	Temporary access roads must avoid identified sensitive areas. All disturbed sites must be rehabilitated as per the guidelines that were incorporated into the EMPr. Assess current conditions of the site. Adhere to Specialists recommendations and BA process / provide technical input. Include Specialist recommendation in EMPr. No- go areas must be identified and demarcated prior to construction and construction workers made aware of these areas.	1	2	3	2	12
6	Social Aspects	Increased job opportunities (positive)	2	3	4	4	36	N/A					
No-go alternative													
1	Human and vehicle safety	No safe infrastructure for crossing	3	4	5	5	60	Implement the proposed activity and continue development	3	2	1	2	12
2	Alien vegetation	Increased alien vegetation infestation; unchanged aesthetic	3	4	5	4	48	Implement the proposed activity and continue development with the approved EMPr	3	2	2	2	14
3	Job opportunities	Potential job opportunities will be lost	4	2	3	4	36	Implement the proposed activity and continue development with the approved EMPr	3	2	2	2	14

CONSTRUCTION PHASE														
No.	Impact	Activity and nature of impacts	Impact Rating (Before Mitigation)					Mitigation Measures	Impact Rating (After Mitigation)					
			Extent	Magnitude	Duration	Probability	Significance Points		Extent	Magnitude	Duration	Probability	Significance Points	
Alternative 1 (Preferred Alternative)														
1	Loss of Freshwater Habitat & Biota (Afzelia, 2020)	Construction of a new box culvert; Construction of road stormwater infrastructure; Run-off due to increased hardened surfaces	2	4	1	4	28	All work to be done within the riparian and instream habitat must be carried out at a time of low flow conditions (winter to early spring). It is prudent however to be prepared for increased flows by scheduling work according to the weather forecast and to have a contingency plan for unexpectedly large runoff from a sudden storm. Culvert inverts should be buried one quarter of the rise below the average natural stream bed. Culverts should be designed with adequate capacity to carry maximum design flows without creating surcharge or backwater conditions. The use of heavy equipment within the instream habitat should be avoided. The operation of heavy equipment should be confined to dry stable areas such the road. Reno mattresses must be installed at the outlet of the culvert. A detailed method statement for working within the riparian habitat must be compiled by the contractor prior to breaking ground within the riparian habitat. The method statement must be in line with mitigation measures proposed in this report. Refer to Appendix F for a site specific EMPr	1	4	1	3	18	
2	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	Vegetation clearing Impeding flows in the river Undertaking bulk earthworks Working within the watercourse	4	2	2	4	32	Vegetation clearing must be undertaken as and when necessary. The entire construction area must not be stripped of vegetation prior to commencing construction activities. 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. Refer to Appendix F for a site specific EMPr.	2	2	2	3	18	
3	The upgrade of the proposed road and installation of the culvert (Positive)	Removal of invader plants through proper identification and recommendations Improved community safety. Creation of temporary and permanent employment opportunities for local community	2	8	4	4	56	No Mitigation required					0	
4	Water and Soil Pollution Impact - (Afzelia, 2020)	Contaminants may enter watercourse as surface runoff or subsurface interflow and negatively affect the integrity/quality of the receiving water resource	2	2	2	3	18	Topsoil must be stripped and stockpiled separately from subsoil and to be used in rehabilitation. Topsoil must be stockpiled in stockpiles not exceeding 2m in height and be free of weeds and secure from erosion. All stockpiles must be established outside the 30m buffer of all watercourses and on flat ground. Any soil contaminated by hydrocarbons (fuel and oils) must be removed and the affected area rehabilitated immediately. Chemical toilets must be provided to workers during the construction phase, Fuel must be stored in a bunded structure with a roof. Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface. Drip trays should be utilised at all dispensing areas. A chemical spill kit must be present onsite at all times, All solid waste must be collected and placed in bins. Construction activities should be scheduled to minimise the duration of exposure to bare soils on site, especially on steep slopes. After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded. Implement the site-specific EMPr.	1	2	2	2	10	
5	Spillages and Spill Management	A lack of knowledge and experience associated with water management and an absence of suitable on-site practices are the biggest causes of pollution spills where releases of oil and silt being most common; Sources of spillages include (but is not limited to): concrete, cement & grout, oil storage, refuelling & use of chemicals, hazardous substances, polluted groundwater and soils; Mechanisms of spillage include (but is not limited to): surface run-off, drains, pathways created by foundations and excavations	2	6	1	4	36	Temporary bunds must be constructed around chemical or fuel storage areas and hazard signs indicating the nature of the stored facility or containment structure; Spills in bunded areas must be cleaned with a spill kit, The bunded area must be situated at least 50m away from any watercourse; proper maintenance of vehicles; Oil residue shall be treated with oil absorbent such as Drizit or similar and this material must be appropriately disposed at a registered landfill site; use of pre-mix cement is recommended; Material Safety Data Sheet (MSDS) for each substance stored on site must be maintained ; Fuels and storage areas must be at least 100m away from any drainage system inlets. Oils and fuel should be within a bunded area and treated as flammable waste. No hazardous chemicals used and/or spilled during the construction process must enter the stormwater management areas; a hazardous spill protocol must be implemented if required; No concrete mixing machinery can be washed onsite; No mixed concrete should be directly deposited on the ground. All material arising from the development must be prohibited from entering the stormwater management areas. Implement site specific EMPr.	1	4	1	3	18	

No.	Impact	Activity and nature of impacts	Impact Rating (Before Mitigation)					Mitigation Measures	Impact Rating (After Mitigation)				
			Extent	Magnitude	Duration	Probability	Significance Points		Extent	Magnitude	Duration	Probability	Significance Points
6	Storage and Handling of Waste	Handling, storage and disposal of construction waste	2	8	2	4	48	Sufficient waste bins or skips must be placed on site; Bins must be closed with a lid; Recycling material such as glass, paper and plastic must be encouraged among the construction workers. Construction rubble must be disposed of frequently. Waste must be disposed at a registered landfill site with proof kept on site. Design specific training and education programs can be offered to staff to increase the awareness on pollution and recycling. Implement site specific EMPr	1	4	1	2	12
7	Ablution Facilities	Lack of proper sanitation facilities could lead to soil contamination and pollution of the water table; Improper disposal of chemical toilet waste may result in the contamination of water and soil	2	8	1	4	44	Portable chemical toilets must be made available and serviced on site; these sanitation facilities must be situated 100 metres from any water body; are must be taken to avoid contamination of soils and water; All temporary/portable toilets must be secured to the ground to prevent them from toppling over due to the wind or any other cause; The entrances to the toilets must be adequately screened from public view; The contractor must ensure that no spillage occurs implement site specific EMPr	1	6	1	2	16
8	Removal of Vegetation	The removal of indigenous vegetation for the construction of the culvert structure; The spread of alien invasive species	2	4	2	3	24	Ongoing alien plant control must be undertaken; Construction staff and vehicles must stick to the construction servitude and not be allowed to access sensitive areas; indigenous wetland plant species requiring removal shall be removed appropriately with their root ball intact; Wetland vegetation removed shall be stockpiled neatly on the periphery of the area being stripped, for use in wetland rehabilitation; cut vegetation to ground level rather than removing it completely, leaving root systems to sure rapid re-colonisation; implement site specific EMPr	1	2	1	2	8
9	Faunal disturbance/ interaction	Disruption of faunal habitat	2	6	2	3	30	Workers must be made aware of the possible fauna that may be encountered within proposed location; Under no circumstances shall any fauna be handled, removed, killed or interfered with by the Proponent, Project Manager, Resident Engineer, Contractors, Engineers and the employees. However, if construction activities are likely to injure, kill or interfere with fauna encountered on the site, appropriate action must be taken to ensure their protection; All personnel working on site will receive training to ensure awareness of requirements of the Flora and Fauna within the area and relevant statutory responsibilities; Any soil or other materials imported to the site for use in restoration or rehabilitation will be certified free from weeds and pathogens, or obtained from sources that demonstrate best practice management to minimise weed and pathogen risks; implement site specific EMPr	1	2	1	2	8
10	Noise Pollution	Excessive noise is not only distracting, but it can also lead to hearing loss, high blood pressure, sleep disturbance and extreme stress. During the construction period, there will be noise from construction vehicles, construction machinery and construction workers that may disturb the community peace as well as surrounding environment	2	8	1	3	33	Noise must only be generated during the construction phase (from operating machinery, generators, etc.) and occur during the designated working hours (08:00 – 16:00) on weekdays and closed during the weekends; The level of noise generated must be low and below the 70-decibel threshold limit; Engineering controls modify the equipment or the work area to make it quieter. Administrative controls include management decisions on work activities. Personal Protective Equipment (PPE) should be given to workers to reduce their exposure to noise; implement site specific EMPr	1	4	1	2	12
11	Visual Impacts	Excavation and construction may result in unsightly site camps and site area	2	6	1	3	27	The contractor is to implement excellent housekeeping and ensure that any unsightly construction is demarcated with adequate barricading	1	4	1	2	12
12	Air Pollution	Dust particles are emitted into the atmosphere from construction vehicles, and excavations; Operation of diesel engines and demolition equipment releases toxic fumes into the environment. Dust is considered a PM10 substance (Particle Matter less than 10 microns in diameter. This is invisible to the naked eye. PM10 penetrates deep into the lungs, causing a wide range of health problems	2	8	1	3	33	Areas that have been stripped of vegetation must be dampened periodically to avoid excessive dust; construction vehicles must adhere to a speed limit of 30km/hr to avoid excessive dust emission; Loads could be covered to avoid loss of material in transport, especially if material is transported off site; surfaces must be dampened/ sprayed whenever possible and especially in dry and windy/conditions to avoid excessive dust; Information, training and instruction should be given to workers on the health hazards related to diesel exhaust fumes; implement site specific EMPr	1	4	1	2	12
13	Cultural and Natural heritage	The disturbance to the cultural significance within the area	2	8	2	4	48	If construction activities should reveal palaeontological material not visible at the surface, construction should halt immediately. The relevant heritage resources agency in the province (KARI) would need to be informed and a field palaeontologist would be required to visit the site to evaluate such fossil discoveries; No structures older than sixty years or parts thereof are allowed to be demolished or extended without a permit from KARI; Sources of all-natural materials (including topsoil, sands, natural gravels, crushed stone asphalt, etc.) must be obtained in a sustainable manner and in compliance with the heritage legislation; implement site specific EMPr	1	6	1	2	16

No.	Impact	Activity and nature of impacts	Impact Rating (Before Mitigation)					Mitigation Measures	Impact Rating (After Mitigation)				
			Extent	Magnitude	Duration	Probability	Significance Points		Extent	Magnitude	Duration	Probability	Significance Points
14	Socio-cultural dynamics	Adverse impacts of construction projects include prolonged closure of road space, air/water/noise pollution; Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users, landowners and local residents; Community members can become unsettled if there are delays to the construction process. As a result, there will be a delay in service delivery within the area	3	6	2	3	33	No construction staff must be permitted to trespass on private land; Any construction personnel found to be trespassing on private land must be immediately subjected to a disciplinary hearing; Construction workers / construction vehicles must take heed of normal road safety regulations; thus all personnel must obey and respect the law of the road; A courteous and respectful driving manner must be enforced and maintained so as not to cause harm to any individual; A safe designated speed limit must be set by the project managers to limit possible road strikes and accidents; implement site specific EMPr	2	2	1	2	10
No-go Alternative													
1	The project will not be initiated	Should the project not go ahead this will pose a major safety concern for the local community. During rainy seasons, the tributary fills with water and the road become inaccessible. The local community's safety will therefore be compromised. Cars will continue to be damaged and emergency vehicles taking longer to respond promptly to people in need of assistance	2	8	5	4	60	Implement the activity and proceed with construction of the development	2	2	4	2	16
2	Biophysical Impacts	Increased infestation by alien invasive vegetation.	2	6	5	4	52	Implement the activity and proceed with construction of the development	2	2	4	2	16
3	Social Impacts	A number of potential temporary and permanent employment opportunities will not be realised.	2	4	4	4	40	Implement the activity and proceed with construction of the development	2	2	4	2	16

OPERATIONAL PHASE													
No.	Impact	Activity and nature of impacts	Impact Rating				Significance Points	Mitigation Measures	Impact Rating				Significance Points
			Extent	Magnitude	Duration	Probability			Extent	Magnitude	Duration	Probability	
Alternative 1 (Preferred Alternative)													
1	Degradation of Freshwater Habitat Impact (Afzelia, 2020)	The operational of the culvert owing to a poor design. Adjoining houses is discharged directly into watercourses without effective attenuation	2	2	2	3	18	The main risks posed by linear features to watercourses are associated with the construction phase. However, it is imperative that the implemented infrastructure is regularly monitored for signs of damage. Do not allow surface water or stormwater to be concentrated, or to flow down slopes without erosion protection measures being in place. Erosion protection measures must be installed at any pipe culverts or stormwater drainage pipes' outlets located along the route. This is in addition to velocity control measures. Correct and continuous maintenance of infrastructure is essential for their continued functionality. Refer to the comprehensive Wetland study in Appendix D. implement site specific EMPr.	2	2	2	2	12
2	Water and Soil Pollution Impact	Pollution during the operational phase from road contaminants are washed off during a rainfall event and flushed into adjacent watercourses.	2	2	2	3	18	As previously mentioned, the main risks posed by linear features to watercourses are associated with the construction phase. However, it is imperative that the implemented infrastructure is regularly monitored for signs of damage. Do not allow surface water or stormwater to be concentrated, or to flow down slopes without erosion protection measures being in place. Erosion protection measures must be installed at any pipe culverts or stormwater drainage pipes' outlets located along the route. This is in addition to velocity control measures. Correct and continuous maintenance of infrastructure is essential for their continued functionality. Implement approved EMPr.	1	2	1	2	8
3	Upgraded crossing and new culvert	Use of a new culvert that will allow easier access to the surrounding community with a minimised risk of flooding (positive)	2	4	5	4	44	N/A					0
No-go Alternative													
1	Existing infrastructure	Continued danger to the users of the road and crossing; inadequate access to resources and services	2	4	4	4	40	Implement the activity	1	4	2	2	14

Planning Phase		
Aspect	Score	
	Before Mititgation	After Mitigation
Logistic arrangement	21	12
Planning and Design of preferred layout	32	0
Environmental Impacts	32	14
Wetland Disturbance	21	12
Social Aspects	36	0
Human and vehicle safety	28	5
Total	28,33	7,17
Alternative 2 (Not Preferred)		
Alternative Radii	44	21
Low-Level River Crossing	36	20
Environmental Impacts	32	14
Alien Vegetation	24	0
Wetland Disturbance	21	12
Social Aspects	36	0
Total	32,17	11,17
No-go alternative		
Human and vehicle safety	60	12
Alien vegetation	48	14
Job opportunities	36	14
Total	48,00	13,33

Construction Phase		
Aspect	Score	
	Before Mititgation	After Mitigation
Prefered Alternative		
Loss of Freshwater Habitat & Biota (Afzelia, 2020)	28	18
Degradation of Freshwater Habitat Impact (Afzelia, 2020)	32	18
The upgrade of the proposed road and installation of the culvert (Positive)	56	0
Water and Soil Pollution Impact - (Afzelia, 2020)	18	10
Spillages and Spill Management	36	18
Storage and Handling of Waste	48	12
Ablution Facilities	44	16
Removal of Vegetation	24	8
Faunal disturbance/ interaction	30	8
Noise Pollution	33	12
Visual Impacts	27	12
Air Pollution	33	12
Cultural and Natural heritage	48	16
Socio-cultural dynamics	33	10
Total	35,15	12,31
No-go Alternative		
The project will not be initiated	60	16
Biophysical Impacts	52	16
Social Impacts	40	16
Total	50,67	16,00

Operational Phase		
Aspect	Score	
	Before Mititgation	After Mitigation
Prefered Alternative		
Degradation of Freshwater Habitat Impact (Afzelia, 2020)	18	12
Water and Soil Pollution Impact	18	8
Upgraded crossing and new culvert	44	0
Total	26,67	6,67
No-go Alternative		
Existing infrastructure	40	14
Total	40,00	14,00