DRAFT BASIC ASSESSMENT REPORT

FOR THE

PROPOSED AMABENGELA TO MATSHENEZIMPISI ROAD, LOCATED ON PORTION 22 (REMAINING EXTENT) OF FARM 15839 RESERVE NO19, WARD 6, NKANDLA LOCAL MUNICIPALITY, KING CHETWSWAYO DISTRICT MUNICIPALITY, KWAZULU-NATAL.

EDTEA Reference: DC28/0008/2023

July 2023

Applicant:	Environmental Consultant:
Nkandla Local Municipality	GREENBELT PROJECTS **PO BOX 791, Umhlanga, 4320** **Tel: 071 140 8350** **steven@greenbeltprojects.co.za** **www.greenbeltprojects.co.za**

TITLE:
PROPOSED AMABENGELA TO MATSHENEZIMPISI ROAD, LOCATED ON PORTION 22 (REMAINING EXTENT) OF FARM 15839 RESERVE NO19, WARD 6, NKANDLA LOCAL MUNICIPALITY, KING CHETWSWAYO DISTRICT MUNICIPALITY, KWAZULU-NATAL.

Greenbelt Ref:	DATE:	REPORT STATUS:
23056	July 2023	Final

VERIFICATION	CAPACITY	NAME	SIGNATURE	DATE
By Authored and Approved by	Principal Environmental Scientist	Steven Whitaker		24 July 2023

Contents

1 Introduction

Greenbelt Projects (Pty) Ltd has been commissioned to undertake an environmental impact assessment for the for the proposed Amabengela to Matshenezimpisi Access Road. The proposed development will require an Application for Environmental Authorisation in the form of a Basic Assessment (BA), which includes a Basic Assessment Report (BAR) and a Comments and Responses Report (CRR) Report which will be submitted to the Department of Economic Development Tourism and Environmental Affairs (DEDTEA) for Environmental Authorisation (EA).

This Basic Assessment process is being undertaken in accordance with Sections 19 – 20 in terms part 2 of chapter 4 of the National Environmental Management Act (Act No 107 of 1998), as amended, and the Environmental Impact Assessment Regulations of December 2014, as amended 2017. These Regulations identify various activities which may have a substantial detrimental effect on the environment. In addition, the Regulations list procedures for assessing potential associated environmental impacts. Public participation and the scoping of issues form part of these procedures, the results of which are captured in this, the Basic Assessment Report.

1.1 Details of the EAP

Greenbelt Projects (Pty) Ltd was established in 2020 and has a record of undertaking independent environmental processes for a range of clients in compliance with the requirements of the various competent authorities. In this respect we reiterate the declaration of independence made in the application form for this project assented to and lodged with the competent authority.

Contact Details	Environmental Assessment Practitioner (EAP)
Business name of EAP:	Greenbelt Projects (Pty) Ltd
Physical address:	Suite 13, 6 Jabu Ngcobo Drive, Umdloti, 4319
Postal address:	PO Box 791, Umhlanga, Durban
Postal code:	4320
Telephone:	071 140 8350 / 087 701 6514
E-mail:	steven@greenbeltprojects.co.za
Cell:	071 140 8350

Names and details of the expertise of each representative of the EAP involved in the preparation of this report are provided below. Curricula vitae will be provided on request.

Name of representative of the EAP	Educational qualifications	Professional affiliations	Environmental assessment experience (yrs)
Steven Whitaker	B.Sc. (Hons)	EAPASA (2019/1492), IAIA (2285)	16 years

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

Name of specialist	Education qualifications	Field of expertise	Section/ s contributed to in this basic assessment report	Title of specialist report/ s as attached in **Appendix C**
Prasheen Singh	MSc. Pr.Sci.Nat 116822	Terrestrial and Aquatic Ecology	Appendix C	Freshwater Ecological and Impact Assessment for the Proposed Amabengela Road
Phillipa Harrison	PHD	Archeology, Heritage and Cultural	Appendix C	Heritage impact Assessment for the Amabengela Road
Mark Meyer	BSc(Hons)	Geology	Appendix C	Geotechnical Assessment for the Amabengela Road

1.2 Location of the Activity

The project is situated within Ward 5 and 6 of the Nkandla Local Municipality, King Chetswayo District. The site is located approximately, 4km east of Nkandla town. The site is located at co-ordinates 28°38'12.13"S 31° 7'49.90"E (start points and ends at 28°36'22.75"S 31° 7'48.62"E. The proposed project is located on Farm Portion 22/15839 of Farm Reserve No 19, SG 21 Digit Code: N0GU00000001583900022.

Table 1: Project Proponent and Site Details

Applicant	
Trading name	Nkandla Local Municipality
Contact person	Mthobisi P. Shezi
Postal address	Private Bag X161, Nkandla, 3855
Telephone	035 833 2058
E-mail	Mthobisi.shezi@nkandla.gov.za
Property Details	
Property Details	Farm Portion 22/15839 of Farm Reserve No 19
Property Owner	Ingonyama Trust
SG 21 Code	N0GU00000001583900022
Land Use / Zoning	Vacant / Unspecified
Title Deed	T12506/2005
Coordinates	28°36'22.75"S 31° 7'48.62"E
Local Municipality	Nkandla Local Municipality
District Municipality	King Chetwswayo District Municipality
Province	KwaZulu-Natal
Neighbouring Landuses	
North	Rural area
East	Rural area
West	Rural area
South	Rural area
Water Catchment Management Area	W12A Pongola-Mtamvuna WMA
Quaternary Drainage Region	W12A Quaternary catchment

1.3 Development Proposal

The project is situated witihin Ward 4 and 6 of the Nkandla Local Municipality, King Chetswayo District. The site is located approximately, 4km east of Nkandla town. The site is located at co-ordinates 28°38'12.13"S 31° 7'49.90"E (start points and ends at28°36'22.75"S 31° 7'48.62"E.

The Nkandla Local Municipality have proposed the construction of a new 4060m gravel road between the villages of Amabengela and Matshenezimpisi. The proposed road will following an existing track, for the most part with sections of horizontal and vertical re-alignments required in order for the road to meet minimum design standards. A road re-alignment is proposed between chainage 3650 and 4000, in order to meet standard road design criteria, and decommission an unsafe track corner. The proposed realignment provides a shorter road section and as such reduces the area of disturbance required by road construction.

The new proposed road includes one (1) watercourse crossing which traverse the major Madiyana River. The location of the crossing is provided overleaf:

Watercourse Crossing	Co-ordinates (DMS)	Proposed infrastructure and Dimensions
WC1 – Madiyana River	28°37'32.33"S 31° 7'37.93"E	2.4x 1.2 box culverts - 43.24m length, 10.9m wide, 2.96m height

The road traverses the perennial Madiyana River, and such a low level bridge crossing is proposed. It is proposed that a number of box culvert (each 2.4x1.2) are installed to cater for high rainfall periods. The new road and watercourse crossing will provide formal access and an efficient link between the villages of. The project also aims to allow local residents to have improved, formalised vehicular access to their homes, schools, shops and the extended road network, particularly during high rainfall periods when access is limited.

The proposed road construction will be constructed and complete with formal stormwater infrastructure, cut-off drains and a watercourse crossing structure, and road signs. The proposed road width is expected to be a 6m wide cambered gravel access road, with 1m servitudes on either side, having a total width of 8m.

The development will provide safer intersections at provincial and district roads. Currently, the access to these roads are not formalised and is not according to minimum required standards.

Plate 1. Image looking north west showing an overview of the existing informal track proposed for upgrade to a gravel road.

Plate 2. Image looking north overlooking the Proposed road bridge and road alignment at the Madiyana River watercourse crossing towards the mid-point of the road construction.

1.4 Description of the Scope of the Proposed Activity

The proposed development triggers identified activities in terms of Listing Notice 1, Government Notice No. 327, as amended 2017, and Listing Notice 3 Government Notice No. 324, as amended 2017, of the National Environmental Management Act, 1998 (No. 107, 1998).

Description of Listed Activity	Applicability
Listing Notice 1 No. 327, as amended, 2017 Activity 12. The development of – (iii) bridges exceeding 100 square metres in size; (xii) infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs – (a) Within a watercourse ~~(b) In front of a development setback; or~~ (c) If no development setback exists, with 32m of a watercourse, measured from the edge of the watercourse. The proposed infrastructure will exceed 100m^2 in size, within 32 metres of a watercourse, therefore, activity 12 is triggered.	The proposed new road section traverses the perennial Madiyana River at 28°37'32.33"S 31° 7'37.93"E. The major watercourse crossing will comprise 2.4x 1.2 box culverts of 43.24m length, 10.9m wide, 2.96m height, together with a base foundation and wing walls. Ingress and egress points at the wingwalls will be shaped to conform with the new gravel road elevation. The proposed road and watercourse crossing infrastructure will exceed 100m2 in size, within 32 metres of a watercourse, therefore, activity 12 is triggered.
Listing Notice 1 No. 327, as amended, 2017 Activity 19. 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 – (i) A watercourse.	The proposed new road section traverses the perennial Madiyana River at 28°37'32.33"S 31° 7'37.93"E. The major watercourse crossing will comprise 2.4x 1.2 box culverts of 43.24m length, 10.9m wide, 2.96m height, together with a base foundation and wing walls. Ingress and egress points at the wingwalls will be shaped to conform with the new gravel road elevation. The construction of the proposed road and watercourse crossing structure, will require the infilling, depositing, and excavation of more than 10m3, therefor activity 19 is triggered.
Listing Notice 3 No. 324, as amended, 2017 Activity 4. *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***d. KwaZulu-Natal*** *viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *ix. Core areas in biosphere reserves;* *x. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;* *xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;*	According to the KwaZulu-Natal Terrestrial Systematic Conservation Plan (TSCP) (EKZNW, 2016) areas of CBA: Irreplaceable areas are present within the proposed road alignment.

Listing Notice 3 No. 324, as amended, 2017 Activity 12. *The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan* *d) KwaZulu-Natal* *v. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;* *vi. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	According to the KwaZulu-Natal Terrestrial Systematic Conservation Plan (TSCP) (EKZNW, 2016) areas of CBA: Optimal are present within the proposed road alignment. Approximately 1400m of the total road alignment traverses the EKZNW CBA.

1.5 Approach

In order to meet the objectives of the environmental assessment study, the following activities were undertaken:

- Consultation with representatives of Nkandla Local Municipality to establish the nature and extent of the proposed activity
- Identification of legislation, regulations and guidelines pertaining to the proposed activity
- A baseline desktop survey
- Site visits to the area to determine the nature of the affected environment and to identify potential issues of concern
- An identification and assessment of the physical, biological, social, economic and cultural aspects of the environment that may be affected by the proposed activity
- The identification and assessment of any feasible and reasonable alternatives
- Identification and liaison with key Interested and Affected Parties (IAP)
- Advertisement in the local press, placement of notices on site, distribution of pamphlets
- The compilation of this document the Draft Basic Assessment Report.
- Circulation of this Draft Basic Assessment Report for comment
- Updating of the Draft Basic Assessment Report to Final to include all comments received.

2 Need and Desirability of the Proposed Development

The project aims to provide safe vehicular and pedestrian access across the perennial Madiyana River within ward 5 and 6 while improving the safety and access for the local community between the villages of Ambengela and Matshenezimpisi. The river is currently traversed via an informal track with no possibility of vehicular crossing. Access across the river can be challenging during times of average to high rainfall. At present, there is no formal infrastructure to cater for high rainfall periods resulting in an unsafe environment for the local inhabitants, school children and livestock when crossing the river. The drivability of the road is affected by the boulder outcrops and in some sections, cut back embankments that do not seem to be stable. The existing track is slippery when wet and is prone to stormwater damages during heavy rainfall. The narrow road width does not allow for two way traffic or areas where busses and taxis can pull over to pick up commuters. The proposed gravel road and crossing structure will provide a formal link between villages in the surrounding area. Improved and efficient access to hospitals, emergency services, community halls and the extended road network will be established through the implementation of the gravel access road and bridge.

3 Preferred Site, Activity and Technologies

As the preferred site already has an existing track road leading towards and from either side of the the Madiyana River, it is preferable to develop this site, rather than developing at an entirely new location crossing at an alternative position, with associated clearing and access from either side of the proposed watercourse crossing. The proposed route is the route which the local communities utilise between villages, schools and the local road network, as such the track follows contours which are easily traversed. The current watercourse crossing point does not have any crossing infrastructure, however is traversed by exposed rocks and existing ingress and egress tracks. A road re-alignment is proposed between chainage 3600 and 4000, in order to meet standard road design criteria, and decommission an unsafe track corner. The proposed realignment provides a shorter road section and as such reduces the area of disturbance required by road construction. The proposed formal road and associated watercourse crossing will help to ensure an adequate and safe vehicular transit along a gravel road, and river bridge crossing during high rainfall and flood events. Alternative methodologies may be available; however, the proposed method is deemed the most cost-effective and sustainable solution. Please see Appendix B for detailed design.

4 Alternatives

4.1 Site Alternatives

No alternative sites have been considered as the proposed Amabengela to Matshenizimpisi Access Road, as presented, is site specific so as to service the communities of ward 5 and 6 and surrounding areas. The proposed road and crossing will provide a vehicular pedestrian link between the villages, as well as an efficient route to the extended regional transportation network.

4.2 Technological/Design Alternatives

The current informal access track and rudimentary stone river crossing are not considered infrastructure but rather informal wearing of access routes and informal placement of stones within the watercourse. These are likely succumb to damage by further erosion and other accumulated waste and vegetation. Severe erosion rills and gulleys have been identified along the existing access track.

Design, layout and configuration of South African roads is standard and are ordinarily employed by developers such as the Municipality; alternatives are likely to be inferior. The proposed option is considered to be the most cost effective option in order to meet minimum requirement and provide basic infrastructure services.

4.3 No-Go Alternative

Leaving the access track and watercourse crossing in its current condition is regarded as the No-Go Alternative. This alternative would have the least direct impact on the environment, as none of the construction related impacts would occur. Indirectly however, this alternative may eventually result in the loss of life during flood events. This alternative may also result in the complete erosion of the watercourse and eventual wash-away of the rock and stone crossing point. It is unlikely that the road is heavily utilised by vehicles, but the government and the municipality's responsibility to its constituents remains. The No-Go Alternative has therefore not been assessed.

4.4 Preferred Alternative

Considering the site and the technological alternatives which are available, and the feasibility of each, the preferred alternative is, therefore, the site and preferred technological alternative as proposed in the development proposal description (**Section 1.3**). As the only feasible option, only the preferred alternative has been assessed.

5 Public Participation Process

5.1 Objectives of the Public Participation Process

The objectives of the public participation process (PPP) are to:

- Identify and inform potential IAPs of the proposed development
- Provide them with the opportunity to register any issues or concerns regarding the proposal, and
- Identify mitigatory and management options to address issues and concerns raised, where appropriate.

5.2 Details of the PPP

In undertaking the public participation process, all known, relevant facts pertaining to the proposed project were made available to registered and identified IAPs so that they could participate in a meaningful manner. The approach included:

- Ongoing technical liaison with relevant local municipal officials and the project facilitators regarding the proposed development
- Preparing and distributing leaflets to nearby IAPs.
- Identifying potential IAPs during discussions with the project facilitators and representatives
- Placing and English and isiZulu advert in a regional newspaper (Ilanga Newspaper on the 15/06/2023) calling for IAPs not previously identified to identify themselves and make an input into the process (see copy of advert in Appendix D).
- Keeping IAPs informed, keeping a register of all IAPs and allowing them the opportunity to make comment on the proposed activity (see table below of registered IAPs)
- This Draft Basic Assessment will be made available for 30 days to all identified Stakeholders and placed at the Umzimkhulu Municipal Library for comments.
- **Note, comments received in response to the Draft Basic Assessment Report circulation will be incorporated in to the Final Basic Assessment Comments and Response Report.**

The following IAPs were identified or identified themselves:

Organisation	Contact Person	Contact Details
Department of Water and Sanitation	Ms RJ Madibe	Tel: 031 336 2700 / 2765 Mngoma-Madibe Jabulile Mngoma-MadibeJ@dws.gov.za
Department of Agriculture Forestry and Fisheries (DAFF) Forestry Regulations and Support	Ms Karen Moodley	nsontangane @dffe.gov.za Tel: 033 392 7739; P/Bag X 9029, Pietermaritzburg, 3200
Ezemvelo KZN Wildlife	Nerissa Pillay	Nerissa.pillay@kznwildlife.com PO Box 13053, Cascades, 3202
KZN Department of Transport Transportation Engineering Sub-Directorate	Michele Schmid Judy Reddy	michele.schmid@Kzntransport.gov.za judy.reddy@kzntransport.gov.za Private Bag X 9043, Pietermaritzburg, 3200 Tel: 033 355 8600; Fax: 033 342 3962 Ref: T10/2/2/3922/2
Eskom	M. Nicol	Nicolm@eskom.co.za P O Box 66, New Germany, 3620 Tel: 031 710 5404 MtawalNP@eskom.co.za
Telkom SA SOC Limited Network Engineering and Build Eastern Region Wayleave Management Section	S. Mchunu	Private Bag X 54326, Durban, 4000 Tel: 033 342 1591; Fax: 033 345 6126 wayleaves2@telkom.co.za PortiaN2@openserve.co.za
Amafa	Annie van de Venter Radford	amafaddps@amafapmb.co.za
Ingonyama Trust Board	Suewellan Ellis	EllisS@ingonyamatrust.org.za
Ward Councillor Ward 5	Cllr LN Ngobese	cllrlnngobese.nka@gmail.com
Ward Councillor Ward 6	Cllr Sfiso Ngobese	cllrsnngobese.nka@gmail.com
King Chetsway District Municipality	Mr V Zungu	Tel No.: 039 834 3939/2485 Email: zunguv@kingchetswayo.gov.za
Nkandla Public Library	Ms Salaphi N Masango	Tel: 0829522085 Lot 292 Maree Rd Nkandla 3855

5.3 Summary of the Issues Raises by IAPs

Comments and registered IAPS received have been included in the Comments and Response Report (CRR) (Appendix D). Comments received will be incorporated into the Final Comments and Response Report with a response to each identified issue.

6 The Receiving Environment (All Alternatives)

6.1 Geographical and Physical Environments

6.1.1 Topography and Hydrology

The study area is undulating with a central valley incised by the Madiyana River. The project high point is at 1131masl near the end point and low-point of 901 masl at the watercourse crossing, at the mid-point. The site is an incised valley with gentle to moderately steep gradients. The proposed road alignment traverses one perennial watercourses being the Madiyana River, and is located within the W12A quaternary catchment of the Pongola to Mtamvuma Water Management Area). The Wetland and Aquatic Assessment undertaken by The Biodiversity Company (2023)Verdant identified no wetlands within the Project Area Of Influence (PAOI), only the non-perennial drainage lines/tributaries and the Madiyana River. Therefore, efforts were afforded to a riverine assessment rather than a wetland assessment.

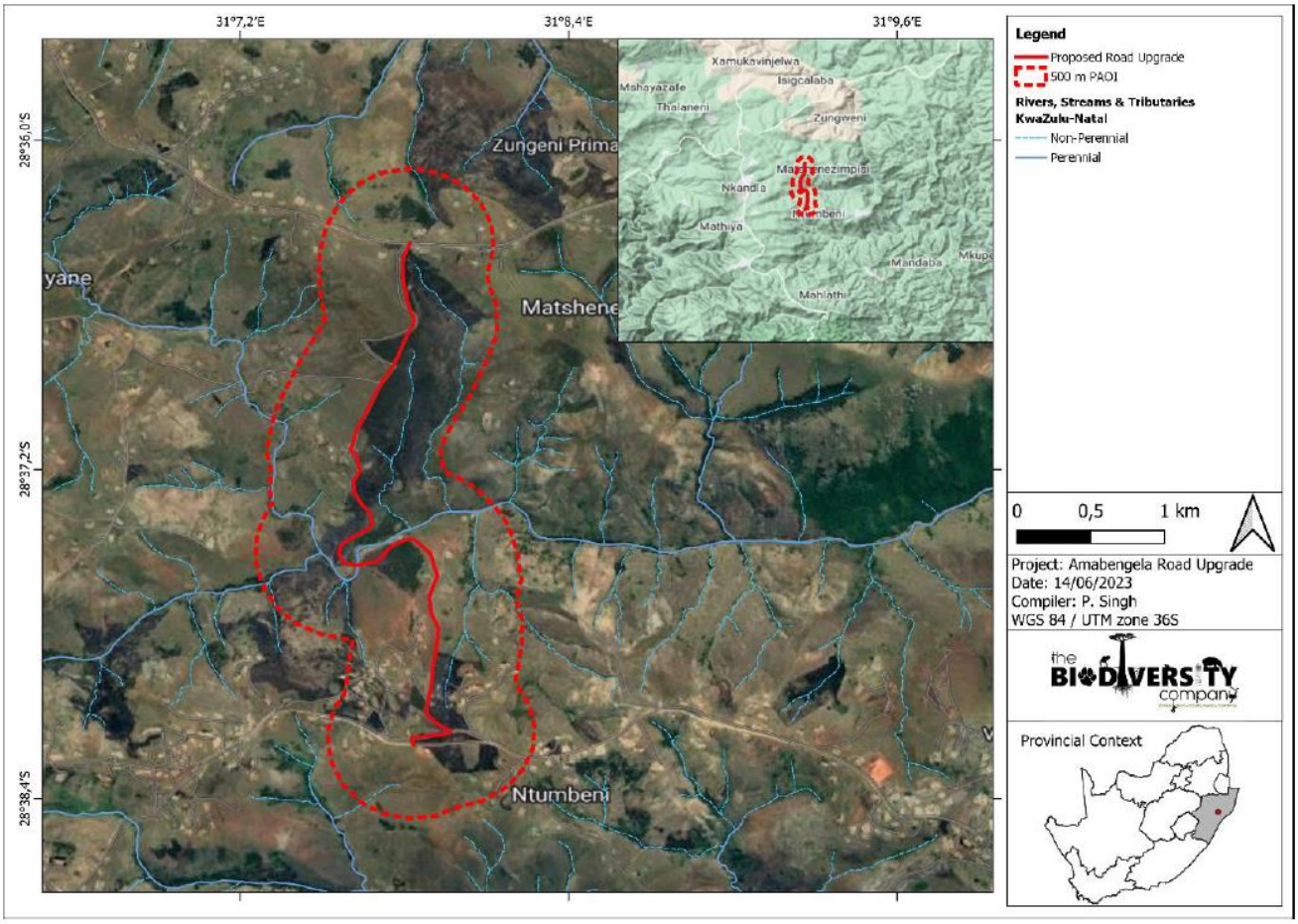


Figure 1. Project area in proximity to watercourses

6.1.2 Geology and Soils

According to the published Geological Sheet, 2830 Dundee, the study area is underlain by a range of geological units including the Dwyka Formation which consists primarily of tillite (shale-like material with scattered hard rock inclusions) at the northern end of the route; the tillite has been been intruded by generally dolerite dykes and sills which normally weather to hard-rock boulders in a clayey matrix in this type of environment; Natal Group sandstone underlies a short section of the route; while all of the above are underlain by granite at depth. Residual soils originating from the tillite are generally firm clayey soils in the area; a generally thick (>0,5m) layer of clayey-sand colluvium was noted in most profile positions which decreases in thickness in the steeper areas on site.

Geology and Soils – Specific Site Conditions
A shallow water table (less than 1.5m deep) occurs on site.
Dolomite, sinkhole or doline areas were not found on site. Erosion gulley's were noted/
Seasonally wet soils (often close to water bodies) occur on site.
Unstable rocky slopes or steep slopes with loose soil were not found on or near the site.
Dispersive soils (soils that dissolve in water) are not likely to occur on site.
Soils with low clay content (clay fraction more than 40%) occur on site.
No other unstable soil or geological features were noted on site.
An area sensitive to erosion was noted

6.1.3 Climate

The study area mainly receives summer rainfall with little winter rainfall. Frosts do occur. Some valleys are sheltered and may show weak rain shadow effects. The average annual precipitation ranges from 700mm to 1100mm. Temperatures are variable with winter temperatures close to 0°C and summer temperatures in excess of 30 °C being a common occurrence.

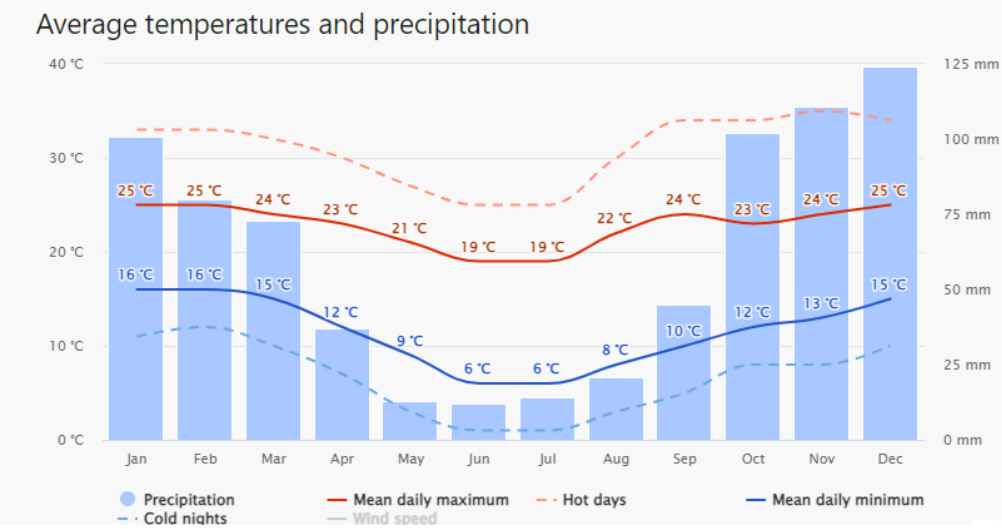


Figure 2. Climatic conditions

Blue bars - median monthly precipitation.
Upper and lower red lines – mean daily maximum and minimum temperature
MAP – Mean Annual Precipitation
MAT – Mean Annual Temperature

7 Biological Environment

7.1 Flora and Fauna

According to The Vegetation of South Africa, Lesotho and Swaziland, the vegetation in the study area can be classified as Midlands Mistbelt Grassland (Gs9), and Moist Coastal Hinterland Grassland (Gs20) within the grassland biome. Midlands Mistbelt Grassland, (Gs9) are typically hilly and rolling landscapes mainly associated with a discontinuous east-facing scarp formed by dolerite intrusions. Dominated by forb0rich, tall, sour Themeda triandra grasslands transformed by the invasion of native 'Ngongoni grass (Aristida juncifomis. Only a few patches of the original species rich grasslands remain. The vegetation units is described as endangered with a 23% conservation target.

Invasive plants species were noted to have established along and on the peripheral edges of existing road tracks and nearer to disturbed settlement areas. These invasives comprised Black Wattle, (*Acacia Mearnsii*), Bugweed (*Solanum mauritianum*), Rag weed (*Ambrosia artemisiifolia*), Bracken fern (*Pteridium aquilinum*), and Lantana (Lantana Camara).

The Intermediate Habitat Integrity Assessment (IHIA) results for the instream habitat integrity of the Madiyana River was rated as class B, or largely natural whilst the riparian habitat integrity was rated as class C, or moderately modified. A loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. The nature of the topography, watercourse and riparian habitat are illustrated in Images 1 to 6 .

Image 1. The nature of the existing track proposed for upgrade near the start point.

Image 2. Image looking north showing the xisting track proposed or upgrade and the invasive *Acacia mearnsii* and *Lantana camara* invasives along the existing track periphery.

Image 3. View looking north approaching the Madiyana River valley showoing the existing track proposed for upgrade.

Image 4. View looking north west along the proposed alignment parrellel to the madiyana river approaching the watercoure crossing point. Note alien invasion and existing track.

Image 5. Image north west showing the proposed location across the Madiyana River and associated river riparian zone.

Image 6. Image looking south from the end point showing the existing track proposed for upgrade.

Image 7. View looking south showing the proposed road re-alignment over grassland habitat.

Image 8. View looking south east showing existing track proposed for road upgrade and severe erosion gulleys formed from stormwater runoff.

7.1.1 Riparian Habitat Assessment

The Riparian Delineation undertaken by The Biodiversity Company (2023) reveals that the project encroaches into the Madiyana River Riparian Zone. The riparian zone was assessed as being of moderate importance. The riparian habitat integrity was rated as class C, or moderately modified. A loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. The modifications within the watercourse may be a resultant of a bridge that washed away as well as flow modification, bed modification, and channel modification in both the instream and riparian habitat, as well as exotic vegetation encroachment in the riparian habitat. This results from surrounding land use changes in the catchment where the establishment of agriculture within a farming community along with the associated infrastructure such as roads.

Riparian		
Indigenous vegetation removal	10	5.2
Exotic vegetation encroachment	10	4.8
Bank erosion	8	4.5
Channel modification	8	3.8
Water abstraction	6	3.1
Inundation	3	1.3
Flow modification	8	3.8
Water quality	5	2.6
Total Riparian Score		70.8
Riparian Category		C

Figure 3. Riparian Habitat Integrity Assessment

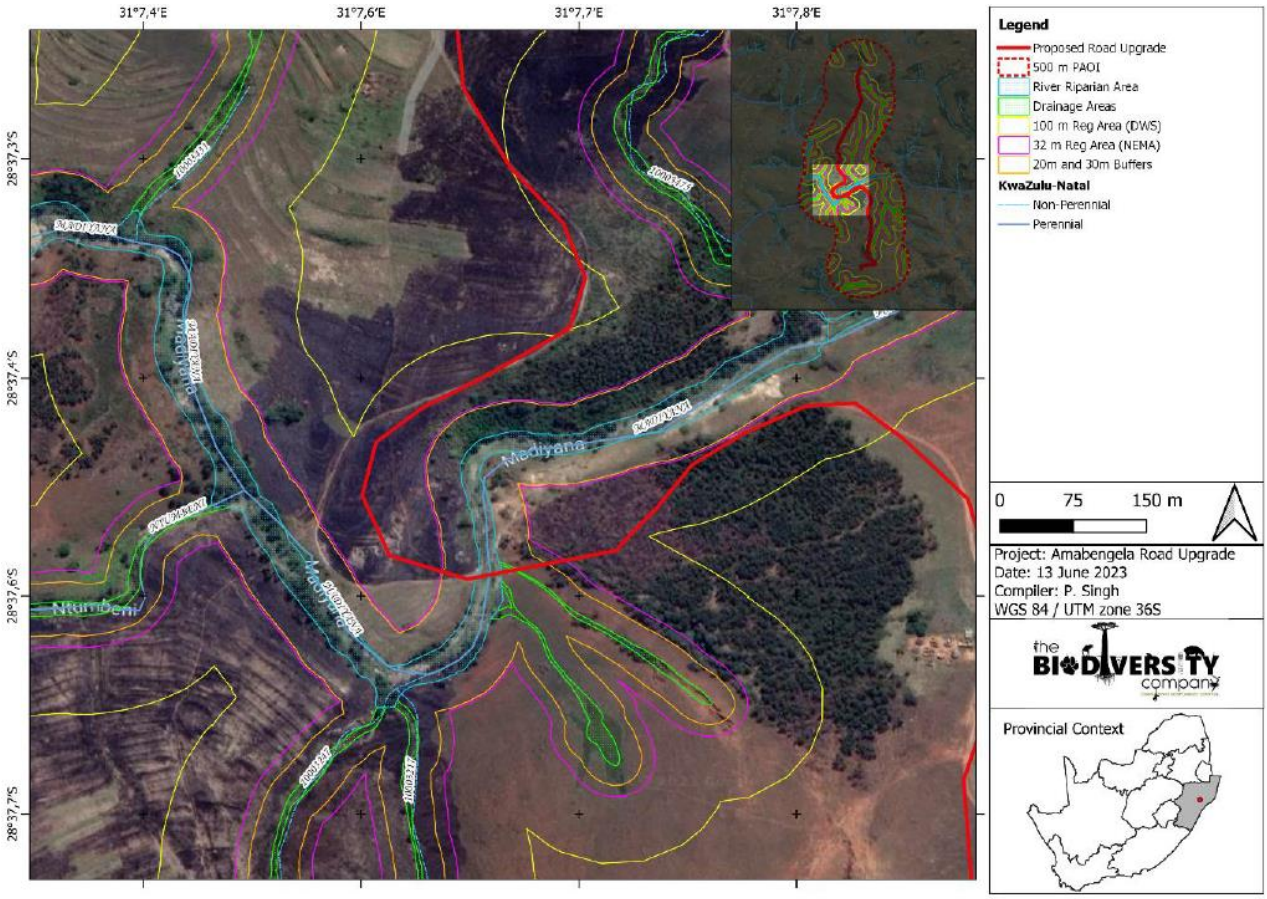


Figure 4. Map showing Riparian Zone, and regulated areas.

7.1.2 Wetland and Aquatic Assessment

A wetland and aquatic ecosystem assessment was undertaken by Th Biodiversity Company (2023), explains that after consulting the desktop data and visiting the site, it was noted that there were no wetlands within the Project Area of Influence (PAOI), only the non-perennial drainage lines/tributaries and the Madiyana River.

The *in-situ* water quality indicated water quality parameters in the Madiyana River (site M) fell within the acceptable limits for tolerant aquatic life in the project area. This on account of the dissolved oxygen not meeting the TWQR. The tributaries were dry during the survey, possibly due to their location in catchment (source zones) compounded by the dry season. The water quality observed may be considered baseline/reference water quality for this reach of the Madiyana River. It should be noted that *in-situ* water quality provides a simplistic overview of physical water quality parameters and aids in the interpretation of biological results.

Parameters	pH	Conductivity (µS/cm)	DO[1] (mg/L)	DO[1] (%)	Temperature (°C)
Limits	6.5-9** 6.5-8.4*	500*	5.0-9.5***	80-120**	5-30**
M	6.65	112	6.68	72.0	17.7
MT1	Dry				
MT2	Dry				

*RQOs | **TWQR (DWAF, 1996) | ***Chapman and Kimstach (1996)
M – Madiyana River reach | MT1 – Drainage tributary 1 | MT2 – Drainage tributary 2
Parameters exceeding guideline limits are indicated in red.

Figure 5. Surface water quality test results.

Criterion	Average Score	Score
	Instream	
Water abstraction	5	2.8
Flow modification	6	3.1
Bed modification	8	4.2
Channel modification	6	3.1
Water quality	7	3.9
Inundation	3	1.2
Exotic macrophytes	0	0.0
Exotic fauna	0	0.0
Solid waste disposal	0	0.0
Total Instream Score		81.7
Instream Category		B

Figure 6. Stream Habitat Integrity Assessment

Present Ecological State

PES is defined as a measure of the similarity or deviation from a natural or reference state (Macfarlane et al., 2020). The current PES of this reach of Madiyana River is classed as 'Unmodified, Natural' (Class A), with a 'Very high' Ecological Importance (EI) and 'High' Ecological Sensitivity (ES);

The SASS5 score and SASS5 ecological classes obtained for the sampled system during the survey are presented below. Based on the Average Score Per Taxon (ASPT – average sensitivity) scores the aquatic macroinvertebrate communities for the sampled site comprised primarily of tolerant taxa (Intolerance Rating < 5), while a low diversity of moderately tolerant taxa (Intolerance Rating 6 - 10) were sampled in the reach. Few sensitive macroinvertebrate taxa (Intolerance Rating 11 - 15) were observed in the project area.

Period	May 2023
Site	Site M
SASS Score	143
No. of Taxa	26
ASPT*	5.5
Ecological Category (Dallas, 2007)	A

Figure 7. Macro Invertebrate Assessment

Data adapted from: Wetland and Aquatic Ecosystem Assessment Report for the Proposed Amabengel Access Road, The Biodiversity Company, 2023.

7.2 Socio-Economic Environment

The villages of Amabengela and Matshenezimpisi, proposed to be serviced by the new road construction, are rural in nature. The mid-section of the proposed road is new river bridge construction which is undeveloped and un-occupied. Subsistence agricultural grazing land is the dominant landuse, with smaller subsistence cultivated gardens closer to homesteads. The socio-economic structure can be classified as primarily low income. At present, there is no formal infrastructure to cater for high rainfall periods and the road and watercourse crossing. There is existing track ion the southern and northern approach to the river, however no formal crossing infrastructure in place. The current crossing point an unsafe environment for the local inhabitants, school children and livestock when crossing the river. The proposed road will provide an efficient and safe link to exiting infrastructure.

7.3 Culture and Heritage Environments

No sites of cultural significance were noted within the site or within close proximity to the site. The project details and reports will be submitted to AMAFA for comment.

In line with Section 38(1) of the National Heritage Resources Act, Act 25 of 1999, (NHRA), the project does trigger the activities identified. Heritage Impact Assessments (HIAs) as required by the National Environmental Management Act 107 of 1998 as amended (NEMA), in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA). Section 38(1) of the NHRA may require such an assessment in case of:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or
  barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity which will change the character of a site –

(i) exceeding 5 000m^2 in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority (PHRA);

- the re-zoning of a site exceeding 10 000m^2 in extent; or
- any other category of development provided for in regulations by SAHRA or a PHRA.

A phase one cultural heritage survey undertaken by Land Matters for the proposed road. A ground survey of the study site was conducted on the 25th of April 2023 following standard archaeological survey procedures. The consultant was accompanied on site by appointed public liaison officer, Mr. Louis Dlamini. Consultation was undertaken with local community members on the possible presence of graves or other heritage features on the study site. Persons interviewed indicated that there are graves present within some of the residential homesteads within the general study area, however none of these graves fall within or directly adjacent to the road upgrade route. None of the persons interviewed were aware of the presence of any other heritage features along the road upgrade route. No heritage or palaeontological resources were identified on or directly adjacent to the road upgrade corridor during the Phase 1 HIA and Desktop PIA, and the site does not form part of any known cultural or heritage landscape. The heritage consultant is of the opinion that the proposed Amabengela to Matshenezimpisi Road upgrade project may proceed on the proposed site, subject to the implementation of the recommendations as outlined in Section 11 of this Report. The proposed development must also adhere to the requirements of the National Heritage Resources Act (NHRA),

1999 (Act 25 of 1999) and the KwaZulu-Natal Amafa and Research Institute Act which states that all operations that expose graves, fossils or other heritage features must cease immediately, pending an investigation by the provincial heritage resource authority.

8 Environmental Impact Assessment of the Proposed Activity

8.1 Geographical and Physical Environments

8.1.1 Topography and Drainage

The topography of the area will not be affected because of the site specific nature of the proposed development.

Drainage will be affected during construction and post construction if not correctly managed. The proposed development traverses a watercourse, and will thus affect the flow of the Madiyana River during construction. This will be managed through the use of temporary stream diversion, if required. The flow will not be stopped at any time, and, where possible, the majority of the construction work will take place within the dry season.

8.1.2 Hydrology and Geomorphology

With poor mitigation, increased rates of erosion and sedimentation are likely to occur because of the direct impacts to soils, flow, and vegetation during the construction phase. Increased rates of erosion and sedimentation within the channel is inevitable as a result of the clearing of vegetation, the loss of soil cohesion and disturbance to the channel bed within the construction corridor. The objective of mitigation should be to minimise the intensity and extent of such impacts through the application of appropriate method statements and the installing of appropriate erosion and sediment control measures. If such measures are poorly implemented, gulley erosion could occur which may migrate upstream, with resulting sedimentation downstream.

The need to create a dry working area within the river to establish the culverts will necessitate some form of temporary flow diversion and bunding of the working areas. Flow diversions will likely increase the velocity of water that could result in bank or bed scour and/or increased aquatic habitat turbidity. Working area dewatering could also result in bank and bed erosion and/or sedimentation downstream of the working area if the pumped water is discharged back into the watercourse and in an uncontrolled or inappropriate manner.

Increased inundation is expected for a short period upstream of the dammed / bunded area, which could result in increased stress to the shorter mariginal hygrophilous species that are submerged as well as later the predominant flow characteristics and levels of turbidity.

Increased rates of erosion and sedimentation will result in increased local sediment loads and turbidity, and increased rates of deposition downstream of the working area. The ultimate result will be the degradation of local aquatic habitat integrity. In terms of predicted PES changes there is likely to be a moderate reduction in PES for the short term for the bridge construction.

Culvert structures promote the erosion and scouring of the riverbed and banks at the discharge area below the structure which negatively influences the habitat within these areas, resulting in downstream impacts such as sedimentation and smothering of course substrates. These construction and operational phase disturbances could also result in further spread of alien vegetation which in turn would affect the functioning of the aquatic ecosystems.

Activity	Aspect	Combined Impact
Construction Phase	Access routes	Loss of aquatic habitat
	Clearing vegetation (outside riparian zone)	Erosion of watercourse.
	Clearing riparian vegetation	
	Construction of laydown yard	Loss of indigenous vegetation
	Stormwater management	Exotic vegetation proliferation
	Operation of machinery & equipment	Sedimentation of the watercourse.
	Excavation of bed and banks	
	Installation of concrete base and culverts	Flow sediment equilibrium change
	Ablution and eating areas	Water quality impairment
	Rehabilitation and final landscaping	
	Establishment of alien vegetation	Flow modifications
	Soil and building material management and soil wash from working areas.	Loss of biodiversity Alteration of bed and banks
Operational Phase	Sedimentation and erosion	Flow modifications
	Stormwater	Water quality modifications/impairments
	Alien vegetation encroachment and proliferation	Erosion
	Hydrocarbon contamination	Habitat modifications
	Conducting maintenance of culverts and fishway structures	Alteration of bed and banks

Figure 8. Potential risk impacts of construction. (TBC, 2023)

8.1.3 Geology and Soils

The proposed development will have little to no negative impact on the geology and soils of the area. Construction activities may temporarily increase erosion during excavation for bridge culverts, and stream sedimentation and may also result in soil compaction both within, and alongside the watercourse. Access to culvert bases areas and across the Madiyana River may increase erosion and sedimentation during construction. The relevant mitigation measures to help to reduce this impact, will be incorporated into the project EMPr.

8.1.4 Climate

No measurable affect is anticipated.

8.2 Biological Environments

8.2.1 Direct ecosystem modification

The proposed road upgrade project will involve the development of a new access road and bridge across the Madiyana River. The establishment of the new road and crossing will involve the direct and permanent infilling of small areas of aquatic, bed and riparian habitats within the road development footprint and the direct and temporary modification of the channel in the vicinity of the road footprint during the construction phase.

The loss of cumulative river area will likely result in a very small reduction in the condition (PES) of the local reach. However, the PES class units are unlikely to change in the long term, provided mitigation measures are implemented.

8.2.2 Habitat connectivity and edge disturbance

During the construction phase, there will be a temporary reduction in ecological connectivity within river reach because of clearing and earthworks activities along the construction corridor that bisects the unit. The construction corridor will physically block the movement of aquatic and riparian fauna. In addition, construction activities are likely to result in elevated levels of noise and dust, and increased alien invasive plant invasion due to soil disturbance and vegetation clearing and/or poor rehabilitation. Such indirect impacts could result in the alteration in the composition of biotic communities, habitat degradation, and/or the displacement of fauna sensitive to human presence and noise pollution.

8.2.3 Water Pollution

Contaminants such as hydrocarbons and solids may be generated during the construction phase from several potential sources (examples include petrol/diesel, oil/grease, paint, cement/concrete and other hazardous substances).

In this case, the volume of hazardous pollutants is expected to be low. If pollutants are washed into the local river reach, there will be small impacts to the downstream aquatic habitats in terms of increased stress and possibly mortality to sensitive aquatic fauna.

8.3 Socio-Economic Environment

8.3.1 Social

The proposed construction of an upgraded gravel access and bridge will benefit the local community, as it will enable a formal vehicular, pedestrian and livestock passage across the existing gravel road during moderate to high rainfall events. The local community may also benefit through the provision of 25 temporary employment opportunities during the construction phase. The safety of the local inhabitants will need to be considered during construction and access to the construction area must be regulated.

Proposed Development Socio-Economic Statistics	
Expected capital value of the activity on completion:	R 18,480,000.00
Number of new employment opportunities that will be created in the development phase of the activity:	25 people
Expected value of the employment opportunities during the development phase:	R 1,100, 000.00
Percentage of this which will accrue to previously disadvantaged individuals:	100 %
Number of employment opportunities that will be created during the operational phase of the activity:	10
Percentage of this will which accrue to previously disadvantaged individuals:	100%

8.3.2 Traffic

The proposed road upgrade and construction provides a formal gravel access road with complete watercourse drainage infrastructure. The proposed road will be a road upgrade adjoining the D1642 at start point 28°38'12.13"S 31° 7'49.90"E. The end point is at 28°36'22.75"S 31° 7'48.62"E and will link to the D1636 at the end point 28°36'22.75"S 31° 7'48.62"E. The site is accessed off the D2236 from the P50-2 near Nkandla. The proposed development is unlikely to impact any provincial or national road, although slow turning construction traffic and the generation of dust may have an impact during construction phase for the transportation of materials. The size of the trucks transporting goods to and from the site will not exceed the size of the trucks utilised in the construction of the provincial roads itself. The trucks will also comply with local road regulations and weight specifications. The number of trucks gaining access to the site is not known at this stage. If the speed (and weight) limits on the haulage roads are adhered to no impacts different from the impact of the current traffic are envisaged. This will include the generation of noise, dust and potential safety issues.

8.3.3 Emissions – Waste, Smoke, Dust, Noise

Dust and noise emitted during construction from vehicle movement and excavations are inevitable but will be of short duration. Dust originating from the gravel roads giving access to the site is likely to occur especially if construction takes place during the drier winter months as is recommended to help to reduce the impacts on the watercourse. If the amount of dust on the gravel access road becomes a problem, the road may be sprayed with water to settle the dust (as a last resort only). Any water utilised must be from an approved source with documentation as proof.

It is not expected that the emissions will cause an impact on the residents in the surrounding areas or exceed the levels stipulated in the National Environmental Management: Air Quality Act (No.39 of 2004).

Waste generated during construction will include construction rubble and general waste, all of which will be disposed of at the nearest registered landfill site. The Nkandla Waste Disposal Facility is the nearest waste disposal facility. Recycling must be encouraged.

8.3.4 Heritage and Cultural Environment

Heritage Impact Assessments (HIAs) as required by the National Environmental Management Act 107 of 1998 as amended (NEMA), in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA). Section 38(1) of the NHRA may require such an assessment in case of:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or
  barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity which will change the character of a site –

(i) exceeding 5 000m2 in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or subdivisions thereof which have been consolidated within the past five
years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources
authority (PHRA);

- the re-zoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a PHRA.

No heritage or palaeontological resources were identified on or directly adjacent to the road upgrade corridor during the Phase 1 HIA and Desktop PIA, and the site does not form part of any known cultural or heritage landscape. The heritage consultant is of the opinion that the proposed Amabengela to Matshenezimpisi Road upgrade project may proceed on the proposed site, subject to the implementation of the recommendations as outlined in Section 11 of this Report. The proposed development must also adhere to the requirements of the National Heritage Resources Act (NHRA), 1999 (Act 25 of 1999) and the KwaZulu-Natal Amafa and Research Institute Act which states that all operations that expose graves, fossils or other heritage features must cease immediately, pending an investigation by the provincial heritage resource authority.

9 Environmental Risk Assessment Methodology

The purpose of the Environmental Risk Assessment (ERA) is to identify the potential environmental risks and impacts associated with the installation of the proposed cccess road and watercourse crossing. This provides a basis to identify the key risk drivers and make informed decisions on the way forward in order to ensure that these risks do not result in unacceptable social, environmental or reputational risk.

Risk Assessment Methodology

The potential environmental impacts associated with the proposed development have been evaluated using a recognised semi-quantitative risk assessment methodology. This methodology has been developed to ensure all procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment as set out in National Environmental Management Act (No. 107 of 1998) [NEMA] 24(4b) are met. In order to assess the significance as objectively as possible, the following criteria have been used:

SEVERITY of the impact
SPATIAL SCALE (EXTENT) of the impact
} **Consequence**

FREQUENCY of the ACTIVITY
FREQUENCY of the OCCURRENCE (PROBABILITY) of the impact
} **Likelihood**

} **Significance**

This system derives environmental significance on the basis of the consequence of the impact on the environment and the likelihood of the impact occurring. **Tables 4 to 8** describe the process in detail. The significance rating of potential risks is outlined in **Table 8**. Significance is calculated as the product of consequence and likelihood.

9.1 Determining Consequences

In terms of this project, consequence is determined based on the consideration of a combination of severity, extent and duration of the environmental impact. Consequence is determined as the average of the three values (i.e. (severity + extent + duration) / 3) (**Table 4**).

Table 4: Assessment of Consequences

Rating	Description		
	Severity	Spatial Extent (Scale)	Duration
1	Negligible / non-harmful / minimal deterioration	Within immediate area of activity	Less than 1 month / quickly reversible
2	Minor / potentially harmful / measurable deterioration	Surrounding area within project boundary	Less than 1 year / quickly reversible
3	Moderate / harmful / moderate deterioration	Beyond project boundary	More than 1 year / reversible over time
4	Significant / very harmful / substantial deterioration	Regional / provincial	More than 10 years / reversible over time / life of project or facility
5	Irreversible / permanent	National / international	Beyond life of project of facility / permanent

9.2 Determining Likelihood

Likelihood considers the frequency of the activity together with the probability of an environmental impact associated with that activity occurring. Likelihood is determined as the average of the two values (i.e. (frequency + probability / 2) (**Table 5**).

Table 5: Assessment of Likelihood

Rating	Description	
	Frequency	**Probability**
1	Less than once a year	Almost impossible
2	Once in a year	Unlikely
3	Quarterly	Probable
4	Weekly	Highly likely
5	Daily	Definite

9.3 Determining Overall Impact Significance

Overall significance is determined using professional judgement based on a clear understanding of the nature of the impact, its severity, the duration and degree to which the impact can be reversed as well as the extent of the impact. These aspects define the impacts consequence which must be considered against the likelihood of the impact occurring in order to assign an overall significance of the impact. Significance ratings of the identified impacts have been based on the implementation of mitigation measures as per the proposed Environmental Management Plan (EMPr).

The status of the impact must be defined, and the impact can either be positive, neutral or negative. A positive impact is where an activity will have a social / environmental / economic benefit. A neutral impact is when an activity will have no effect. A negative impact is when an activity will be harmful socially / economically / environmentally. Significance should be assigned according to the definitions in the table below (**Table 6**).

Table 6: Description of Impact Significance

Rating	Significance	Description
L (1 – 4.9)	**Insignificant**	A potential issue which was found to have no impact when evaluated
LM (5 – 9.9)	**Very Low**	Impacts will be site specific and temporary with no mitigation necessary
M (10 – 14.99)	**Low**	Impact will have a minor influence on the biophysical and/or social environment, and will not have an influence on the decision.
MH (15 – 19.9)	**Medium**	Impact will have a moderate influence on the biophysical and/or social environment, and it should have an influence on the decision unless it is mitigated.
H (20 – 25)	**High**	Impact will have a major influence on the biophysical and/or social environment, and would influence the outcome regardless of any possible mitigation.

10 Environmental Impact Assessment Matrix

The purpose of the environmental impact assessment (EIA) is to identify the potential impacts and associated risks posed by the project on the environment. The outcomes of the EIA will provide a basis to identify the key risk drivers and make informed decisions on the way forward in order to ensure that these risks do not result in unacceptable social, environmental or reputational risk to the Umzimkhulu Local Municipality.

The potential environmental impacts in terms of NEMA are assessed in the risk matrix below (**Table 7**) according to the criteria described in the consequences, likelihood and significance tables provided above. The reasons for selecting each is covered under the qualification of the potential impact; the associated recommendations, findings and / or mitigation measures are also provided.

Table 7: Environmental Impact Risk Matrix (overleaf)

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
10.1 Geographical and Physical Environments (Preferred Alternative)											
Decrease in surface water quality	A decrease in surface water quality is expected during the construction phase owing to an accumulation of suspended sediment and excess sediment deposition from potential sediment release associated with the construction methodology.	2	2	2	**2**	2	2	**2**	***4 L***	**-**	The proposed construction methodology is considered "best practice" as it makes use of the most appropriate technologies. Notwithstanding the above, mitigation and rehabilitation measures and recommendations will be incorporated into the Environmental Management Programme. For example: Construction within the active channel will require temporary stream diversion to help reduce erosion and sedimentation. Any excavations or excavated material must be protected from erosion if it is anticipated that it will remain exposed for any length of time. Stockpiles of this material must be positioned away from the watercourse, keeping the topsoil and the sub-soil separate (where applicable). As a result, a long-term decrease in surface water quality is not expected; the impact is likely to be very low (negative). **Insignificant**.
	With mitigation:	2	2	1	**1.6**	1	2	**1.5**	**-**	***2.4 L***	
Impact on surface water flow	Alteration of surface flow conditions owing to physical obstruction of the culvert causeway.	1	1		**1**	1	1	**1**	***1 L***	**-**	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
	With mitigation:	1	1	1	**1**	1	1	**1**	**-**	***1L***	The proposed construction is not expected to significantly affect surface water flow during the construction phase. This phase is expected to be short in duration, and management measures must be employed during the construction phase to help to ensure that the surface water flow is maintained as far as possible. The impact post mitigation is expected to be very low/(negative). This impact can be reduced further if construction takes place within the dry months.
Increased sedimentation	Increased sedimentation of the watercourses owing to disturbances / alterations to the bed and banks could potentially cause an increase in transportation and deposition of sediments to the watercourse, leading to a reduction in water quality.	2	2	2	**2**	2	2	**2**	***4 LM***	**.**	The probability for this impact to occur will be increased during high rainfall periods. The potential impact of sedimentation is expected to be of a very low significance if the recommendations in the EMPr are implemented. In addition, construction will be limited to the dry (low rainfall) winter months. Based on the above, the potential impact on surface water resources is likely to be very low (negative).
	With mitigation:	2	1	1.5	**1.5**	2	2	**2**	**.**	***4.5 L***	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	**Impact Assessor Comments and Recommendations:** - **Degree to which impact can be managed** - **Possible Mitigation Measures and level of residual risk** **Positive and Negative Impacts**
Decrease in groundwater water quality	The installation method could result in contamination of ground water arising from the construction plant, oils/grease, cement, building materials etc.	3	3	3	**3**	3	3.5	**3.25**	***9.75 LM***	.	There is the potential for contamination of groundwater owing to uncontrolled releases of cement, hydraulic fluid, oil, diesel during construction. The potential impact of groundwater contamination is expected to be of a **low (negative)** significance if the recommendations in the EMPr are not implemented and **very low** after mitigation. Please refer to recommendations regarding hazardous material and spill management in the EMPr.
	With mitigation:	2	2	2	**2**	2.5	2.5	**2.5**	.	***5 LM***	
Decrease in soil and groundwater water quality	The development of a construction site could result in damage to soil and ground water contamination.	3	2	2	**2.3**	3	3	**3**	***7 LM***	.	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
	With mitigation:	2	2	2	**2**	2	2	**2**	**.**	***4 L***	The clearing and development of the site may cause soil compaction and contamination, and ultimately erosion, as well as ground water contamination as a result of the movement of heavy vehicles and the uncontrolled release of hydrocarbons, cement and other hazardous materials. Bunded areas must be set up from the outset to help to ensure all spillages are contained. Any spillages must be immediately cleaned up and disposed of at the nearest registered landfill only, with proof of correct disposal. During construction continuous monitoring of containers, bunded areas, surface runoff and air emissions must be undertaken by a responsible person. The proposed development areas must be kept to a minimum where possible. At the site camp and ingress and egress points of the culvert, topsoil should be removed from the proposed construction site prior to establishment. The compacted soil must be ripped up, the topsoil replaced, and rehabilitated with indigenous vegetation once construction has been completed. This impact is of **low (negative)** significance without mitigation, and of very low, (no) significance if mitigated**.**

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	**Impact Assessor Comments and Recommendations:** - **Degree to which impact can be managed** - **Possible Mitigation Measures and level of residual risk** **Positive and Negative Impacts**
Increased soil erosion	The road construction and watercourse crossing installation method may exacerbate erosion of the Madiyana River banks and bed.	3	3	2	**2.6**	4	3	**3.5**	***9.1 LM***	.	There is the potential for soil erosion to occur because of excavation activities within the Madiyana River during construction. The probability for this impact to occur is increased during high rainfall periods. The impacts from erosion are expected to be **very low** pre-mitigation and **very low** if the soil erosion and surface water protection measures recommended in the EMPr are implemented **(negative)**. In addition, construction of the crossings will be limited to the dry winter months.
	With mitigation:	2	2	2	**2**	3	3	**3**	.	***6 LM***	
Compaction of soils	Compaction of the soils from heavy vehicles.	2	2	2	**2**	3.5	3	**3.25**	***6.5 LM***	.	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - **Degree to which impact can be managed** - **Possible Mitigation Measures and level of residual risk** **Positive and Negative Impacts**
	With mitigation:	2	1	2	**1.7**	3	3	**3**	**.**	***5.1L M***	Compaction of soils in and along the edges of the watercourse must be minimised as far as possible. Areas excluded from development (riparian d zones) must be clearly demarcated and indicated to construction staff. Compacted soil must be broken up, raked loosely, and then re-vegetated or packed with large boulders and stones (within the river bed). Use of gabions and reno mattresses must also be considered. The impact is thus expected to be **very low (negative)** both pre and post mitigation. Crossing of the river must be avoided as far as possible to help limit impact. If crossing is necessary, simple surface and temporary structures to limit damage to the river must be utilised. Reno mattresses, gabion baskets and biodegradable sand bags may be utilised. No plastics must be utilised. At completion, ALL imported material must be cleared up. All waste must be correctly disposed of with proof of correct disposal.

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
10.2 Biological Environments (Preferred Alternative)											
Ecological impacts – river banks and beds	Modifications to the channel banks and beds from the construction process may result in a loss of habitat. Aquatic habitat will be disturbed and potentially lost during construction. The additional permanent habitat loss will be minimal, as the site is disturbed by the existing crossing.	5	2	4	**3.6**	4	5	**4.5**	***16.5 MH***	**.**	Revegetation of adjacent areas disturbed during construction, but not permanently transformed. Limit the construction footprint. Implement erosion and sediment control measures. The topsoil must be removed and stockpiled / stored separately from the underlying sub-soil prior to construction on the banks of the watercourse. The backfill process must ensure that the material is returned in the same order that it was removed i.e. the sub-soil replaced first, followed by the topsoil material closer to the surface. The impact is thus expected to be **Moderate (negative)**, pre mitigation and **low** post mitigation.
	With mitigation:	2	1	4	**2.3**	4	3	**3.5**	**.**	***5.8 M***	
Ecological impacts – alien invasive vegetation	Disturbance of vegetation and the encroachment of alien invasive plant species	4	4	4	**4**	4	4	**4**	***16 M***	**.**	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	**Impact Assessor Comments and Recommendations:** - **Degree to which impact can be managed** - **Possible Mitigation Measures and level of residual risk** **Positive and Negative Impacts**
	With mitigation:	3	3	4	**3.33**	3	3	**3**	**.**	***10 LM***	It is critical that vegetation is established over disturbed areas immediately after construction is complete. Groundcover that were removed during the initial phases of construction along the river banks must be replanted on completion of construction. An approved local indigenous grass seed mixture must be applied in conjunction with the sods if it is deemed that establishment of the vegetation from the sods is unlikely to be successful. Pre mitigation the impact is expected to be **medium and post mitigation low (negative).**
Ecological impacts – loss of riparian habitat	Disturbance of sections of riparian habitat.	2	2	2	**2**	2	3	**2.5**	***5LM***	**.**	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
	With mitigation:	3	2	2	**2.3**	3	3	**3**	**.**	***7 LM***	The proposed working area must be clearly demarcated prior to the commencement of the works. The width of the working area within the watercourse must be kept to a strict minimum to ensure that impacts on the freshwater systems and the watercourse are minimised. All activities must be restricted to within the demarcated working area. The reinstatement of the watercourse and banks must be carried out immediately after the culverts have been installed. The backfill material must be returned in the same order that it was removed i.e. the sub-soil replaced first, followed by the topsoil material closer to the surface. Re-vegetation must be carried out immediately after backfilling, and the establishment of alien invasive plants must be prevented. The use of engineered mechanisms (reno and gabions), biodegradable sand bags or large rocks and boulders, will also assist in stabilising the soil and river beds and banks. The impact is then expected to be kept within the **very low range (negative)** pre-mitigation, and **very low** if mitigation measures are employed.

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
10.3 Socio-Economic Environment (Preferred Alternative)											
Potential Safety and security impact	Exposure of local residents (and livestock) to potentially dangerous site conditions (open excavations) during construction	4	3	2	**3**	3	3	**3**	***9 LM***	**.**	The proposed crossing will expose the local residents to potentially dangerous conditions during the construction phase if excavations are left accessible and unguarded during construction hours and after hours. Local residents must be informed of the proposed construction activities and warned to stay away. Where possible the site must be fenced off. Communication keeping the local residents/IAPs informed will be important throughout the construction phase. The impact is likely to be **very low (negative)** pre and post mitigation.
	With mitigation:	2	3	2	**2.3**	3	2	**2.5**	**.**	***5.8 LM***	
Changes in the social fabric	The influx of construction workers may create social issues such as conflict, conflict for work, changes in financial outlook, changes in domestic cohesion.	3	3	2	**2.6**	3	3	**3**	***8 LM***	**.**	The proposed development will expose the local residents to potential conflict situations if construction work is only available to some, and if social and domestic cohesion is compromised. It is suggested that the construction workers be advised of these pitfalls in order to help avoid them. This impact is expected to be of **very low (negative)** significance both pre and post mitigation.
	With mitigation:	2	2	2	**2**	3	2	**2.5**	**.**	***5 LM***	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	**Impact Assessor Comments and Recommendations:** - **Degree to which impact can be managed** - **Possible Mitigation Measures and level of residual risk** **Positive and Negative Impacts**
Improved social amenity	The construction of the proposed road will provide improved and safer access for residents, pedestrians, school children.	5	3	4	**4**	4	4	**4**	***16 MH***	**.**	The current crossing may become difficult and dangerous to cross during high rainfall and flood events, the construction of a culvert causeway will improve safety and access for local residents. This is a **positive** impact of **Medium** Significance.
	With mitigation: Not required										
Construction Phase Waste, and Effluent,	Waste may be produced during the construction phase	3	3	3	**3**	5	4	**4.5**	***13.5 M***	**.**	A small quantity of waste in the form of construction rubble, overburden and general waste may be created during the construction phase. This will be disposed of appropriately at the nearest registered waste disposal site. **Low** impact is expected during construction and **very low** post mitigation.
	With mitigation:	2	2	2	**2**	4	3	**3.5**	**.**	***7 LM***	
Construction Phase Emissions and Noise	Noise and Dust may be created by the construction vehicles and machinery	3	3	3	**3**	4	3	**3.5**	***10.5 M***	**.**	

Qualification of Potential Impacts (Nature)		Severity	Extent	Duration	Consequence (S+E+D)/3	Frequency	Probability	Likelihood (F+P)/2	Significance (No Mitigation) (CxL)	Significance (With Mitigation)	Impact Assessor Comments and Recommendations: - Degree to which impact can be managed - Possible Mitigation Measures and level of residual risk Positive and Negative Impacts
	With mitigation:	2	2	2	**2**	3	2	**2.5**	**.**	***5 LM***	Noise and dust may be created by construction vehicles during the construction phase (the access roads are dirt and gravel roads). This must be prevented by ensuring that the vehicles travel at reduced speeds. Wetting the roads and dusty areas down is an option but must only be considered as a last resort in extreme cases. Noise must be reduced through the use of silencers and correctly maintained equipment. These impacts are likely to be of short and intermittent duration, and are not considered intolerable. There are residents and a school located close to the site, so noise and dust must be correctly managed. The impact is thus **low** during construction and **very low (negative)** post mitigation.

10.4 Cumulative Impacts

The majority of the impacts were found to be of a medium to low negative significance, prior to mitigation. Cumulatively, the impacts assessed are not expected to significantly alter the environmental condition, especially if the mitigation measures are employed.

10.5 Degree to which the Impacts can be reversed

All the significant impacts identified can be reversed, other than the permanent impact of the installation of the proposed Amabengela Access Road. In some instances, a positive outcome is anticipated such as improved, safer vehicular and pedestrian access across the Madiyana River.

10.6 Degree to which Impacts may cause Irreplaceable Loss of Resources

None of the impacts will result in an irreplaceable loss of resources.

10.7 Outcome of the Site Selection Matrix

The preferred site and technology/design was assessed. The proposed development is site specific as an efficient link across of the Madiyana River. The proposed Amabengela Access has been sited to optimise the existing vehicular transportation routes and foot paths through the valley and improve the safety of motorists and pedestrians.

11 Environmental Impact Statement

11.1 Assumptions, Uncertainties and Gaps in Knowledge

Detailed description of the construction methodology (aside from the diagrams provided in Appendix B) was not available.

11.2 Summary of Findings

11.2.1 Summary of the Positive and Negative Impacts and Risks

Table 8: Summary of Impacts and Risks (Preferred Alternative)

Potential Environmental Impacts	Qualification of Potential Impacts (Nature)	Impact Significance
Decrease in surface water quality	A decrease in surface water quality is expected during the construction phase owing to an accumulation of suspended sediment and excess sediment deposition from potential sediment release from erosion associated with the construction activities.	**Very low (negative)** during and with mitigation measures **Very low (negative)**.
Impact on surface water flow	Alteration of surface flow conditions owing to physical obstructions.	The potential impact on surface water resources is likely to be **very low (negative)** prior to mitigation. The impact post mitigation is expected to be **very low (negative).**
Increased sedimentation	Increased sedimentation of the watercourses owing to disturbances / alterations to the bed banks could potentially cause an increase in transportation and deposition of sediments to the watercourse, leading to a reduction in water quality.	**Very low** significance if the recommendations in the EMPr are implemented. The potential impact on surface water resources is likely to be **very low (negative)** prior to mitigation.
Decrease in groundwater water quality	The installation method could result in contamination of ground water arising from the construction plant, oils/grease, cement, building materials etc.	The potential impact of groundwater contamination is expected to be of a **very low (negative)** significance if the recommendations in the EMPr are not implemented and **very low** after mitigation.
Decrease in soil and groundwater water quality	The development of a construction site could result in damage to the soil and ground water contamination.	This impact is of **very low (negative)** significance without mitigation, and of no significance if mitigated..
Increased soil erosion	The installation method may exacerbate erosion of the river banks and bed.	The potential impact on surface water resources is likely to be **very low (negative)** both pre and post mitigation.
Compaction of soils	Compaction of the soils from heavy vehicles.	The impact is expected to be **very low (negative)** both pre and post mitigation.
Ecological Impact – temporary loss of habitat	Disturbance of the aquatic ecosystem and disturbance of riverine embankments as a result of a construction activities.	The impact is expected to be **Moderate (negative)** without mitigation and **low** with mitigation. **Low.**
Ecological impacts – river banks and beds	Modifications to the channel banks and beds from the construction process.	The impact is expected to be **low (negative)**, pre-mitigation and **low** post mitigation.
Ecological impacts – alien invasive vegetation	Disturbance of vegetation and the encroachment of alien invasive plant species	Pre-mitigation, the impact is expected to be **medium (negative).** The post mitigation impact is expected to be **low.**

Table 8: Summary of Impacts and Risks (Preferred Alternative)

Potential Environmental Impacts	Qualification of Potential Impacts (Nature)	Impact Significance
Ecological impacts – loss of riparian habitat	Loss of sections of riparian habitat.	The impact is expected to be kept within the **low** range **(negative)** pre-mitigation, and **very low** if mitigation measures are employed.
Potential Safety and security impact	Exposure of local residents (and livestock) to potentially dangerous site conditions (open excavations) during construction	The impact is likely to be **very low (negative)** pre and post mitigation.
Changes in the social fabric	The influx of construction workers may create social issues such as conflict, conflict for work, changes in financial outlook, and changes in domestic cohesion.	This impact is expected to be of **very low (negative)** significance both pre and post mitigation.
Improved social amenity	The construction of the causeway over the river will provide improved and safer access for residents.	This is a **positive** impact of **Medium** Significance.
Construction Phase Waste, Effluent, Emissions and Noise	Waste may be produced during the construction phase	**Low** impact during construction and **very low (negative)** impact post mitigation.
	Noise and Dust may be created by the construction vehicles and machinery	**Low** impact during construction and **very low (negative)** impact post mitigation.

11.3 Key Impact Management Measures

11.3.1 Mitigation Measures to be included in EMPr

Mitigation measures as presented in the Risk Assessment, (**Table 7**) (amongst others) above will be included in the EMPr.

11.3.2 Mitigation Measures Identified in Specialist Reports

Wetland and Aquatic Assessment Report for the Proposed Amabengela Road, The Biodiversity Company, 2023.

The following culvert specific mitigation measures are provided:

River crossing structures

• Preparation of the crossing point and alteration of the culverts must be undertaken during the low flow period to avoid the need for river diversions and associated impacts;

• Due to the potential of threatened species expected in the project area, construction activities need to keep impacts to the watercourse minimal with special consideration given to catering for fish migration;

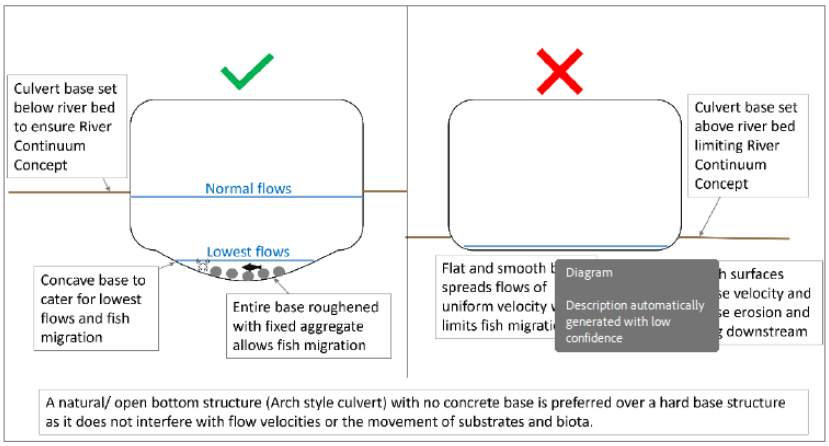
• The proposed bridge design indicated the use of multicell box culverts. These box culverts must incorporate natural riverine bottoms (arch shaped with an open base) to cater for the River Continuum Concept;

• Box culverts that have a solid flat cement base (cube shaped) must be avoided as they result in a uniform depth and flow of water covering the full width of the culvert floor, resulting in an insufficient depth of water for the passage of fish and macroinvertebrates during low flow periods;

• Arch shaped box culverts with natural riverine bottoms allow for the natural stream depth and flow characteristics, with associated maintenance of a low flow channel that fish can utilise during drier periods;

• The use of precast (depending on the dimensions) arch shaped (with an open base) box culverts, could result in substantial cost savings associated with lower difficulty and less time spent on site (speed of construction), which in turn will lower the environmental impact at the crossing site;

• An alternative to natural bottoms, it is highly recommended that the base/floor of each of the box culverts (applicable for the drainage line culvert as well) as presented in the diagram below be redesigned to avoid a flat surface and incorporate a concave shape to cater for the lowest of flows and migration of biota (fish and macroinvertebrates) and substrates;

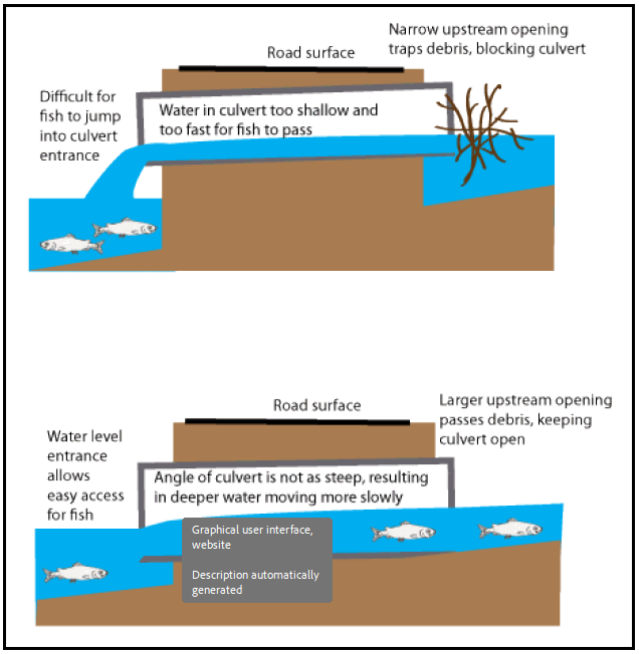


• The sides of the box culverts (the portal arch) and the concave shaped concrete bases should be left with a rough surface and the base can be roughened up with a course concrete mix using larger stone concrete mix to create broken hydraulic forces allowing smaller aquatic taxa (small fish and macroinvertebrates) a gripping surface to traverse the structure during times of flow. This could include the use of baffles;

• Inlets and outlets of the culvert must be positioned below the stream bed for the continuation of the streambed and natural movement of riverine substrates as discussed for Arch shaped box culverts;

• The gradient and horizontal alignment of the culvert pipes must be the same as the existing stream;

• Culvert improvements would involve increasing/ lowering the downstream end of the culvert to just below the water's surface to reduce the steepness of the culvert, and making design modifications to reduce water velocity and increase water depth in the culvert. These improvements as presented must be incorporated for the proposed project to maintain lower potential risk ratings;



• Rocky material (aggregate) must be placed at the base of the culvert discharge point to avoid the concentrated flow from eroding and scouring the receiving area. Ideally this layer should incorporate a double layer with the bottom layer partially sunken into the riverbed, with the second layer placed on top of the base layer. Due to the increased flow velocities created by smooth concrete and box culverts flow dynamics, the sediments in the discharge area are expected to be washed away. The double aggregate layer will limit this;

• The larger rock material needs to be concreted in place to prevent them from washing away during high flows;

• The rocks can be placed behind the culvert structure with a cascade pattern creating a rock ramp (step-like riffles) creating a natural fishway for fish movement without the elevated costs of constructing formal fish-ladders. The extent and height of the aggregate placement would depend on the drop height of the culvert opening height and riverbed. This should also incorporate a large variety of rock sizes placed at random in the rock pile to create a diversity of hydraulic conditions (microhabitats) within the rock ramp;

• For best environmental practice implementation and least long-term environmental impact, each watercourse crossing structure in the greater project area should incorporate larger box (single or multicell) culverts with natural riverine bottoms over the smaller culvert pipes.

Gabions

• It is recommended that the exposed riverbanks located immediately up and downstream of the bridge which includes the areas scoured by discharge from the bridge be given bank protection to minimise erosion, scouring and bank collapse associated with the presence of the bridge. To ensure rehabilitation efforts/mitigation for the bridge structure are assigned the best environmental protection, the specialist strongly recommends that the gabion structure incorporate vegetation in the structure (Green 'living' gabions – image below) as this option provides several ecological benefits over the standard non-living gabion structure.

• According to Maccaferri (2022), "Green Gabions are modular gabion units used for streambank stabilization, restoration and erosion protection solutions. They are specifically designed for use with

soil bioengineering techniques such as live staking, brush layering and rooted plants, to create permanent, vegetating, armoured systems. The Green Gabion consists of a basket manufactured from heavily galvanized and polymer coated double twisted hexagonal woven steel wire mesh which is lined with a 100% coir blanket. The unit is filled in-place with gabion stone and then the voids between the stones are filled with quality topsoil, before the unit is closed. The topsoil sustains the establishment of the vegetating soil-bioengineering techniques, and the stone fill provides a tough skeleton to the system."

Benefits of Green 'living' gabions:

- Reduces erosion risk.
- Ecologically friendly.
- Improves the resilience of the structure through the vegetation roots systems.
- Water polishing through phytoremediation.
- Provides habitat for a wider variety of biota compared to plain stone gabions.
- Aesthetic value.

• The wire mesh is expected to rust due to its location within a watercourse. Therefore, the mesh must be PVC coated to prevent rust and failure of the structure in the long-term;

• The structure must incorporate strategically placed tiebacks to protect against the edges flanking out and the centre from bulging out and failure of the structure which commonly occurs in South Africa;

• The base layer of gabions must be placed below the expected maximum scour depth;

• The flanks of the gabion walls must not be exposed and must be angled at 45 degrees and be deeply set into the embankment to beyond the expected maximum erosion depth;

• All areas surrounding the gabion structure must be vegetated (hydroseeded and watered) towards the end of the construction phase to prevent the loss of the soils holding the structure in place;

• Ideally a gentler angle of the slope is preferred as the gentler gradient offers greater vegetation establishment potential over steeper angles; and

• This green method can also be used for the stepped/terraced gabion baskets (where implemented).

<u>Water Quality</u>

• All construction activities must be undertaken during the low flow (dry season) period as much as possible to limit surface flow transporting contaminants to the surrounding watercourse habitat;

• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping";

• During construction contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;

• Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the freshwater systems;

• Where feasible, as much material must be prefabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site;

• All chemicals and toxicants during construction must be stored in bunded areas;

• All machinery and equipment should be inspected regularly for faults and possible leaks; these should be serviced off-site;

• No dumping of construction material on-site may take place; and

• All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.

• A suitable stormwater plan (or design) must be compiled for the channel diversion. This plan must attempt to displace and control all the draining water in areas downstream and adjacent to the channel diversion point, as this will still be the preferential path for water during rain events.

• During operation, the pedestrian bridge platforms must be routinely monitored for maintenance for the life of the project.

Erosion and Sedimentation

• All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the water resources. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;

• Install sandbags around soil stockpiles to prevent soils washing into the system;

• Document the soil profile on removal and ensure the soil is backfilled in the same horizon order in which it was removed;

• Ensure that topsoil is appropriately stored and re-applied; and

• Make sure that the soil is backfilled and compacted to appropriate geotechnical specifications for the project area.

• Signs of erosion must be addressed immediately to prevent further erosion of the upgraded infrastructure;

• Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;

• Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil; and

• Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.

Alien Vegetation

• Quarterly vegetation rehabilitation surveys need to be conducted of the vegetation within the project footprint; and

• An alien invasive plant management plan needs to be compiled and implemented prior to construction to control and prevent the spread of invasive aliens.

General

• The aquatic and riparian areas outside of the specific project site area must be avoided where possible;

• Aspects of the site development plan (SDP) such as laydown area and site camp should be relocated to outside of the riparian buffer zone, which would significantly reduce potential impacts to the riparian zone;

• The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access. A single access route through the riparian area must be used.

• Laydown yards, camps and storage areas must be located beyond the aquatic areas. Where possible, the construction of the road and crossings must take place from the existing footpath and not from within the aquatic systems;

• The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;

• It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;

• Temporary storm water channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion;

• Prevent uncontrolled access of vehicles through the river system that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;

• All chemicals, construction materials and toxicants to be used for the construction must be stored within bunded areas;

• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced in a designated area;

• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping";

• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);

• Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems;

• All removed soil and material must not be stockpiled within the system. Stockpiling should take place away from the watercourse and buffer area. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;

• Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;

• No dumping of construction material on-site may take place;

• All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and

• An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of AIPs on cleared areas. Alien vegetation must not be allowed to encroach onto the sites and must be continually removed during construction. Construction must not promote further alien plant disturbances in the surrounding area.

• Heavy vehicles must be parked outside of the riparian buffer zone except where needed for the construction process.

• Erosion prevention and sediment control measures must be implemented. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching.

• Caution must be exercised when removing the existing bridge. The banks must be reshaped to the natural/adjacent slope. The resultant remains, rubble and/or waste must be disposed of at a registered facility.

• Rehabilitation of the riparian area, bed and banks must be budgeted for and should incorporated into the project life cycle, and must be completed as soon as construction is completed. Rehabilitation must be done following an approved Rehabilitation Plan and in consultation with a suitably qualified SACNASP professional.

• The bridge and culvert upgrade must be constructed as per the approved design(s).

• All areas upstream and downstream of construction footprint must be demarcated as a 'no-go' zone for the duration of the construction process. No activities or site staff are permitted to enter these areas.

• Areas exposed to erosion must be protected through the use of sandbags, berms and efficient construction processes i.e., limiting the extent (footprint) and duration period that areas are exposed.

• Measures are implemented to minimise the duration of disturbance and the footprint of the disturbance of the beds and banks of the watercourse.

• All works, including emergency alterations or the rectification of incidents, start upstream and proceed in a downstream direction, to ensure minimal impact on the water resource.

• All material excavated from the bed or banks of the watercourse are stored at a clearly demarcated location until the works have been completed, upon which the excavated material must be backfilled to the locations from where it was taken (i.e., material taken from the bed must be returned to the bed, and material taken from the banks must be returned to the banks).

• All alterations or hardened surfaces associated with such structures or works are structurally stable, do not induce sedimentation, erosion or flooding, do not cause a detrimental change in the quantity, velocity, pattern, timing, water level and assurance of flow in a watercourse, do not cause a detrimental change in the quality of water in the watercourse, do not cause a detrimental change in the stability or geomorphological structure of the watercourse; and does not create nuisance condition, or health or safety hazards.

• Measures must be implemented at alterations (including at existing structures or activities) to 1) prevent detrimental changes to the breeding, nesting or feeding patterns of aquatic biota, including migratory species (if present), 2) allow for the free up and downstream movement of aquatic biota, including migratory species (if present), and 3) prevent a decline in the composition and diversity of the indigenous and endemic aquatic biota.

Recommendations:

• A competent Environmental Control Officer (ECO) must oversee the construction and rehabilitation phase of the project, with watercourse areas as a priority; and

• An infrastructure monitoring and service plan must be compiled and implemented during the operational phase.

Heritage Impact Assessment for the Amabengela Access Road, Land Matters, 2023. Aspects Conditional to the Findings

- The Phase 1 HIA and Desktop PIA for the proposed Amabengela to Matshenezimpisi Road upgrade project in the Nkandla region identified no heritage sites or features on or directly adjacent to the road upgrade corridor. The area also does not form part of any known cultural landscape. It is also highly unlikely that fossils are present within the development footprint due to the nature of the bedrock (Dwyka Group glacial tillite; Nsuze Group quartzite and phyllite; and granite) and geological conditions present at the site and surrounding area. The proposed development may therefore proceed as no heritage or paleontological features are threatened by the proposed road upgrade project.

- In the unlikely event that the proposed road upgrade activities expose any graves, fossils or other heritage features on the site footprint, all activities must cease, and the Environmental Control Officer (ECO) appointed for the road upgrade project must be contacted. The ECO must in turn notify the provincial heritage resource authority, the KwaZulu-Natal Amafa and Research Institute and/or the heritage consultant, and the chance find protocol in Appendix C must be implemented.

- The proposed road upgrade project must adhere to the requirements of the NHRA and the KwaZulu-Natal Amafa and Research Institute Act, and Draft Regulations, which requires that a person that discovers any archaeological or palaeontological material or a meteorite must immediately cease all operations or activity within a 25m radius of the discovery and must notify the KwaZulu-Natal Amafa and Research Institute. In addition, no structures older than sixty years or parts thereof are allowed to be demolished, altered, or extended without a permit from the KwaZulu-Natal Amafa and Research Institute. Under no circumstances may any heritage material be destroyed or removed from site unless under direction of the KwaZulu-Natal Amafa and Research Institute and appointed heritage consultant.

Geotechnical Investigation of Amabengela Road, Mark Meyer, 2023

No significant hindrances to further development from a geotechnical point of view were observed. Noteworthy factors affecting to the final design are as follows:

• Soft excavation (i.e. TLB) is anticipated for the majority of the roads, up to the depths achieved in the test pits (1,0m) and DCPs, with roughly 10% of the route underlain by shallow dolerite corestones or bedrock.

• No problem soils (heaving, collapsible, compressible) were noted within any of the test pits.

• Generally medium dense consistencies indicating good founding conditions for the road are indicated by the DCP tests.

• No seepage was encountered; significant seepage is expected at the river crossing.

• Shallow refusal was encountered at the river crossing on a dense alluvial boulder bed, the depth to bedrock could not be established.

• G6-type shale material is present in an existing borrow pit on site, however the material at the borrow pit is variable and may be hard to break down to fine gravel. Another overgrown granite borrow pit is expected to contain more consistent material that is easier to work with; it is not known why this borrow pit has been abandoned. Every effort was made during the site investigation to ensure that generally accepted practices of our profession were used in the sub-surface evaluation of the site, and that the sampling and testing was representative of the soil/rock conditions observed on-site. However it is impossible under the constraints of a restricted investigation of this nature to guarantee that zones of poorer geological materials were not identified that could have a significant bearing on the outcomes of this investigation. The investigation has therefore attempted, through interpolation and extrapolation at known test locations, to identify problem issues of a geotechnical nature on which this report is based. Variances in soil and rock quality and quantity from those predicted may be encountered during construction and these should be recorded, however no warranty against these variations is expressed or implied, due to the geological changes that can occur over time due to natural processes, or human activity.

No conditional aspects have been identified.

11.4 Reasoned Opinion on Proposed Development

The Basic Assessment Study has made extensive use of desktop and field data, which reveals typical impacts associated with the proposed Amabengela Access Road and bridge over the Madiyana River.

The impact of the proposed development on the receiving biophysical environment will be permanent (lifetime of the facility) but low provided the development is implemented as proposed and all reasonable steps to implement the proposed development using standard best practices and that the proposed mitigations included in a comprehensive Environmental Management Programme (EMPr) are put in place and correctly adhered to.

The operational maintenance of the proposed culvert causeway is vital to ensure the longevity of the development, as well as to help reduce potential operational impacts on the geophysical, biophysical and social environments.

The information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the activity applied for.

12 Conclusion

The proposed development site and their surroundings reveal signs of previous disturbance owing to current and previous uses and anthropogenic changes. From a biophysical perspective, the most significant factor to take into consideration is the disturbance of the Madiyana River and associated riparian and watercourse habitats, and the road re-alignment. The road re-alignment is proposed between chainage 3650 and 4000, in order to meet standard road design criteria, and decommission an unsafe track corner, and require indigenous vegetation clearing. Storm-water runoff and potential erosion during construction phase and prior to rehabilitation of the river banks taking effect must be managed. The combination of these factors is a matter of some concern and allowances for these issues must be made in the comprehensive EMPr that must be put in place for the construction and operation of the infrastructure.

Considering the impacts associated with the proposed development, the following recommendations are provided:

- The requirement for additional specialist studies is not anticipated
- Implementation must follow the proposed EMPr and adhere to standard best practices
- All proposed mitigations or reasonable alternatives must be adopted
- During implementation continuous monitoring of containers, bunded areas, surface runoff and air emissions must be undertaken by a responsible person, appointed or approved by the Department of Economic Development, Tourism and Environmental Affairs, to ensure that specifications are being duly regarded.
- Regular construction monitoring will be required to measure compliance with mitigation measures and the project EMPr.

Provided that the recommendations and mitigation measures as proposed in this report and in the EMPr are implemented, it is the opinion of the EAP that the development may proceed as envisaged.

13 Timeframes

13.1 Environmental Authorisation Timeframes (if no Operational aspect)

- Period for which Environmental Authorisation is required: 10 years
- Date on which the Activity will be concluded: Unknown at this stage
- Date on which the Post Construction Monitoring Requirements will be finalised: Unknown

14 EAP Affirmation

Oath / Affirmation by the EAP:

The Environmental Assessment Practitioner hereby confirms that the information provided in this report is to our knowledge, correct, and includes all comments and inputs from IAPs, EAP responses to these comments, and recommendations from specialists (where relevant).

15 Financial Provisions

Details of any financial provisions for Rehabilitation (where applicable), closure, ongoing post decommissioning management of negative impacts: Not available at this stage.

Rehabilitation of the site will take place during and after construction. The cost of the rehabilitation must be factored into the construction cost.

16 Any Other Specific Information

Additional information is provided in the attached appendices. Any further information can be requested from the EAP as necessary.

Appendix A – Mapping

- Figure 1: Locality Plan
- Figure 2: Topocadastral Map
- Figure 3: Site Plan
- Figure 4: Cadastral Map
- Figure 5: Watercourses Map
- Figure 6: Quarternary Catchment Map
- Figure 7: Critical Biodiversity Areas Map
- Figure 8: Vegetation Map
- Figure 9: Landuse
- Figure 10 Existing Services

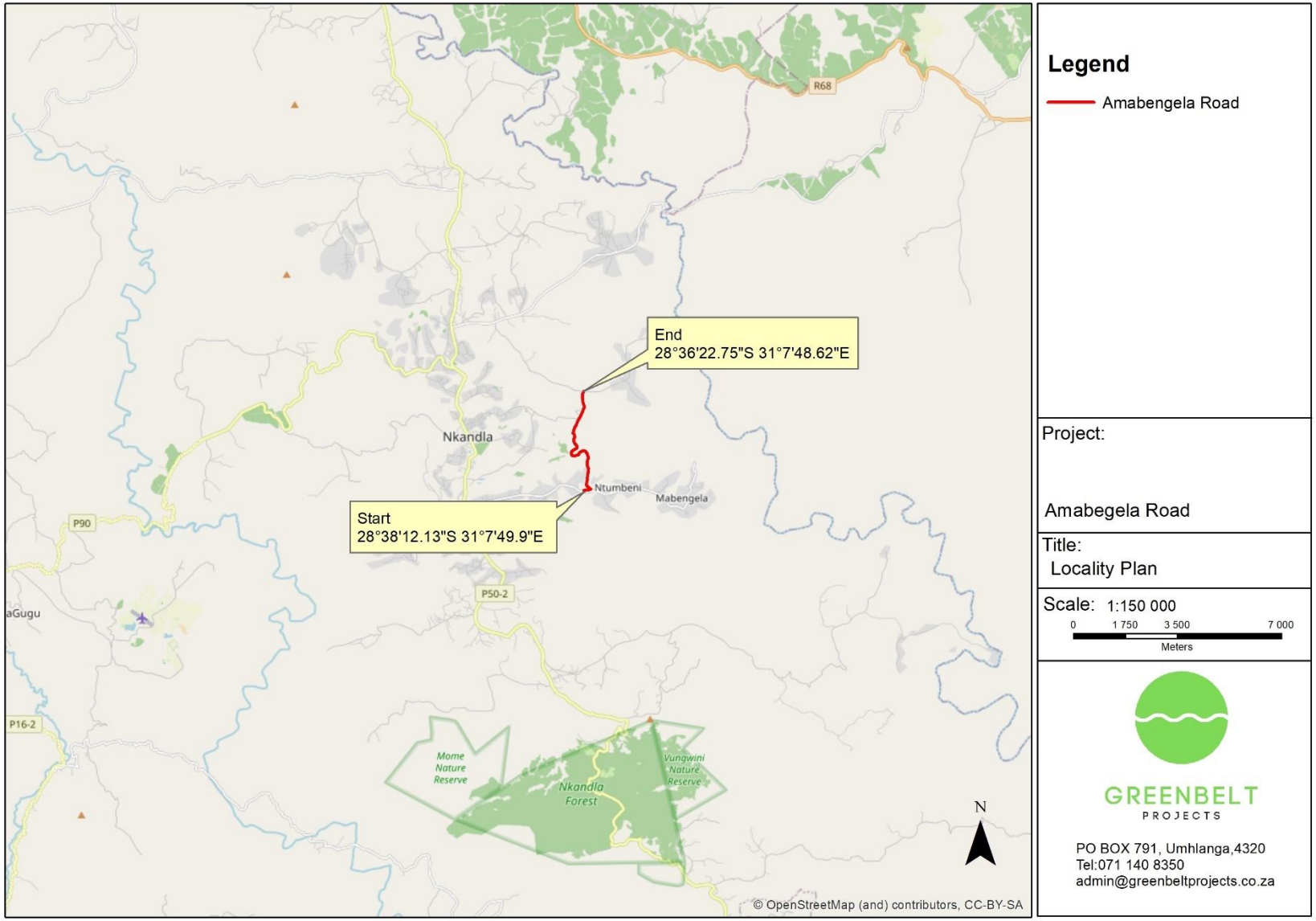


Figure 9: Locality Plan

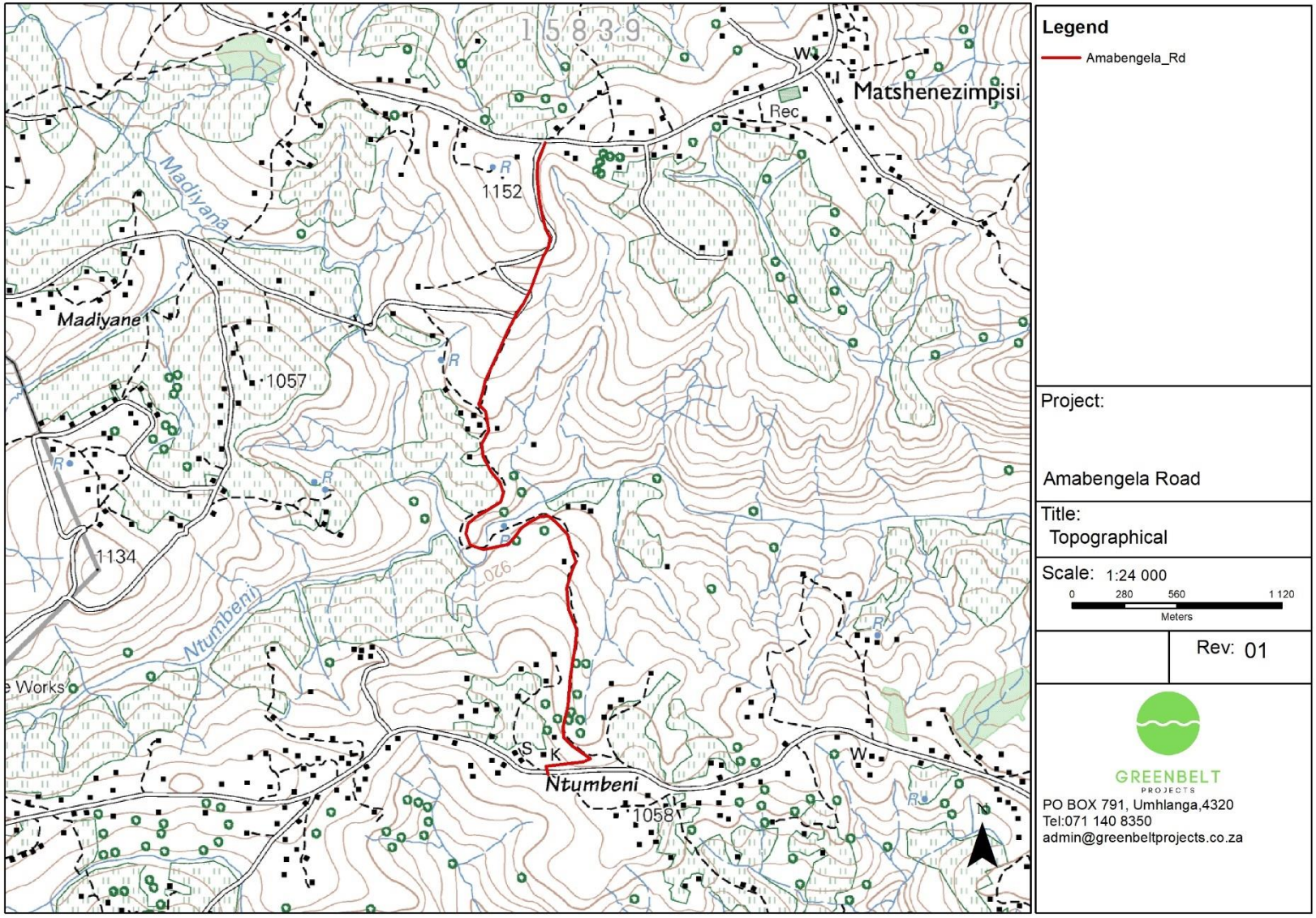


Figure 2: Topocadastral Plan

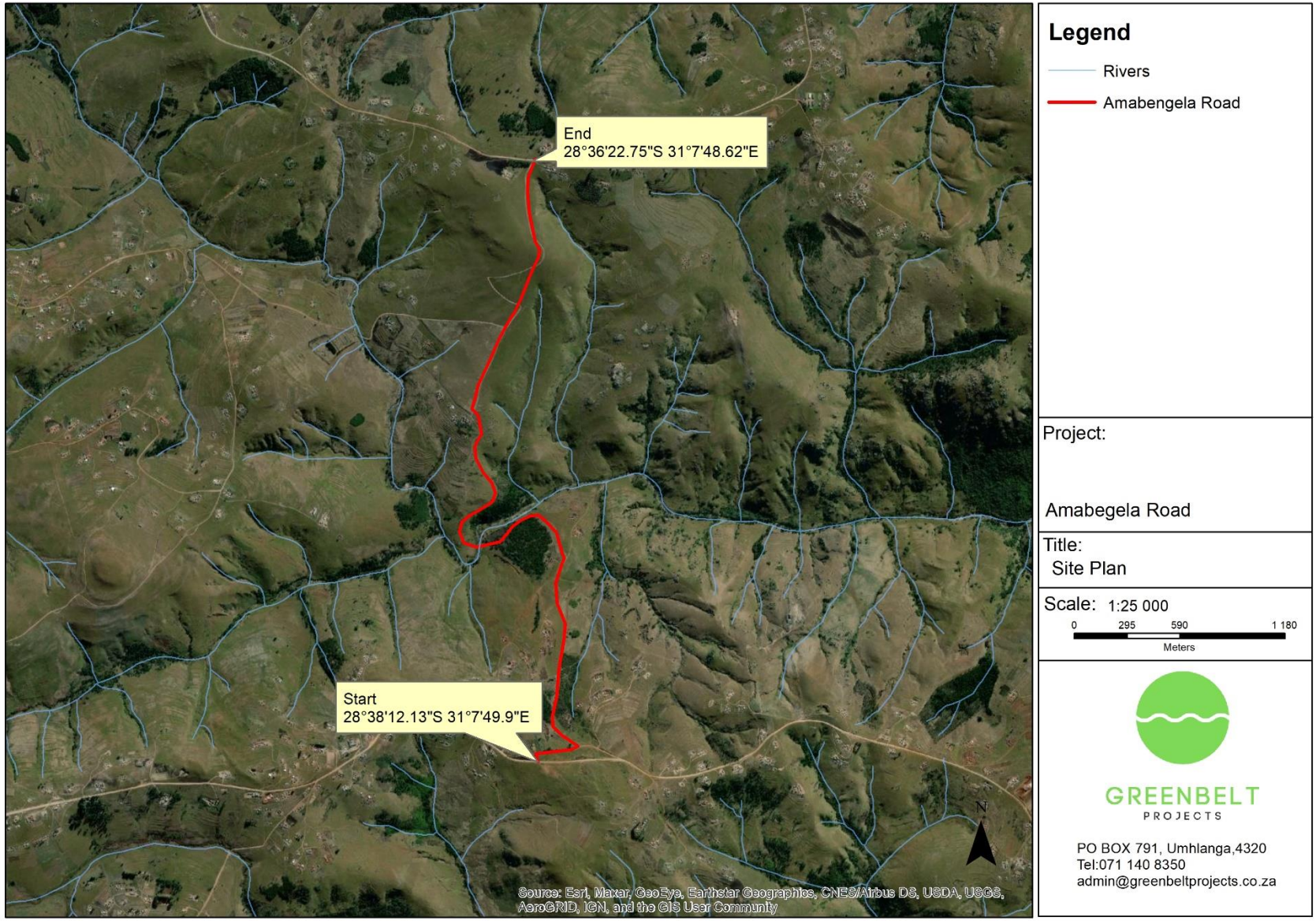


Figure 3: Site Plan (Preferred Alternative)

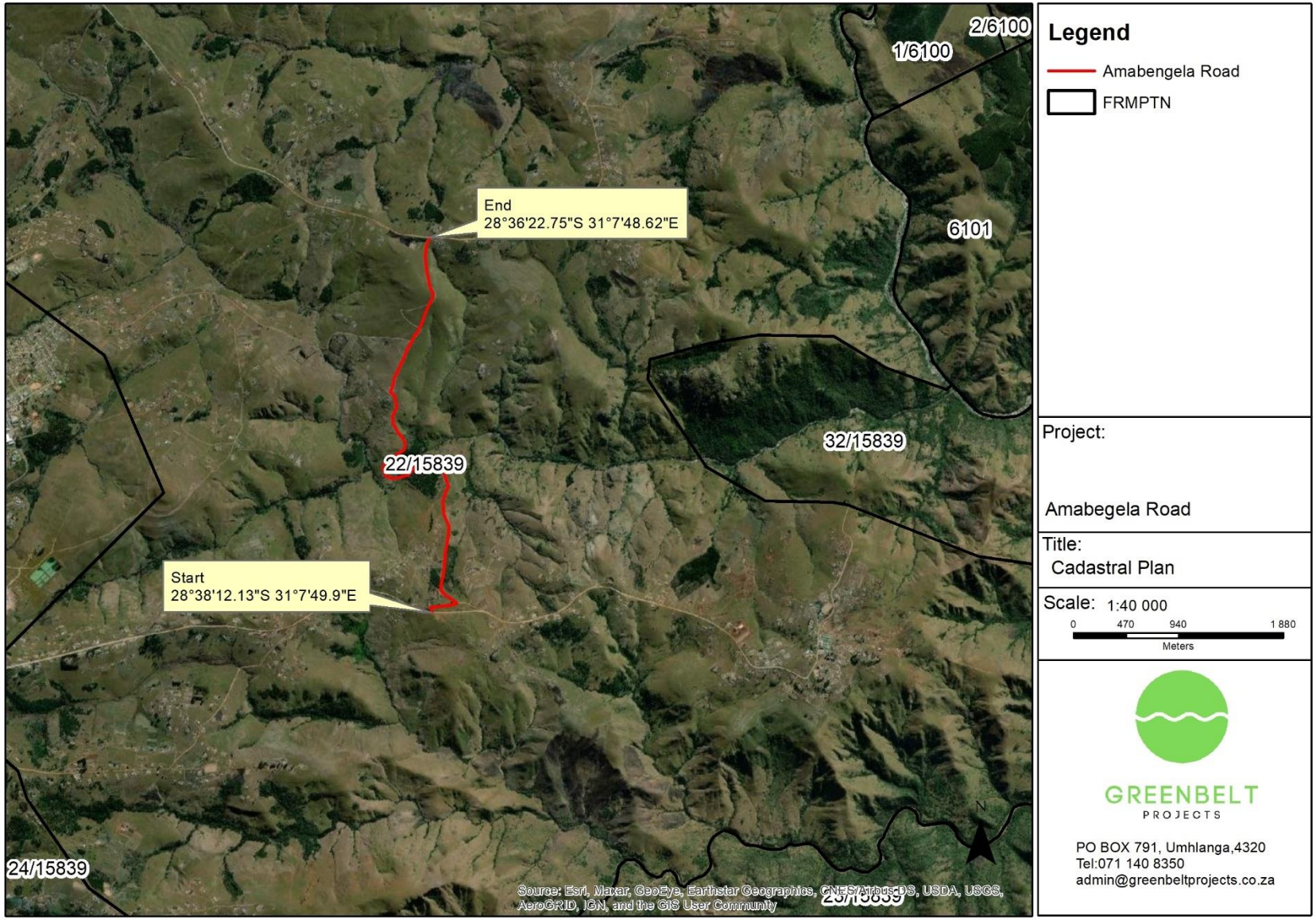


Figure 4: Cadastral Map

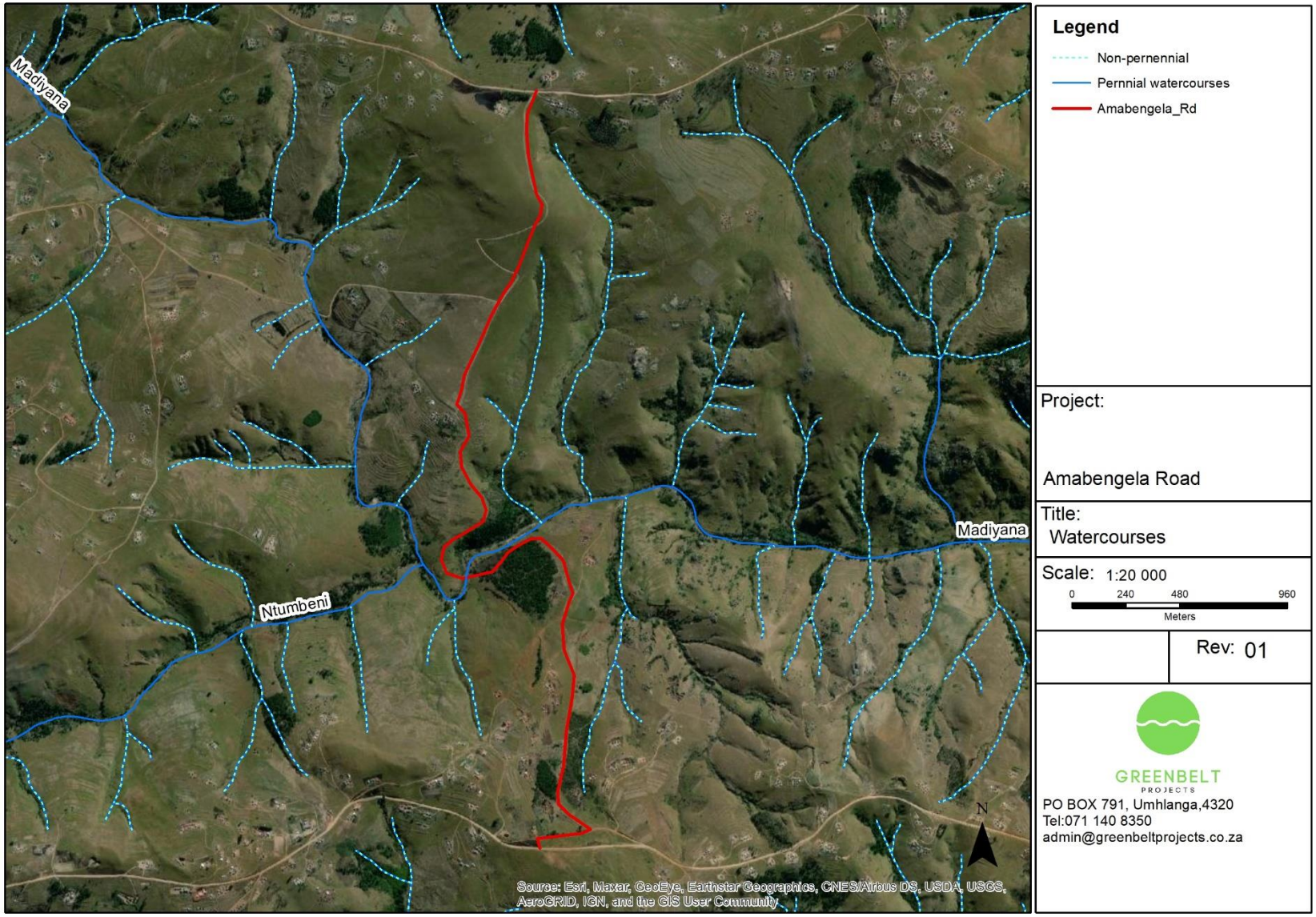


Figure 5: Watercourses

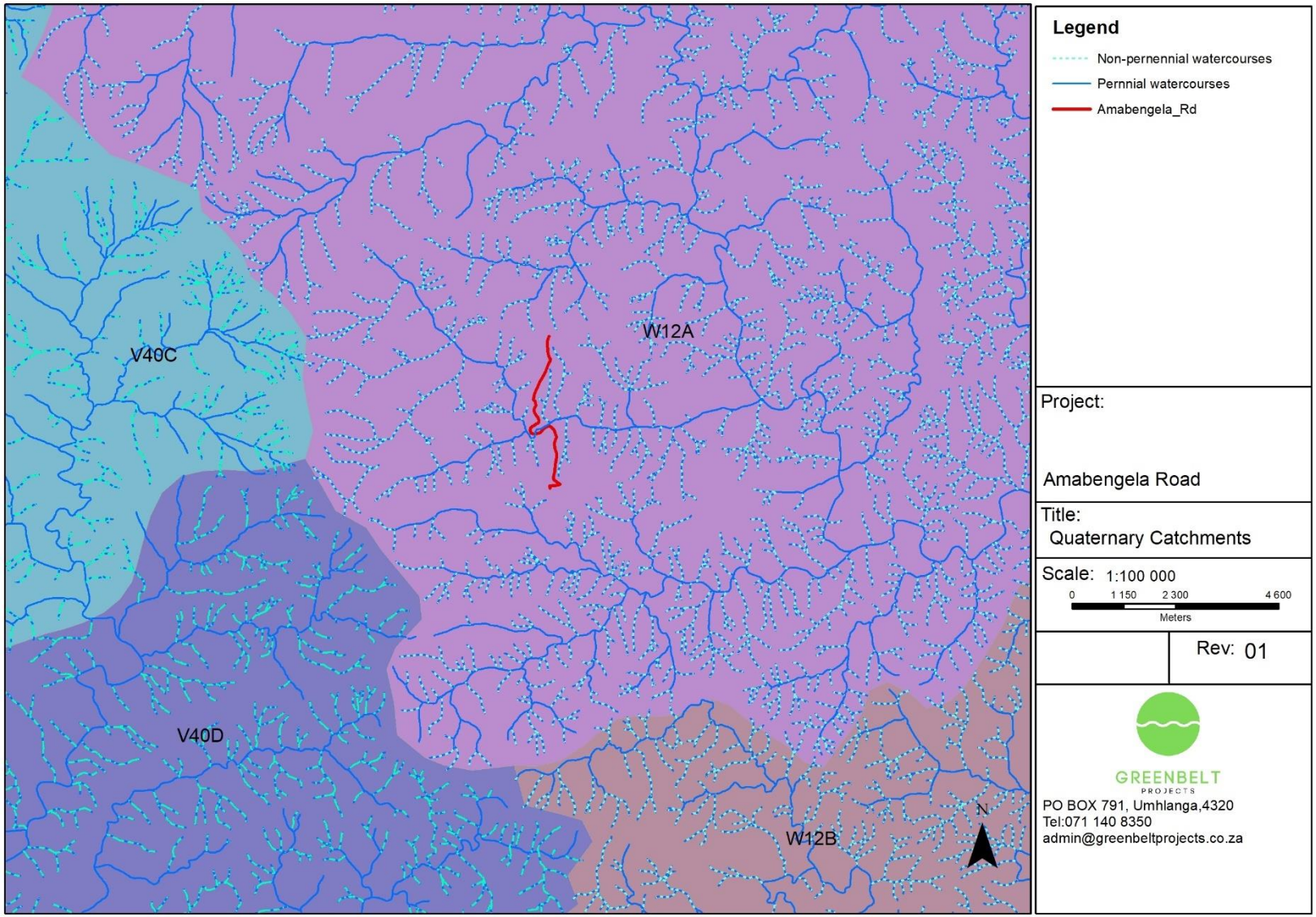


Figure 6: Quaternary Catchment Map

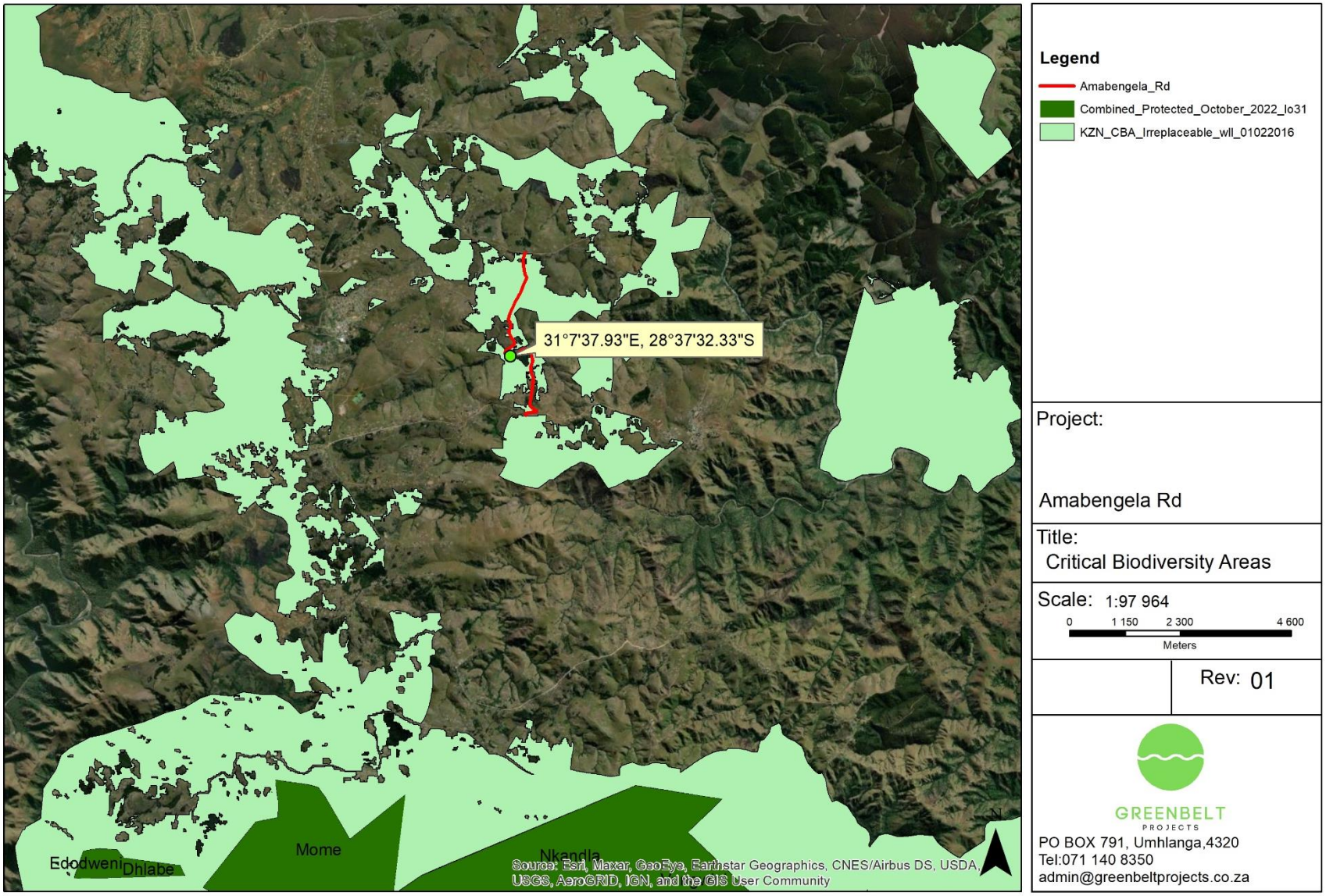


Figure 7: Critical Biodiversity Areas

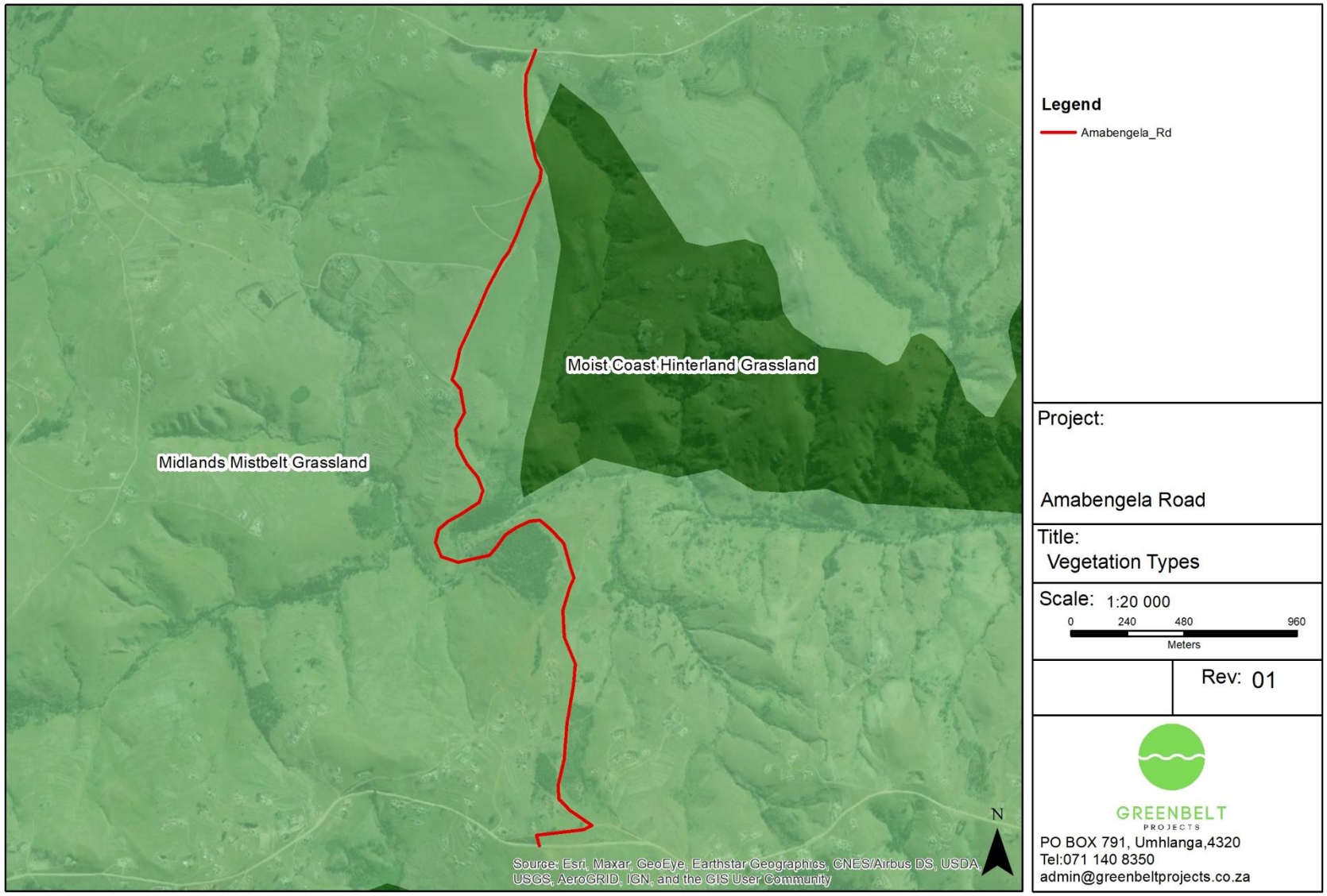


Figure 8: SANBI Vegetation Plan

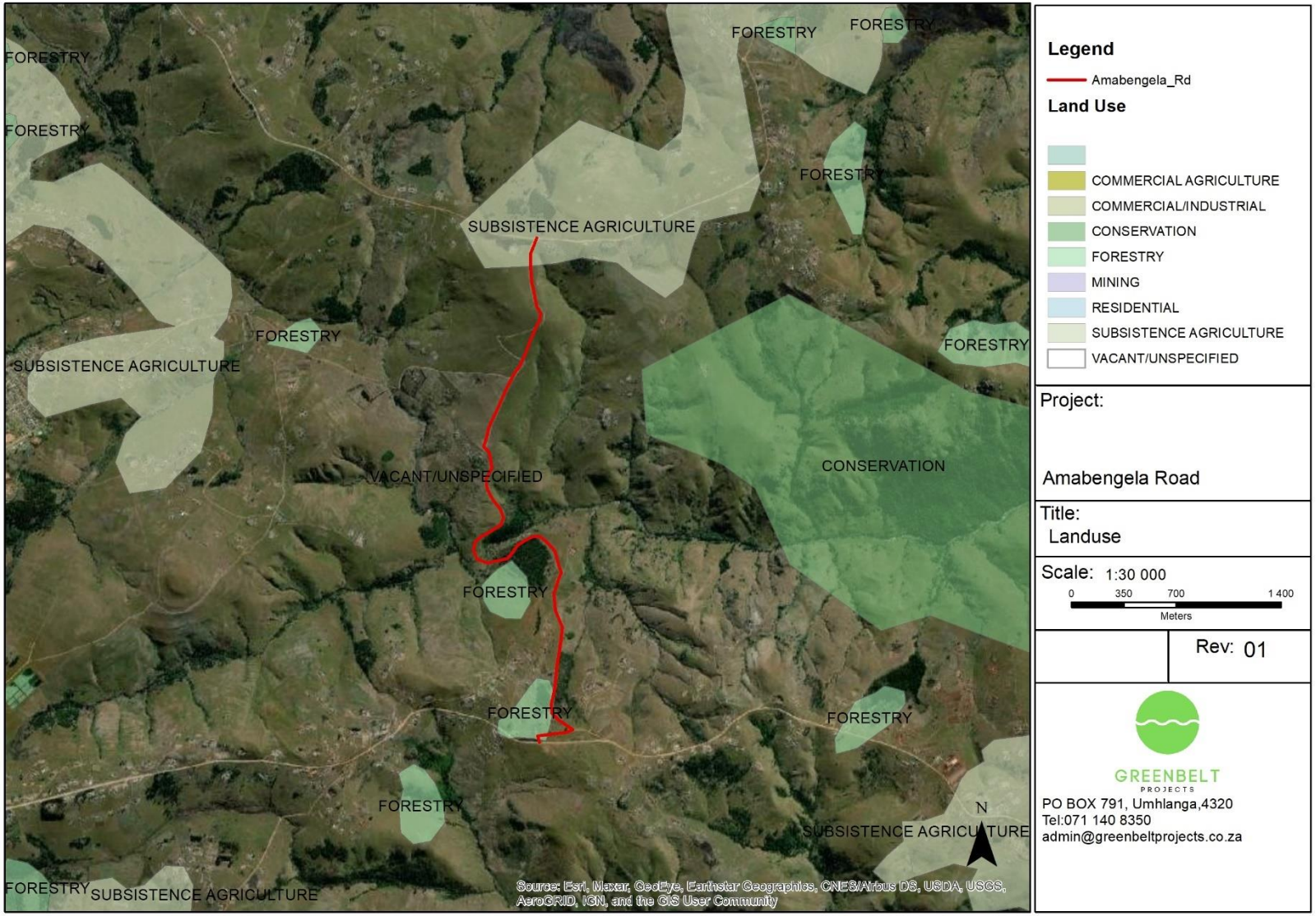


Figure 9: Landuse Map

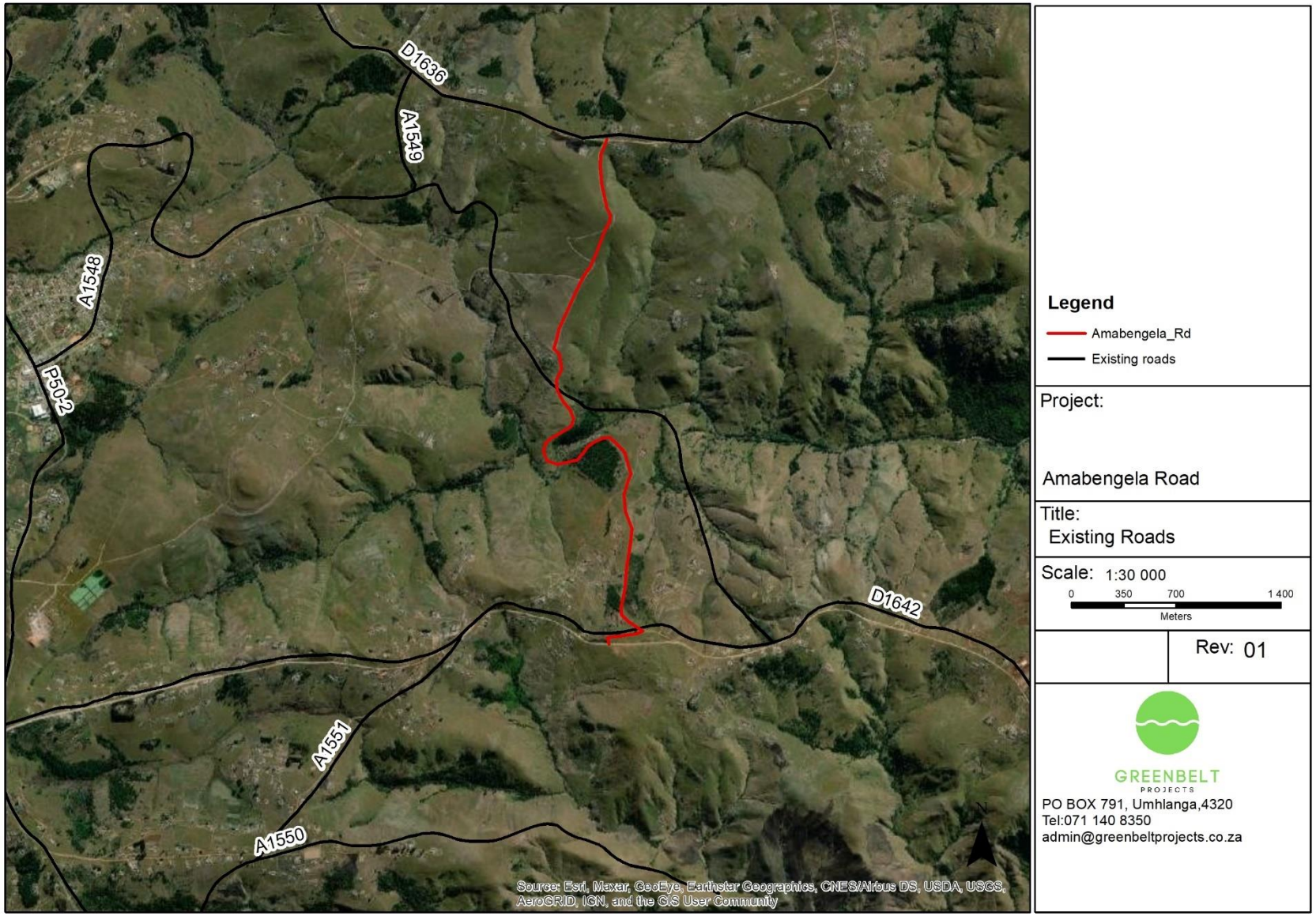


Figure 10: Existing Roads

Appendix B – Development Proposal

Appendix C – Specialist Investigations

1. Freshwater Ecological and Impact Assessment for the Proposed Amabengela Road
2. Heritage impact Assessment for the Amabengela Road
3. Geotechnical Assessment for the Amabengela Road

Appendix D – Public Participation

- Copy of Newspaper Advertisement
- Site Notices
- Comments and Response Report

Amabengela to Matshenezimpisi Access Road

Comments and Response – Interested and Affected Parties

July 2023

Organisation	Contact Person	Contact Details
Department of Water and Sanitation	Ms RJ Madibe	Tel: 031 336 2700 / 2765 Mngoma-Madibe Jabulile Mngoma-MadibeJ@dws.gov.za
Department of Agriculture Forestry and Fisheries (DAFF) Forestry Regulations and Support	Ms Karen Moodley	nsontangane @dffe.gov.za Tel: 033 392 7739; P/Bag X 9029, Pietermaritzburg, 3200
Ezemvelo KZN Wildlife	Nerissa Pillay	Nerissa.pillay@kznwildlife.com PO Box 13053, Cascades, 3202
KZN Department of Transport Transportation Engineering Sub-Directorate	Michele Schmid Judy Reddy	michele.schmid@Kzntransport.gov.za judy.reddy@kzntransport.gov.za Private Bag X 9043, Pietermaritzburg, 3200 Tel: 033 355 8600; Fax: 033 342 3962 Ref: T10/2/2/3922/2
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Telkom SA SOC Limited Network Engineering and Build Eastern Region Wayleave Management Section	S. Mchunu	Private Bag X 54326, Durban, 4000 Tel: 033 342 1591; Fax: 033 345 6126 wayleaves2@telkom.co.za PortiaN2@openserve.co.za
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Ingonyama Trust Board	Suewellan Ellis	EllisS@ingonyamatrust.org.za
Ward Councillor Ward 5	Cllr LN Ngobese	cllrlnngobese.nka@gmail.com
Ward Councillor Ward 6	Cllr Sfiso Ngobese	cllrsnngobese.nka@gmail.com
King Chetsway District Municipality	Mr V Zungu	Tel No.: 039 834 3939/2485 Email: zunguv@kingchetswayo.gov.za
Nkandla Public Library	Ms Salaphi N Masango	Tel: 0829522085 Lot 292 Maree Rd Nkandla 3855

Note comments received in response to the Draft Basic Assessment Report circulation will be incorporated in to the Final Basic Assessment Comments and Response Report.

Department of Water and Sanitation (DWS)		Tel: 031 336 2700 / 2765 Mngoma-Madibe Jabulile Mngoma-MadibeJ@dws.gov.za
Comments:		
Department of Agriculture Forestry and Fisheries (DAFF) Forestry Regulations and Support		ThembalakheS@daff.gov.za KarenM@daff.gov.za PMBResourceCentre@daff.gov.za Tel: 033 392 7739 Fax: 033 342 8783 P/Bag X 9029, Pietermaritzburg, 3200
Comments:		
Response:		
Ezemvelo KZN Wildlife		nerissa@kznwildlife.com PO Box 13053, Cascades, 3202
Comments:		
Response: None required.		
KZN Department of Transport Transportation Engineering Sub-Directorate		Private Bag X 9043, Pietermaritzburg, 3200 Tel: 033 355 8600 Fax: 033 342 3962
Comments:		
Response:		
Eskom		P O Box 66, New Germany, 3620 akkiahb@eskom.co.za Tel +27 (0)31 710 5369 Cell +27 84 233 4610
Comments:		
Response:		
Telkom SA SOC Limited Network Engineering and Build Eastern Region Wayleave Management Section		Private Bag X 54326, Durban, 4000 Tel: 033 342 1591; Fax: 033 345 6126 SthembisoM@openserve.co.za PortiaN2@openserve.co.za RampeRR@telkom.co.za; mchunusr@telkom.co.za wayleaves2@telkom.co.za
Response		
AMAFA		amafaddps@amafapmb.co.za
Comments:		
Response:		
Ingonyama Trust Board		EllisS@ingonyamatrust.org.za/ bothatht@ingonyamatrust.org.za
Comments:		

Response: No comments required.		
King Chetsway District Municipality		Tel No.: 039 834 3939/2485 Email: zunguv@kingchetswayo.gov.za Mr V Zungu
Comments:		
Response:		
Ward Councillor Ward 5	Cllr LN Ngobese	cllrlnngobese.nka@gmail.com
Comments:		
Response:		
Ward Councillor Ward 6	Cllr Sfiso Ngobese	cllrsnngobese.nka@gmail.com
Comments:		
Response:		
Nkandla Public Library	Ms Salaphi N Masango	Tel: 0829522085 Lot 292 Maree Rd Nkandla 3855
Comments:		
Response:		

Appendix E – Site Photographs

- Current Site Photographs

Figure 10. Image looking north at the start point of the proposed road upgrade.

Figure 11. Image looking north west showing road alignment proposed for road upgrade.

Figure 12. Image looking north showing the existing track proposed for upgrade. Note track surface in poor condition and slippery when wet.

Figure 13. Image looking north west along the proposed alignment approaching the Madiyana River valley.

Figure 14. Image showing rural homestead cluster who will benefit from the road construction project. Note the existing track.

Figure 15. Image looking west along the proposed alignment proposed for road upgrade. Note alien invasive plants *Chromoleana oderata, Lantana Camara* and *Bidens Pilosa* proliferating.

Figure 16. Image looking north west showing the proposed bridge crossing site. Note no infrastructure in place and access tracks on the north and southern approach. The current PES of this reach of Madiyana River is classed as 'Unmodified, Natural' (Class A), with a 'Very high' Ecological Importance (EI) and 'High' Ecological Sensitivity (ES)

Figure 17 Image looking south showing the existing track and the proposed road realignment at km 3600.

Figure 18. Image looking south west showing the existing track and erosion gulleys on the northern approach to the Madiyana River valley.

Figure 19. Image looking south showing the end point of the Amabengela Road, at the D1636 Road.

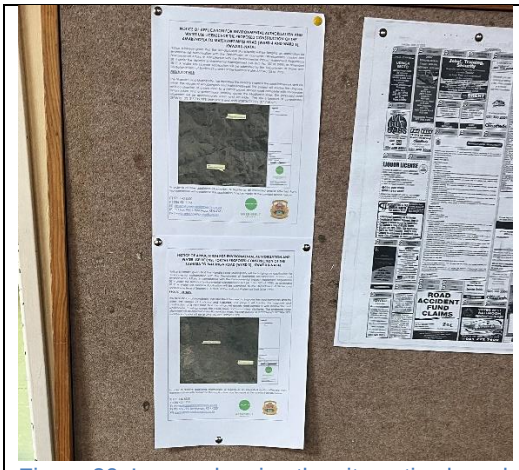

Figure 20. Image showing the site notice board placement at the Nkandla Public Library.

Figure 21. Image showing the location of the site notice board placement at homestead cluster on the southern hillside of the Madiyana River valley.

Figure 22. Image showing site notice board placement at the end point of the proposed road near the D1636 intersection.

Figure 23. Image showing site notice board placement at the rural homestead cluster on the northern hillside of the Madiyana River valley.

Appendix F – Environmental Management Programme