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**Geotechnical, Environmental
& Earth Science Consultants**

Basic Assessment Report
PROPOSED SMOZOMENI ROAD
UPGRADE PROJECT, RICHMOND LOCAL
MUNICIPALITY, KWAZULU-NATAL

June 2016

Draft

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DRAFT BASIC ASSESSMENT REPORT

PROPOSED SMOZOMENI ROAD UPGRADE PROJECT, RICHMOND LOCAL MUNICIPALITY, KWAZULU-NATAL.

VERIFICATION PAGE				Form 4.3.1 Rev 13
REPORT NO. 41625 :	DATE: 23 June 2016	STATUS:	Draft BAR	
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<p>QUALITY VERIFICATION</p> <p>This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2008 which has been independently certified by DEKRA Certification under certificate number 90906882</p> <div style="text-align: right;">  </div>				
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Executive Summary

Terratest (Pty) Ltd has been appointed by Richmond Local Municipality to undertake the environmental services required for the proposed Smozomeni Road Upgrade Project, in Richmond, KwaZulu-Natal. The 4.3 km segment of road is in a state of disrepair. The maintenance of this road is critical to the effective delivery of services to more than 4,000 households. The proposed project includes activities that are listed under the Environmental Impact Assessment Regulations (GN R. 982 of 2014 and GN R. 983 of 2014) that were promulgated in terms of the National Environmental Management Act (Act 107 of 1998) ('NEMA'). The presence of these Listed Activities has triggered the need to apply for Environmental Authorisation, subject to a Basic Assessment (BA) Process.

The Public Participation Process involves consultation with the relevant authorities, non-government organisations (NGO's), neighbouring landowners, community members and other identified Interested and Affected Parties (IAPs). Site notices prepared in English and isiZulu were erected on site at the outset of the project to inform the general public of the BA Process. A newspaper advertisement was published in Zulu in the Ilanga Newspaper at the time that the BA Report was circulated to the IAPs for comment. Notification letters have been distributed to key stakeholders via post and/or email, where considered necessary.

A Heritage Impact Assessment was undertaken by Umlando: Archaeological Surveys and Heritage Survey cc. to determine if any items of cultural or historical value will be impacted on during construction; and a Wetland and Riparian Assessment was undertaken by Terratest (Pty) Ltd to determine the impact that the proposed construction would have on surrounding watercourses. No fatal flaws were identified by any of the Specialist Studies. Furthermore, Terratest engaged with the Department of Water and Sanitation (DWS) regarding the requirement for a Water Use Licence Application for the proposed development, as the proposed construction will traverse various watercourses, which will result in the excavation of the beds and banks of the identified systems. The DWS has subsequently provided an authorisation for the water uses associated with the proposed development.

The Draft Basic Assessment (BA) Report and Environmental Management Programme (EMPr) have been circulated to IAPs for review and comment. Comments received on the Draft BA Report and EMPr will be consolidated and included into a Final BA Report, which will be submitted to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA) for a decision on Environmental Authorisation.

This BA Report has been drafted in accordance with the EIA Regulations, 2014 and adheres to the requirements contained in Appendix 1 of GNR 982, as noted in Table 1.

TABLE 1: Content of a BA Report (2014 EIA Regulations)

2014 EIA Regulations	Description of EIA Regulations Requirements for BA Reports	Location in the BAR
Appendix 1, Section 3 (a)	Details of – (i) The EAP who prepared the report; and the expertise of the EAP; and (ii) The expertise of the EAP, including a curriculum vitae.	Section 2 & Appendix 1
Appendix 1, Section 3 (b)	The location of the activity, including – (i) The 21 digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	Section 3 & Appendix 2
Appendix 1, Section 3 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 3 & Appendix 3
Appendix 1, Section 3 (d)	A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered; (ii) A description of the activities to be undertaken, including associated structures and infrastructure.	Section 4 & 5
Appendix 1, Section 3 (e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools,	Section 6

2014 EIA Regulations	Description of EIA Regulations Requirements for BA Reports	Location in the BAR
	municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	
Appendix 1, Section 3 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 7
Appendix 1, Section 3 (h)	<p>A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-</p> <ul style="list-style-type: none"> (i) Details of all alternatives considered; (ii) Details of the Public Participation Process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- <ul style="list-style-type: none"> (aa) Can be reversed; (bb) May cause irreplaceable loss of resources; and (cc) Can be avoided, managed, or mitigated. (vi) The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects; (viii) The possible mitigation measures that could be applied and level of residual risk; (ix) The outcome of the site selection matrix; (x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and; (xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity. 	<p>Section 8 Section 9</p> <p>Section 10 & 11 Section 12</p> <p>Section 12</p> <p>Section 13</p> <p>Section 14 Section 14 Section 14</p> <p>Section 14</p>
Appendix 1, Section 3 (i)	<p>A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-</p> <ul style="list-style-type: none"> (i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. 	Section 12
Appendix 1, Section 3 (j)	<p>An assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> (i) Cumulative impacts; (ii) The nature, significance and consequences of the impact and risk; (iii) The extent and duration of the impact and risk; (iv) The probability of the impact and risk occurring; (v) The degree to which the impact and risk can be reversed; (vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) The degree to which the impact and risk can be avoided, managed or mitigated. 	Section 13 & 14
Appendix 1, Section 3 (k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report.	Section 11
Appendix 1, Section 3 (l)	<p>An environmental impact statement which contains-</p> <ul style="list-style-type: none"> (i) A summary of the key findings of the environmental impact assessment; (ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives. 	Section 15
Appendix 1, Section 3 (m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	Section 16
Appendix 1, Section 3 (n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 16
Appendix 1, Section 3 (o)	A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	-
Appendix 1, Section 3 (p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 16
Appendix 1, Section 3 (q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Section 17
Appendix 1,	An undertaking under oath or affirmation by the EAP in relation to-	Section 19

2014 EIA Regulations	Description of EIA Regulations Requirements for BA Reports	Location in the BAR
Section 3 (r)	(i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	
Appendix 1, Section 3 (s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	-
Appendix 1, Section 3 (t)	Where applicable, any specific information required by the Competent Authority.	-
Appendix 1, Section 3 (u)	Any other matter required in terms of section 24(4) (a) and (b) of the Act.	-

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APPENDICES

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APPENDIX 4: Environmental Authorisation Application
APPENDIX 5: Engineering Drawings
APPENDIX 6: Environmental Management Programme (EMPr)
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APPENDIX 9: IAP Register

1 INTRODUCTION

Terratest (Pty) Ltd has been appointed by Richmond Local Municipality ('the proponent') to undertake the environmental services required for the proposed Smozomeni Road Upgrade Project. The Proponent is seeking to rehabilitate a 4.3 km segment of the Smozomeni Road (GPS Coordinates – Start: 29°54'42.51"S; 30°13'19.53"E; End: 29°53'50.64"S; 30°14'42.52"E), which is in a state of disrepair as the road surface continues to fail. The maintenance of this road is critical for the effective delivery of services to more than 4,000 households, situated in Richmond, KwaZulu-Natal.

The Richmond Local Municipality's 2015-2016 Integrated Development Plan (IDP) mentions 'Resurfacing of the Smozomeni Main Road' in Ward 6, and confirms that the project is funded through a provincial Municipal Infrastructure Grant (MIG) from the Department of Co-operative Governance and Traditional Affairs (COGTA).

While the proponent seeks to maintain the existing road infrastructure and intends to remain within the footprint of the road, elements of the proposed project will result in an overall upgrade to the road. Upgrades include improvements to the existing surface water drainage, namely lengthening stormwater culverts and embankment stabilisation activities.

As per GN R982 of the EIA Regulations, 2014, a Basic Assessment (BA) Process must be undertaken in such a manner that the environmental outcomes, impacts and residual risks of the proposed listed activities being applied for are noted in the BA Report and assessed accordingly by the Environmental Assessment Practitioner (EAP). In this regard, the requirements of the BA Process are noted in the EIA Regulations (2014), Listing Notice 1, Appendix 1 of GNR 982 and are consequently adhered to in this report (please refer to Table 1 of the Executive Summary). For reference purposes it is important to note that the Listed Activities in terms of GN R983 of the EIA Regulations, 2014, applicable to this proposed project pertain only to the "development" / construction of infrastructure associated with the road. In this regard this Basic Assessment Report focuses only on construction phase impacts and mitigation measures.

Ultimately, the outcome of the BA Process is to provide the Competent Authority, the Department of Economic Development, Tourism and Environmental Affairs (EDTEA), with sufficient information to provide a decision on the Application for Environmental Authorisation (EA), in order to avoid or mitigate any detrimental impacts that the construction phase of the activity may inflict on the receiving environment.

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

As noted previously, Terratest (Pty) Ltd has been appointed by Richmond Local Municipality to undertake the BA Process for the proposed Smozomeni Road Upgrade Project in Richmond, KwaZulu-Natal. Details of the EAP responsible for undertaking the BA Process are recorded in Table 2 and his Curriculum Vitae (CV) is attached in Appendix 1.

TABLE 2: Details of the EAP

EAP	Qualifications & Professional affiliations	Experience at environmental assessments	Contact details
Mr Warren Hale <i>Environmental Scientist</i>	BSc. Hons Environmental Science BSc. Biological Science IAIAsa KZN Member	10 years	Terratest (Pty) Ltd Tel: (033) 343 6789 Cell: 084 831 8225 Email: halew@terratest.co.za

3 LOCATION OF THE ACTIVITY

The portion of the Smozomeni Main Road that has been earmarked for upgrade falls entirely within a single cadastral land parcel– the remainder of the Farm Indaleni, 4668 (Surveyor General 21 digit site reference number: N0FT00000000466800000). The Deeds Office property search results (via WinDeed) and the Surveyor General diagram for this farm portion are provided in Appendix 2. The landowner is the Ingonyama Trust Board Trustees. The majority of the upgraded road lies within the jurisdiction of the Hlanganani Traditional Authority, while the last 500 metres of the proposed project (from km 3.8 to km 4.3) falls within the urban edge. Figures 1 & 2 below provide a general Locality Plan and a more detailed Site Plan of the proposed road upgrade project. A3 Locality Maps and Site Plans are attached in Appendix 3 for further reference purposes.

The proposed project traverses Wards 6 and 7 of Richmond Local Municipality, which is situated within uMgungundlovu District Municipality in KwaZulu-Natal. A map showing the traditional and municipal demarcations in the vicinity of the project area is provided in Figure 3 below.

The proposed upgrade project will occur within the footprint of the existing Smozomeni Main Road, which is owned and maintained by the Richmond Local Municipality. However, embankment stabilisation activities, where deeply incised gullies threaten to undermine the road layer works, will extend outside of the existing road footprint.

Co-ordinates of the start and end points of the road segment proposed for upgrade are provided in Table 3.

TABLE 3: Road upgrade start and end co-ordinates

Point Number	Kilometre Point	Latitude (S)	Longitude (E)
Start Point	0.0 km	29°54'42.51"S	30°13'19.53"E
End Point	4.3 km	29°53'50.64 S	30°14'42.52 S

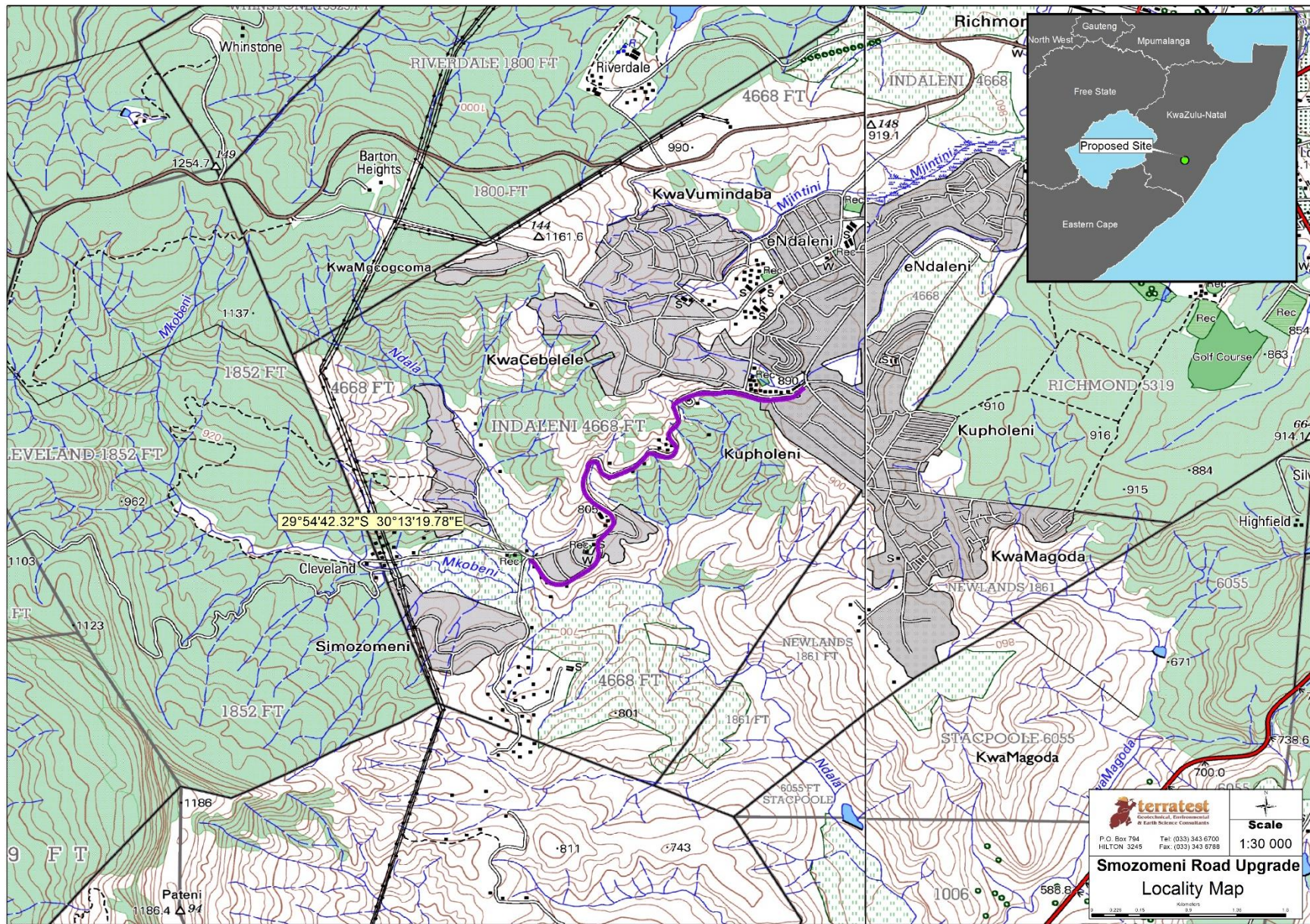


Figure 1: Locality Map

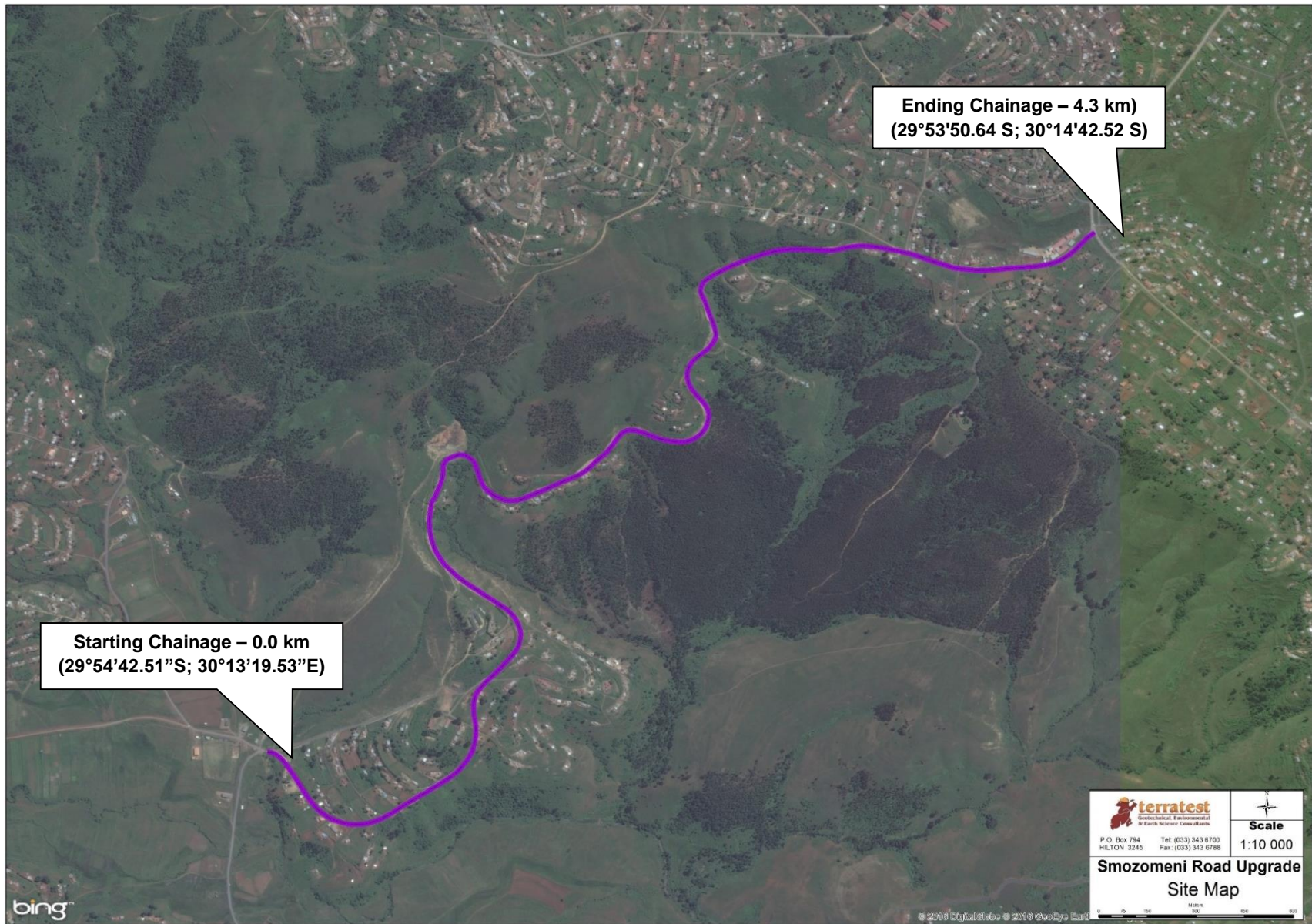


Figure 2: Site Map

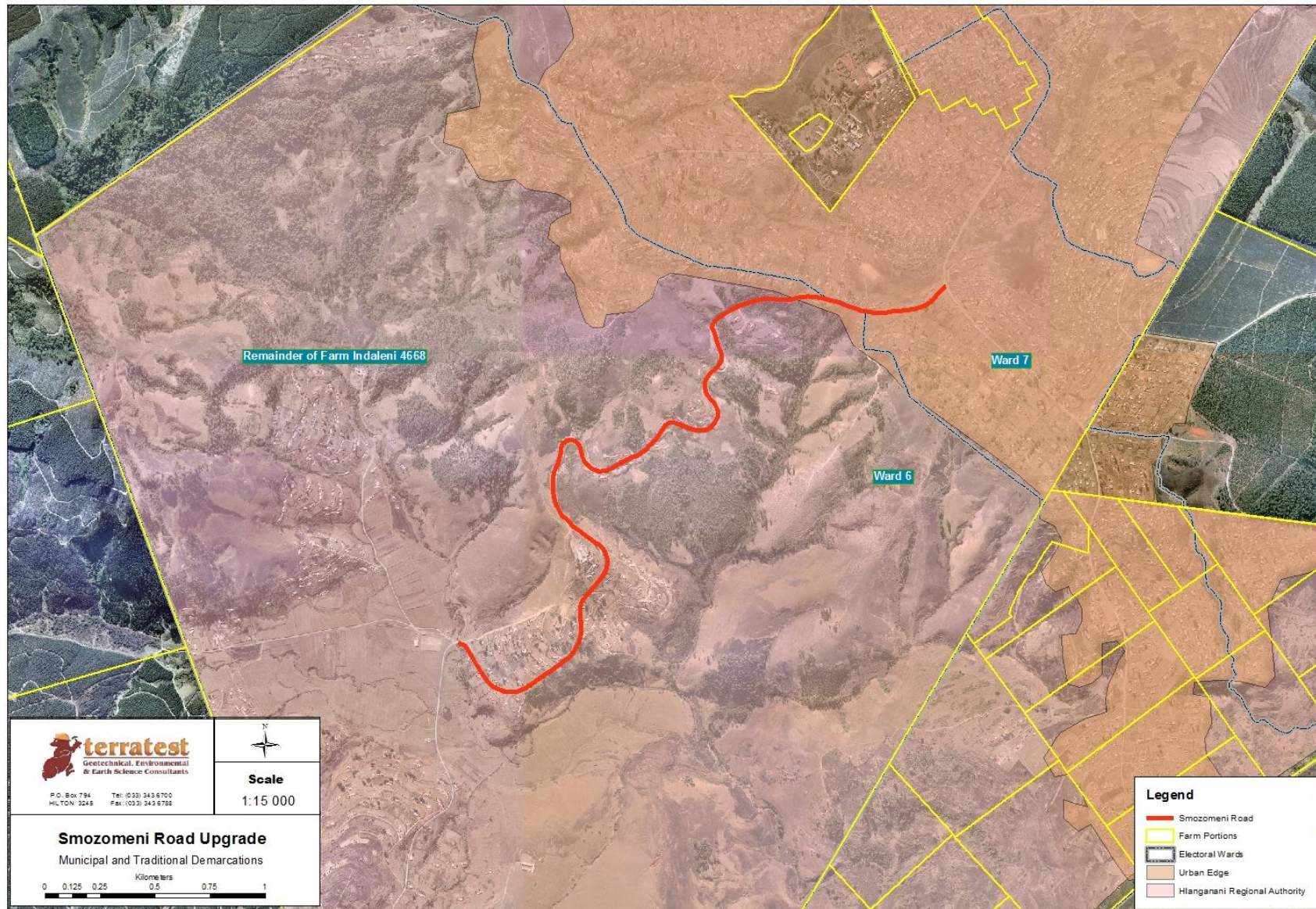


Figure 3: Municipal and Traditional Demarcations

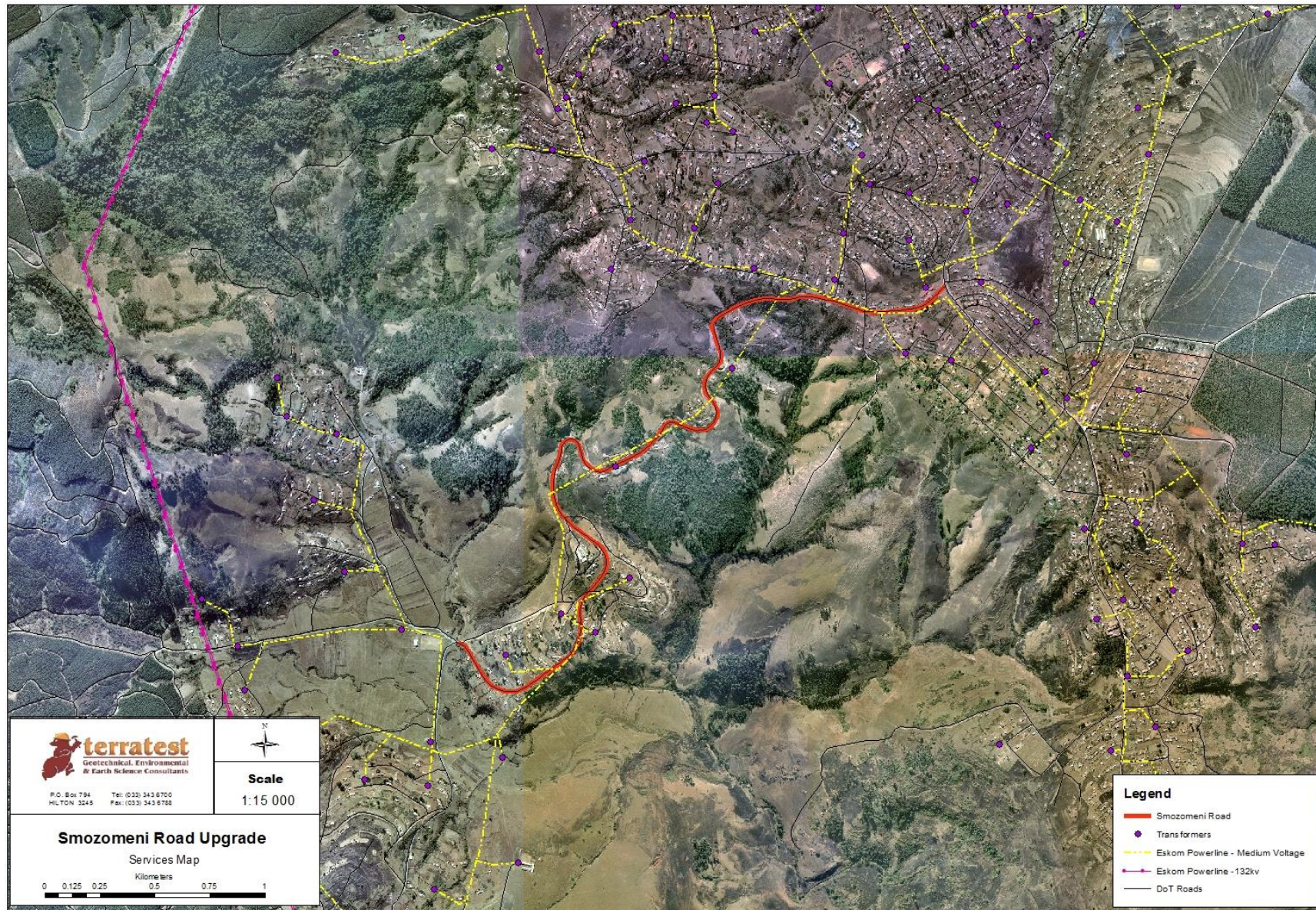


Figure 4: Electrical services in relation to the project area

4 ACTIVITY DESCRIPTION

4.1 APPLICABLE LISTED ACTIVITIES

In the Environmental Impact Assessment (EIA) Regulations (2014), promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GN R 983 and 985) or a full Scoping and EIA (GN R 984) is required.

The following Listed Activities in Government Notice (GN) R 983 (Listing Notice 1) will be applicable to the proposed road upgrade project. The presence of these Listed Activities in the project description necessitates a Basic Assessment (BA) Process.

- **GN R. 983 of 2014, Activity 19:** “The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) A watercourse. But excluding where such infilling, depositing, dredging, excavation, removal or moving – (a) Will occur behind a development setback; (b) Is for maintenance purposes undertaken in accordance with a maintenance management plan; or, (c) Falls within the ambit of activity 21 in this Notice, in which case that activity applies.

This Listed Activity is relevant as the proposed road upgrade project will involve the movement of more than 5m³ of soil from the banks of watercourses and wetlands during road and stormwater infrastructure construction and/or the deposition of 5m³ of material or more into watercourses.

- **GN R. 983 of 2014, Activity 49:** The expansion of (v) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion or expansion and operation occurs – (a) Within a watercourse; (b) In front of a development setback; or (c) If no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. Excluding – (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads or road reserves.

This Listed Activity is relevant as proposed embankment stabilisation activities, utilising gabion baskets and reno mattresses, at one of the watercourse crossings, is likely to have a footprint larger than 100 square metres.

Based on the above proposed activities a Basic Assessment EIA Process is required. The associated Environmental Authorisation (EA) Application form is attached to this Report as Appendix 4 and an organogram of the Basic Assessment EIA Process is provided in Figure 5 below for reference purposes.

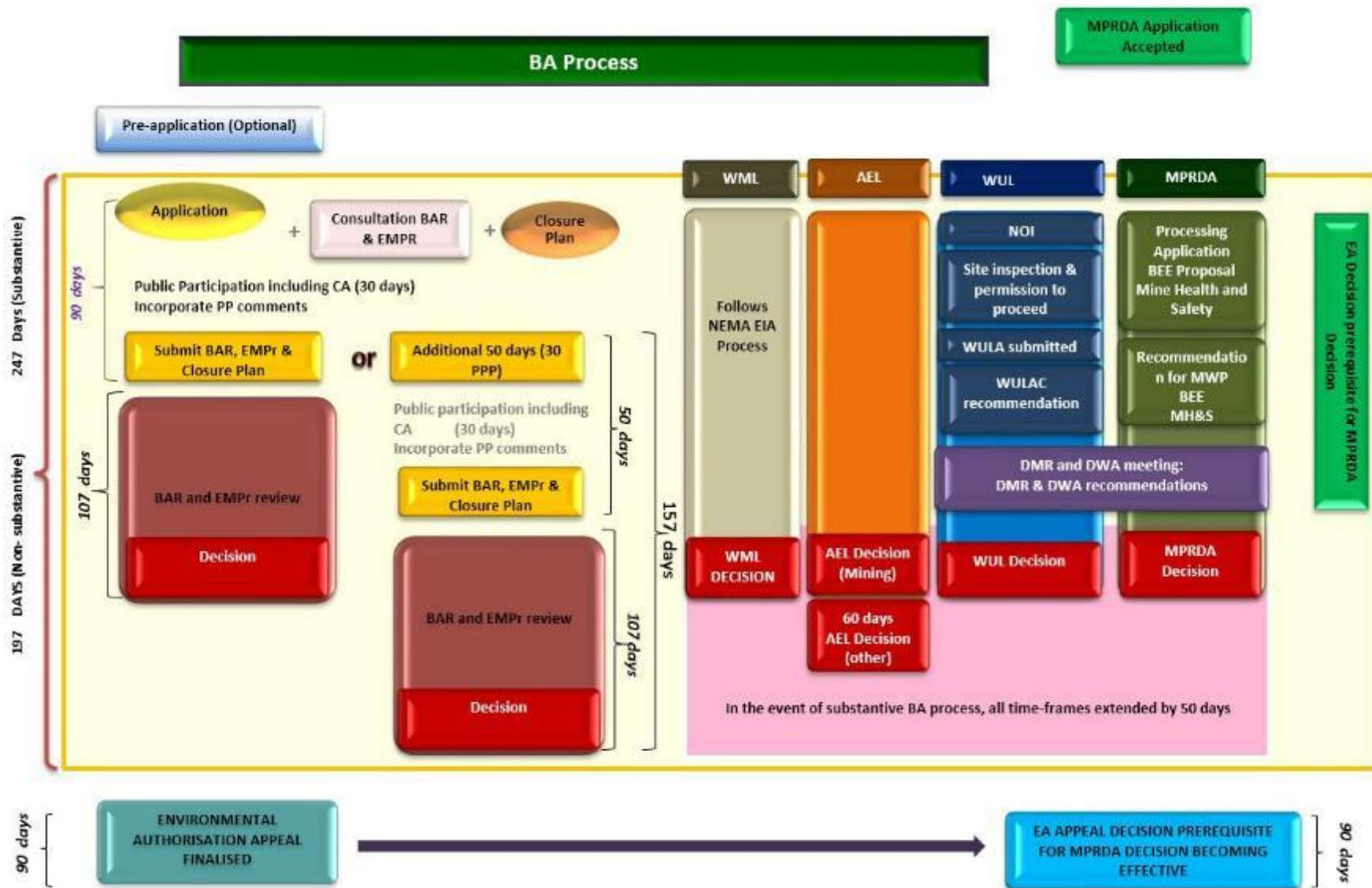


Figure 5: Basic Assessment EIA Process Organogram

4.2 DESCRIPTION OF THE ACTIVITY

4.2.1 Background to the Smozomeni Road Upgrade Project

This Smozomeni Road Upgrade Project forms part of the Richmond Municipality Infrastructure Development Plan. The project entails upgrading the existing road and drainage infrastructure, to address the current poor level of service offered by the existing ailing infrastructure.

One of the Auditor General's comments recorded in the 2015-2016 IDP related to Richmond Municipality's lack of an appropriate road asset management system. This notion was refuted. It was explained that at the start of the financial year and during budget and IDP planning processes, the community within each Municipal Ward identifies four kilometres of roads in each ward that require maintenance and the necessary budget is allocated. The Smozomeni Main Road Upgrade is one such road segment.

Richmond Local Municipality has secured MIG funding from the Department of Co-operative Governance and Traditional Affairs (COGTA) for the resurfacing and upgrade of the Smozomeni Main Road. Additional budget has been ring-fenced for this project in the 2016-2017 financial year.

4.2.2 Project Overview

The proposed project comprises the upgrading of 4.3km of Smozomeni Main Road and the construction of new drainage elements in Richmond Municipality, KwaZulu-Natal. The geographical location of Smozomeni Main Road and how it connects with the rest of the road network suggested that it should be designed to Class 5 Main Collector Standard as per the South African Road Classification and Access management Manual, TRH 26.

The existing layer works will be stripped and replaced and the road will be resurfaced. The upgraded road will have two lanes and because of the mountainous terrain and very steep banks each lane will be 3.25m wide. The new road has been designed to match the footprint of the existing road (i.e. there will be no deviations from the current alignment of the road segment).

The ingress of water was the main reason for the deterioration of the existing road. Therefore, the entire length of road will receive sub soil drains on the cut side and 1.5m wide concrete drains will be constructed to collect and channel stormwater to the desired outlet points.

According to the Engineer, there are two existing watercourse crossings and twenty-two stormwater portal culvert crossings. The two main crossings will not be modified in any way. The existing portal culverts, where necessary, will be lengthened and will have new headwalls constructed.

Electrical services traverse the project site at eleven points (refer to Figure 4). The Construction Phase will not interrupt services. No gum poles or tower structures will be relocated to accommodate construction activities on site.

An A3 Locality Map and Site Map are attached in Appendix 3.

4.2.3 Project Objectives

The purpose of the project is to improve the level of service of Smozomeni Main Road, which is currently in dire state of disrepair, rendering a disservice to some 4148 households of Ndaleneni Area.

Smozomeni Main Road provides the only link for the community of Ndaleneni Area to places of resources and extramural activities. The road meanders past two schools and it is a bus route linking Ndaleneni Area with major routes leading to Richmond CBD.

4.2.4 Construction Project Specifics

The following is proposed to be constructed for the Tarring of Smozomeni Main Road:

- 4.3km of pavement layers designed to meet the minimum requirements for Class 5 Main Collector. The layer works will consist of:
 - 40mm Asphalt Layer;
 - 150mm G2 Base;
 - 150mm C4 Cement Stabilised Layer;
 - 150mm G7 Gravel Selected Layer;
 - 150mm G9 Gravel Selected Layer; and,
 - 150mm Rip and Re-compact existing material.

 - The road will mostly be in Crossfall formation meaning the surface water will in most instances be drawn to the shallow edge of the formation. And the shallow edge will have:
 - A concrete lined V drain, 1.5m wide constructed with 100mm thick concrete; and,
 - Below the concrete V drain a subsoil drain, 1m deep constructed with 110mm perforated pipe wrapped in geotextile fabric, embedded in 19mm loose stone.

 - The existing portal culverts crossings channel the stormwater under the carriageway will be:
 - De-silted and their structural integrity interrogated;
 - Where necessary damaged or structurally unsound panels will be replaced;
 - Lengthened to match the new road formation;
 - New outlet headwalls will be constructed as none exist;
 - Concrete stone pitching at outlet to reduce the effect of erosion; and,
 - The floor slabs of the outlet headwalls will have splitter blocks to dissipate the stormwater energy thus reducing erosion.

 - Gabion retaining walls will be constructed in areas prone to erosion as follows:
 - An anchoring trench 0.5m deep is excavated at the base of the wall;
 - The first row of 1.5m x 1m Gabion baskets is then erected in the anchoring trench and filled with handpicked stone with size ranging between 150 – 200mm;
 - The earth side of the basket is then backfilled with selected earth and compacted;
 - A second row of 1.5m x 1m Gabion baskets is then erected on top of the first row and filled with handpicked stones as mentioned above;
 - The earth side of the basket is then backfilled with selected earth and compacted;
 - The third row of baskets of 1m x 1m is erected on top of the second row with back edges lining up and filled with handpicked stones as mentioned above and the earth side backfilled with selected earth;
 - This process is repeated until the desired height is achieved; and,
-

- The maximum height of the Gabion retaining wall constructed in this formation is 3m.

- Clearing and Grubbing will only be restricted to:
 - Cutting and/or Flattening of cut banks;
 - Inlets and outlets of existing portal culverts; and,
 - Stone pitching and V drain outlets.

- Hydroseeding and topsoil obtained within the site will be spread on cut banks to enhance vegetation growth which will aid the stability of the bank.

5 ENGINEERING DETAILS AND CONSTRUCTION METHODOLOGY

5.1 Construction Materials and Design Considerations

The material for the selected layers, G9 and G7 gravel will be sourced commercially as the quantity required for the upgrading of Smozomeni Road does not warrant opening a borrow pit.

Whilst there are some mining activities at Ch. 1+800 the municipality has indicated that it does not have any open quarries in the area.

The C4 stabilised layer will comprise of G5 natural gravel material stabilised with 3% stabilising agent. The processing of the stabilised layer will be done using a grader and manually opened cement packets.

The material for the G2 Base will be sourced commercially as this material needs to undergo stringent processing and testing under controlled quarry conditions.

The volume of Asphalt required for the Smozomeni Main Road upgrade does not warrant opening a batch plant. Therefore, the asphalt will be sourced commercially using local asphalt manufacturing companies.

The erection of gabion walls, extension of existing portal culverts and construction of headwalls will be done using local labour. The concrete slab for the portal culvert and headwalls will be sourced commercially as it needs to meet certain standards which cannot be achieved batching on site.

Concrete lined v drains will be constructed using commercially sourced concrete as the concrete used in drains needs to meet certain standards which cannot be achieved batching on site.

Hydro seeding, replenishing of topsoil and planting of trees will be done by local labour or the whole item as scheduled in the Bill of Quantities can sub-contracted to a local co-operation group as part of community upliftment.

5.2 Construction Methodology

The extent of the new works will in most cases be situated within the existing road formation. The existing asphalt surfacing will be stripped, broken down into fragments not exceeding 250mm and disposed at a designated spoil site.

The existing drainage furniture (V-drains, concrete kerb and channels) will also be removed, broken down into fragments not exceeding 250mm and disposed at a designated spoil site.

- Earthworks:
 - The surveyor will set up survey peg at 20m intervals along the entire length of road. These depict the horizontal and vertical alignment of the new road design.
 - The cutting and filling of existing material to achieve the design levels will then resume. This will be done in half widths to allow constant flow of traffic. The 'Stop & Go' traffic control system will be utilised.
 - The trimming of banks, either due to change in Horizontal Alignment or Banks with unstable slope also be done at this stage.
 - Profiling of concrete drains formation is also undertaken at earthworks stage.
 - The overall quantity for earthworks is estimated at 6,500 m³.

 - Clearing and Grubbing:
 - This activity will run concurrently with Earthworks.
 - Clearing and grubbing will mainly be on existing pipe culverts where it involves clearing of vegetation at inlets and outlets of structures.
 - Clearing of vegetation on V-drain outlets and areas that will receive stone pitching treatment.
 - The overall quantity for clearing and grubbing is estimated at 3 ha.

 - Stormwater Culverts:
 - Under this section only the extension of existing stormwater culverts is envisaged. The existing inlet and/or outlet structures of the culverts that are to be lengthened will be demolished. New sections of pipes matching the dimensions of the existing culvert will be joined into existing culvert to achieve the new design length. These will be backfilled with selected backfill up to the new road G9 level.
 - The new headwalls at the outlet and the drop chambers at inlets will then be constructed.
 - The overall stormwater culvert extensions are estimated at 200m (600mm x 450mm) and 65m (750mm x 600mm).

 - Layerworks:
 - Before the imported layerworks are processed, the *in situ* material will have to be compacted to 90% Mod AASHTO, tested by an independent laboratory.
 - The selected layers are as follows:
 - The G9 selected gravel layer will be constructed to be 150mm thick and will have to be compacted to achieve 93% Mod AASHTO,
 - The G7 selected gravel layer will be constructed to be 150mm thick and will have to be compacted to achieve 93% Mod AASHTO,
 - The C4 Sub-Base stabilised layer will be constructed using a parent gravel material meeting G5 standard. This material will then be mixed, *in situ*, with 3% cement. The finished C4 layer will have to be 150mm thick and achieve a compacted density of 93% Mod AASHTO.
 - The base layer will be constructed with G2 material. The thickness of the base layer will be 150mm and will have to be compacted to 100% Mod AASHTO.
 - The overall volume of layerworks material is at 21,250m³.

 - Surfacing:
 - The asphalt surfacing will then be laid on top of the G2 Base. The asphalt layer will be 40-50mm thick. A thin layer of bituminous tack coat will be sprayed on top of the G2 Base to promote adhesion between the two interfaces.
 - The overall volume of asphalt layer is at 28,000m².
-

A copy of the Engineering Drawing, showing the geometric layout of the road and the drainage plan, is provided in Appendix 5.

6 APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

Table 4 provides a list of all the applicable legislation, policies and/or guidelines of any sphere of government that are relevant to the application as contemplated in the EIA regulations.

TABLE 4: Applicable legislation, policies and/or guidelines.

Title of legislation, policy or guideline:	Administering authority:	Date:
National Environmental Management Act (Act 107 of 1998) – for its potential to cause degradation of the environment (Section 28).	Department of Environmental Affairs	1998
Environmental Conservation Act (Act 73) – for potential environmental degradation.	Department of Environmental Affairs	1989
National Water Act (Act 36 of 1998) – for potential to cause pollution of water resources defined under the Act (Section 19).	Department of Water Affairs and Forestry	1998
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) – for protection of agricultural resources and for control and removal of alien invasive plants.	National Department of Agriculture	1983
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) – for protection of biodiversity.	Department of Agriculture and Environmental Affairs & Ezemvelo KZN Wildlife	2004
The National Heritage Resources Act (Act No 25 of 1999 as amended) – for the identification and preservation of items of heritage importance.	Department of Arts and Culture (Amafa KwaZulu-Natal)	1999
Guideline 4: Public Participation in support of the EIA Regulations (2005)	Department of Environmental Affairs and Tourism	2006
Guideline 7: Detailed Guide to Implementation of the Environmental Impact Assessment Regulations (2006)	Department of Environmental Affairs and Tourism	2007
Richmond Municipal By-Laws	Local Municipality	Updated accordingly

7 NEED AND DESIRABILITY

The Smozomeni Main Road is the main arterial servicing 4,000 households. The road is currently in a state of disrepair and the surface continues to deteriorate / unravel. The Richmond Local Municipality needs to ensure that this asset is adequately maintained so that the isolated households can continue to receive basic services. This segment of road has been highlighted in the Richmond Municipality's Integrated Development Plans as a priority project in Ward 6.

8 MOTIVATION FOR THE PREFERRED SITE, ACTIVITY AND TECHNOLOGY ALTERNATIVES

The proposed road upgrade triggered listed activities in Listing Notice GNR 983. As per GNR 982, Appendix 1(2)(b), alternatives for the proposed development are to be identified and considered. Chapter 1 of the EIA Regulations provides an interpretation of the word “alternatives”, which is to mean “*in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the -*

- a) *Property on which or location where the activity is proposed to be undertaken;*
 - b) *Type of activity to be undertaken;*
 - c) *Design or layout of the activity;*
 - d) *Technology to be in the activity; or*
 - e) *Operational aspects of the activity;*
- And includes the option of not implementing the activity.”*

Based on the above, the following alternatives are presented for the proposed construction of the pipeline:

8.1 PREFERRED SITE ALTERNATIVE

The preferred site alternative is the 4.3 km segment of the Smozomeni Main Road that has been presented thus far in this document. The Proponent seeks to upgrade the existing road. No deviations are proposed from the existing footprint. Resurfacing and upgrade is considered to be a sound solution taking due account of landowner requirements, Financial, engineering, heritage and environmental considerations. The development will take into consideration items of heritage significance identified in the Heritage Impact Assessment (HIA) Report (Appendix 7), as well the mitigation measures recommended by the Wetland and Riparian Specialist (Appendix 8).

There are no other existing roads that can be upgraded to achieve the level of service that the 4,000 households in the affected community require. The option of constructing a new road to the affected community is not feasible at this stage from a financial perspective, and would not be consistent with the Municipal planning and developmental agendas. Therefore no other site alternatives have been investigated. Maintaining and upgrading the existing infrastructure is the only feasible means of providing basic services to the affected community.

In summary, the proposed alignment for construction takes into account items of heritage significance, ecological importance, and is acceptable to the majority of directly affected landowners. This site alternative is therefore considered to be preferred site alternative.

Plates 1 - 26 provide an overview of the site proposed for construction activities (‘Preferred Site Alternative). The corresponding location of where the photographs were taken are noted in Figure 4.

SITE PHOTOGRAPHS: Plates 1 – 26



PLATE 1: Bridge at start of road upgrade project (chainage 0.0 km).



PLATE 2: Deteriorating road surface.

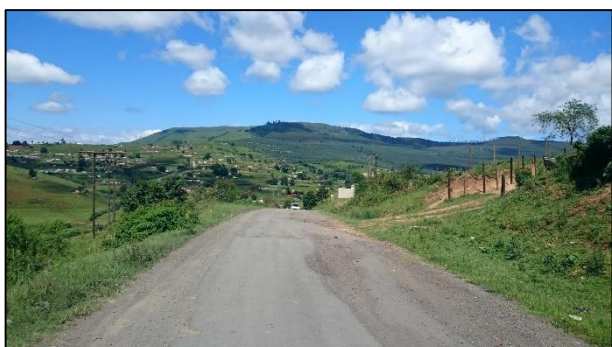


PLATE 3: Deteriorating road surface.

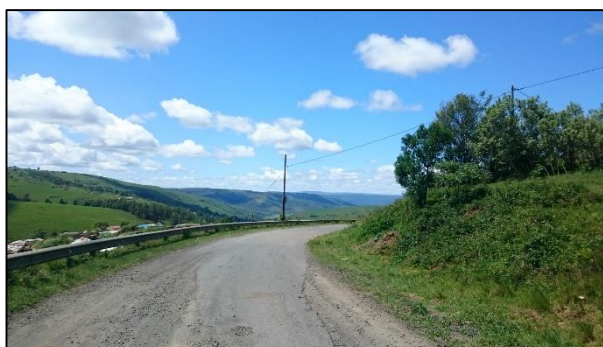


PLATE 4: Deteriorating road surface.



PLATE 5: Deeply incised donga threatens the integrity of the road layer works. The embankment at this site will be stabilised with a gabion retaining structure.



PLATE 6: Deteriorating road surface in the vicinity of the borrow pit. Runoff is flowing over the road surface.



PLATE 7: Culvert outlet.



PLATE 8: Culvert inlet.



PLATE 9: Road surface in vicinity of borrow pit. There is a watercourse crossing draining from right to left at the bend in the road.



PLATE 10: Deteriorating road surface.



PLATE 11: Drainage line crossing.



PLATE 112: Deteriorating road surface.



PLATE 13: Deteriorating road surface.



PLATE 124: Eroded cutting.



PLATE 15: Deteriorating road surface.



PLATE 136: Culvert inlet.



PLATE 17: Culvert outlet. .



PLATE 148: Deteriorating road surface. Stormwater drainage is to be formalised.



PLATE 19: Smozomeni Main Road. Rolling terrain is observed in the background.



PLATE 20: Suitable site for a site camp / material laydown area.



PLATE 21: Deteriorating road. Surrounding landuse is informal housing and subsistence agriculture.



PLATE 22: Culvert will be removed and replaced.



PLATE 23: Deteriorating road. Surrounding landuse is informal housing and subsistence agriculture.



PLATE 24: Deteriorating road. Surrounding landuse is informal housing and subsistence agriculture.



Plate 25: Deteriorated road surface in vicinity of the Ndabikhona Primary School (right).



Plate 26: End of road upgrade project (chainage 4.3 km). A culvert drains from left to right beneath the zebra crossing.

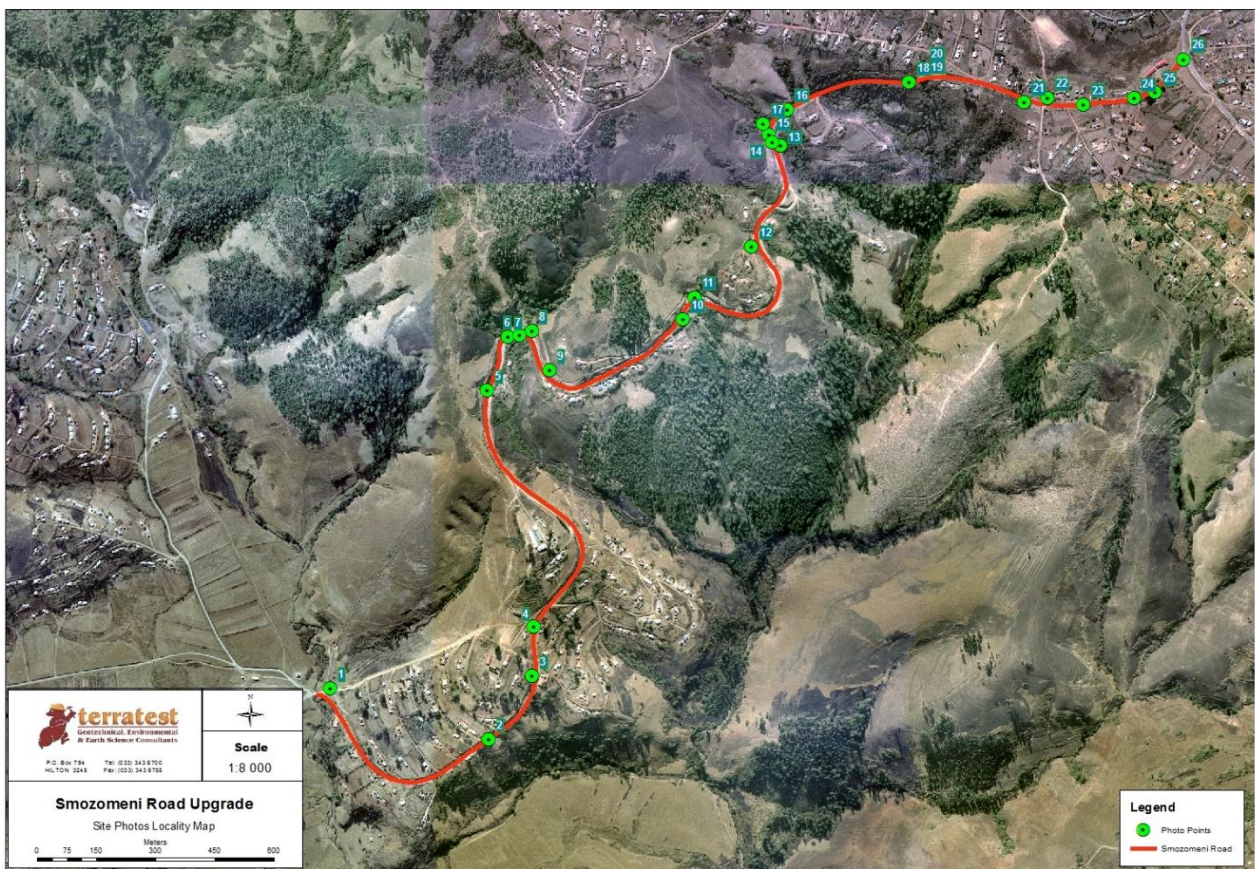


Figure 6: Aerial photo with location of Plates 1 – 26 superimposed.

8.2 PREFERRED TECHNOLOGICAL ALTERNATIVE

In situ road upgrade projects are machinery intensive projects. Milling down the existing road surface, stripping the layer works, rebuilding the road prism and surfacing all require construction plant. In desiring to maximise profits, Engineers and Contractors often endeavour to design and construct projects with a minimal labour input. Such conduct does not align with the job creation agendas of the Local Municipality and the MIG funders.

Notwithstanding the need for construction plant to execute the road upgrade (e.g. bulk earthworks, excavations, haulage, milling, recycling during road stabilisation etc.), labour intensive construction methods have been selected for certain activities, such as construction of the concrete lined V-drains; the

installation of stone pitching in areas where the velocity of the runoff requires dissipation; guard rail installation; gabion basket hand-packing for retaining structures; clearing and grubbing of vegetation; and, traffic accommodation activities. This is considered the preferred technological alternative.

In summary, job creation imperatives have resulted in the preparation of a bill of quantities that provides for labour-intensive construction techniques. This preferred operational alternative will maximise the positive impacts associated with the proposed development namely the creation of job opportunities and the stimulation of the local economy during the construction phase of the development.

8.3 NO-GO ALTERNATIVE

The 'No-go' Alternative is to not to resurface and upgrade the Smozomeni Main Road. As a result, the existing road infrastructure will continue to deteriorate with the concomitant reduction in service delivery to 4,000 local households.

There is the increased risk of road accidents as the number and size of potholes on the road surface will continue to increase. In time the road surface could become considered an unreliable means of accessing the Town of Richmond, and local community members, as an alternative, may seek to widen existing tracks through the surrounding vegetation, resulting in potentially significant environmental impacts.

By not upgrading the road, the developmental and service delivery imperatives in the IDP's for the respective Local and District Municipalities will not be realised. Moreover, the Auditor General's concerns regarding the Richmond Local Municipality's lack of an appropriate road asset management system will be affirmed and potentially reiterated as findings in future IDP reviews.

By not upgrading the road, local job opportunities will be lost and the associated stimulation of the local economy will not manifest.

In summary, the no-go alternative is not a feasible alternative in the short term (failure to meet municipal planning and service delivery imperatives) or the medium and long term (neglect of an infrastructural asset).

9 PUBLIC PARTICIPATION

To fulfil the necessary public participation required as part of the BA Process, the following methods of stakeholder engagement were conducted by the EAP, as outlined below.

9.1 SITE NOTICE BOARDS

Four (4) site notice boards written in English and isiZulu were placed along the road. Figure 7 provides a copy of these site notices, while Figure 8 provides an illustration of the location of the notice boards as per the road alignment.

The purpose of the notice boards was to inform neighbours, community members and passers-by of the pending Application for Environmental Authorisation. The details of the EAP were also provided on the notices should any member of the public require additional information or wish to register as an IAP in the Application. Plates 27 - 34 provide proof that the notice boards were erected on site.

NOTICE OF BASIC ASSESSMENT APPLICATION			ISAZISO NGESICELO SEGUNYA LEZEMVELO		
<p>PROPOSED UPGRADE OF SMOZOMENI ROAD, NDALENI AREA, RICHMOND, KWAZULU-NATAL. TERRATEST REFERENCE: 41625</p> <p>Notice is hereby given in terms of Regulation 41(2) of the National Environmental Management Act (NEMA, Act 107 of 1998), published in Government Notice No. R.982 of 2014, of the intent to carry out a Basic Assessment Process for the above-mentioned development. The following Listed Activities contained in GNR 983 of the EIA Regulations (2014), will be applied for:</p>			<p>UKUTHUTHUKISWA OKUHONGOZWAYO USMOZOMENI ENDAWENI YASE NDALENI, RICHMOND, KWAZULU-NATAL. TERRATEST REFERENCE: 41625</p> <p>Isaziso sikhishwa ngoko-Mihethonqubo 41 (2) womthetho kaZwelonke obhekele ukuphuthwa kwezemvelo (NEMA, Act 107 of 1998) oshicilelwe kwisaziso sikaHulumeni unombolo R. 982 ka 2014, ngenhloso yokwenza ucwaningo oluyisisekelo lomsebenzi obaluliwe ngenhla. Isicelo sokwenza imisebenzi elandelayo etholakala ohlwini lwesaziso sikaHulumeni unombolo R983 womthethonqubo (2014) sizofakwa.</p>		
General Notice Number & Date	Activity No	Description of each listed activity as per project description	Usuku lokushicilelwa kweSaziso Jikele nenombolo yeso	Inombolo yomsebenzi oshicilelwe	Incazelo yomsebenzi odinga ukugunyazwa ngokwezemvelo
GNR 983 04 December 2014	12	The development of (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, within 32 metres of a watercourse, measured from the edge of a watercourse. <i>This Listed Activity is relevant as portions of the road upgrade will require the construction of infrastructure exceeding 100m² within 32 metres of a watercourse.</i>	GNR 983 04 December 2014	12	Ukuthuthukiswa kwangqalazinda (xii) noma izakhiwo ngama 100m ² noma ngaphezulu lapho ukuthuthukiswa kungaphakathi kwamanzi; (b) ngaphambili kokuthuthukiswa; (c) uma kungekho ukushyeka kokuthuthukiswa, ngaphakathi kwama mitha angamashumi amathathu (30) amanzi, kusukela onqenqemeni lwamanzi. - Umsebenzi oshhwini uqondene njengoba izingxenye zomgwaqo zizodinga kwakhiwe izingqalazinda eziqele ku 100m ² ngaphakathi kwamamitha angamashumi amathathu namibili (32) emanzi.
GNR 983 04 December 2014	19	The infilling or depositing of any material of more than 5 cubic metres into, or dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (i) a watercourse. - <i>This Listed Activity is relevant as the proposed road upgrade project will involve the movement of more than 5m³ of soil from the banks of watercourses and wetlands during construction and/or the deposition of 5m³ of material or more into watercourses.</i>	GNR 983 04 December 2014	19	Ukumbiwa, ukusiswa, ukuthuthwa, ukufakwa noma ukubekwa kweshlabathi, amagobolondo, amatsha noma izimbokodo okuzokweqa izinga lika-5m ³ eduze komchachazo wamanzi. - Umsebenzi oshhwini uqondene njengoba umgwaqo ohlongozwayo uzobandakanya ukusiswa kweshlabathi ngaphezulu kuka 5m ³ kusukela osebeni lwemichachazo yamanzi namaxhaphozi uma sekwakhiwa noma ukufakwa kuka 5m ³ ngenkathi kwakhiwa luthi noma ukufakwa kweshlabathi esiyi 5m ³ noma ngaphezulu komchachazo wamanzi.
<p>PROPOSED ACTIVITY: The Proponent is seeking to rehabilitate a 4.3 km segment of the Smozomeni Road (GPS Coordinates – Start: 29°54'42.51"S; 30°13'19.53"E; End: 29°52'50.64"S; 30°14'42.52"E), which is in a state of disrepair as the road surface continues to fail. The maintenance of this road is critical to the effective delivery of services to more than 4,000 households, situated in Richmond, KwaZulu-Natal.</p> <p>PROPERTY LOCATION: Ndaeni area in Richmond, KwaZulu-Natal</p> <p>To register as an Interested and Affected Party (IAP) or provide comment on the project, please contact Mr Warren Hale of Terratest (Pty) Ltd as per the details below.</p>			<p>UMSEBENZI OHLONGOZWAYO: Umsekelo ufuna ukulungisa u 4.3 km kwingxenye yomgwaqo uSmozomeni kusukeli : 29°54'42.51"S; 30°13'19.53"E; End: 29°52'50.64"S; 30°14'42.52"E, okuyinto esesimni esingalungiseki njengoba umgwaqo uqhubeka nokubhidika. Ukugcinwa kwalomgwaqo kubalulekile ikhakhulukazi ekufethweni kwezinsiza emakhaya ngaphezulu kwezinkulungwane ezingamashumi amane, atholakala eRichmond, kwaZulu-Natali.</p> <p>INDAWO: Umsebenzi ohlongozwayo utholakala eNdaeni, KwaZulu-Natal.</p>		
<p>Applicant: Richmond Local Municipality Environmental Consultant: Terratest (Pty) Ltd Contact Person: Mr Warren Hale Tel: (033) 343 6700 Fax: (033) 343 6701 Email: halew@terratet.co.za Postal Address: PO Box 794, Hilton, 3245</p>			<p>Umdlali: Richmond Local Municipality Umdlaleki wezemvelo: Terratest (Pty) Ltd Okuxhunyanwa naye: Mr Warren Hale Tel: (031) 343 6700 Fax: (031) 343 6701 Email: halew@terratet.co.za Postal Address: PO Box 794, Hilton, 3245.</p>		
<p>The Application will be submitted to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA). In order to ensure that you are identified as an IAP, please submit your name, email address, and other contact information and interest in the matter, as well as any comments or queries you may have regarding the proposed development, in writing, to the contact person given above. Thank you for your participation.</p>			<p>Isicelo sizofakwa eMnyangweni wezokuThuthukiswa koMnotho, ezukuVakasha, Kanye nezeMvelo (EDTEA) kwaZulu-Natal. Ukuzo ugnisekise ukhuthi nawe uyabizwa njengohintekayo noma onentshisekelo, uyacelwa uthumele igama lakho, iimeyili yakho kanye neminye imininqwane ongatholakala kuyo, kanye nokuthinteka kwakho noma ukuphawula okanye imbuzo ongaba nayo ngalomsebenzi ohlongozwayo, ngokubhalela umeluleki okuxhunyanwa naye obhalwe ngenhla. Siyabonga ngokuhlanyela kwakho.</p>		

Figure 7: Copy of the written content of the poster placed on site (locality map excluded).

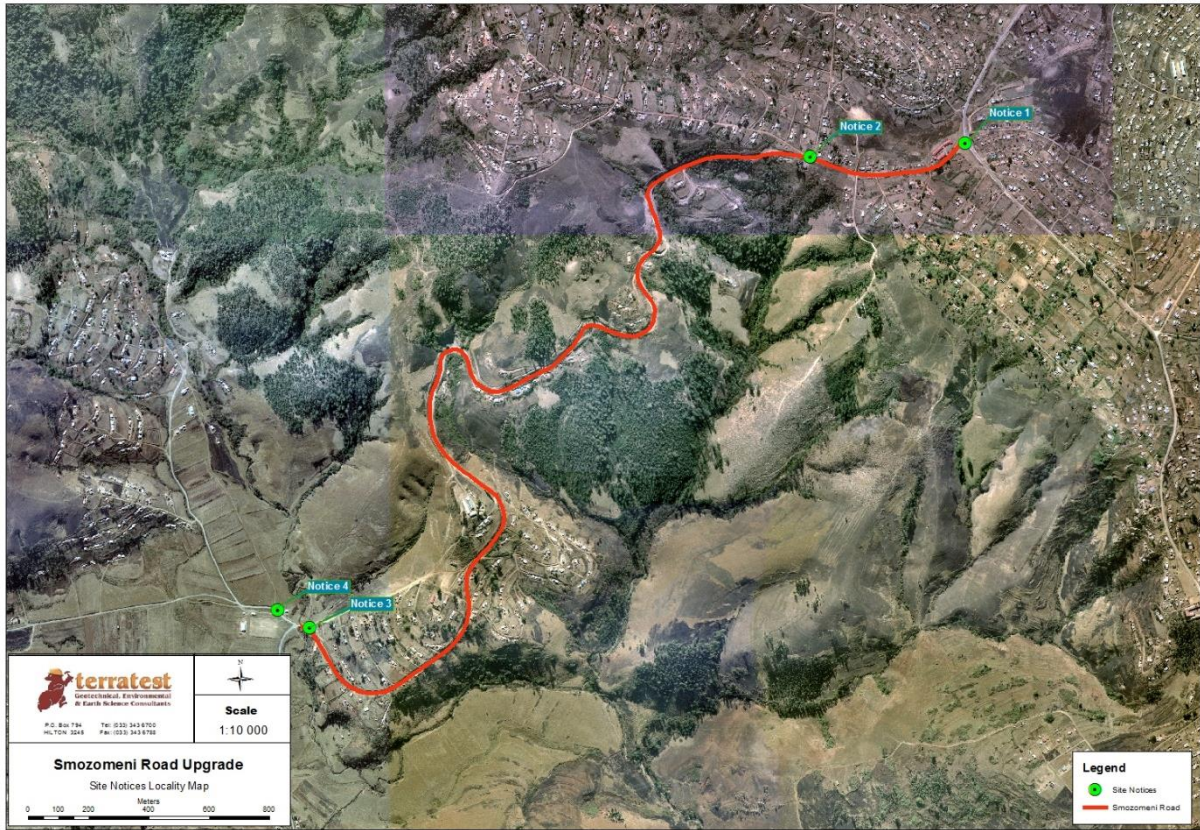


Figure 8: Aerial photograph with locations of site notices superimposed (see plates 27-34)

SITE PHOTOGRAPHS: Plates 27-34 PUBLIC PARTICIPATION



PLATE 27: Site Notice 1

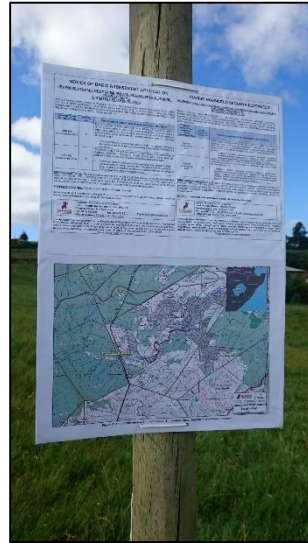


PLATE 28: Site Notice 1



PLATE 29: Site Notice 2

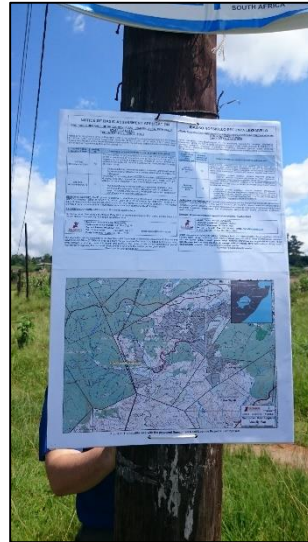


PLATE 30: Site Notice 2



PLATE 31: Site Notice 3

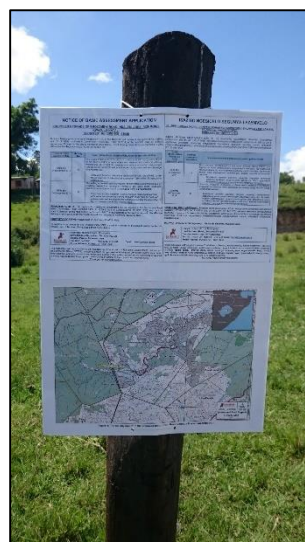


PLATE 32: Site Notice 3



PLATE 33: Site Notice 4

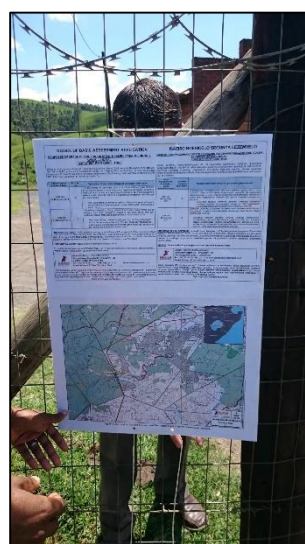


PLATE 34: Site Notice 4

9.2 NEWSPAPER ADVERTISEMENT

An advertisement written in isiZulu was placed in the Ilanga Newspaper on Thursday, the 30th of June 2016 informing potential IAPs of the proposed development and announcing the availability of the Draft BAR for public comment.

9.3 WRITTEN NOTIFICATION TO AUTHORITIES AND NEIGHBOURS

9.3.1 Interested and Affected Parties (IAPs)

A register of IAPs was compiled as per Section 42 of the EIA Regulations, 2014. This included all relevant authorities, Government Departments, the Local Municipality, the District Municipality, relevant conservation bodies and non-governmental organisations (NGO's). This register will be regularly updated to include those IAPs responding to the newspaper advertisements, site notice boards and notification letters. A copy of the IAP Register is included as Appendix 9 of this report.

9.3.2 Notification Letter

A notification letter was compiled and circulated to all identified IAPs by email and post (where necessary) on completion & circulation of the draft Basic Assessment Report. The purpose of the notification letter was to provide summary information regarding the project and its location. Furthermore, the notification letter invited comments from IAPs and requested those notified to provide details of other potential IAPs which they may be aware of.

9.4 PUBLIC MEETING

Due to the nature of this project it was deemed not to be necessary to hold a public meeting. Should the need arise after the circulation of the Draft Basic Assessment Report a public meeting will be undertaken.

9.5 COMMENTS RECEIVED

To date no comments have been received. Formal comment is now requested from all of the Stakeholders on the IAP Register during the 30 day circulation of the Draft BA Report as part of the public participation process (comment period commences on Thursday, 30th of June 2016 and closes on Monday, 1st August 2016). All comment received will be included in, and attached to, the Final BA Report which will be submitted to the EDTEA for a decision on Environmental Authorisation.

9.6 CIRCULATION OF DRAFT BASIC ASSESSMENT REPORT FOR COMMENT

Copies of the draft Basic Assessment Report have been circulated to the following Key Stakeholders and IAPs for review and comment over a 30 day period commencing on Thursday, 30th of June 2016:

- Amafa Heritage: Ms. W. Tshabalala (online upload);
- Ezemvelo KZN Wildlife: Mr D. Wieners (hardcopy and electronic shapefiles);
- Department of Water and Sanitation: Ms N.Mokoena (hardcopy);
- Department of Transport: Ms. J. Reddy (softcopy);
- Department of Cooperative Governance and Traditional Affairs: Ms. Z. Dlamini (softcopy);
- Umgungundlovu District Municipality: Ms N. Nxumalo (softcopy);
- Richmond Local Municipality: Mr. S. Mkhize (hardcopy);
- Ward 6 Councillor (softcopy);
- Ward 7 Councillor (softcopy);
- Hlanganani Traditional Authority: Mr. T. Dlamini (hardcopy);
- Ingonyama Trust Board: Mr. P. Manipersadh (softcopy)

All registered IAPs were notified of the availability of the Draft BA Report and the deadline for comments, being on Monday, 1st of August 2016.

An electronic version of the BA Report, including all appendices, can be downloaded from the Terratest website. A hardcopy of the report can be placed in the Richmond Library in Harding Street for public review, at the request of an IAP.

10 DESCRIPTION OF THE BASELINE ENVIRONMENT

The study area is located south-west of the town Richmond in the province of KwaZulu-Natal, South Africa.

10.1 CLIMATE

The region has a mean annual precipitation rate of 800 to 1 500 mm and is considered humid. Rain fall occurs in spring and summer; winters are dry.

10.2 TERRAIN

The terrain is characterised by rolling hills with the Drakensburg escarpment as the main topographic feature. The project site is located between 625 m and 1000 m above sea level. The lowest point of the project area is to the south-east. The highest point is in the north-western portion of the project area.

The Smozomeni road winds down the hillside which is dominated by slopes, some of which are in excess of 29°, with only the north eastern point and the south western point being on the flatter plains.

10.3 GEOLOGY AND SOILS

The geology within the region is mainly composed of sandstone, shale and siltstone of the Vryheid Formation, Ecca Group with small areas of dolerite.

The soils are dominated by red and yellow freely draining soils (Hutton and Clovelly) with the remainder of the are being shallow Mispah and Glenrosa soils on the steeper slopes. The Valley bottoms are dominated by Westleigh and Katspruit soils.

10.4 HYDROLOGY

10.4.1 CATCHMENT

The project site is situated in the quaternary catchment U10J, within the Mvoti to Umzimkulu Water Management Areas (WMA 11). The Mvoti to Umzimkulu WMA is situated along the eastern coast of South Africa, mainly within the province of KwaZulu-Natal, and borders on Lesotho to the west.

A number of parallel rivers drain the Mvoti to Umzimkulu WMA, of which two originate in the Drakensberg Mountains at the border with Lesotho. The area is characterised as rural, and activities include subsistence and commercial farming. The area surrounding the proposed project site consists of agricultural and livestock activities, and small rural settlements.

Earth Water Environmental Science cc was commissioned to undertake a Wetland Functionality and River Health Assessment in the vicinity of the proposed road resurfacing and upgrade project. The focus for the study is a site on a tributary of the Mkobeni River, which feeds into the Mkomazi River, and the assessment of the wetlands within 500m of the proposed road upgrade.

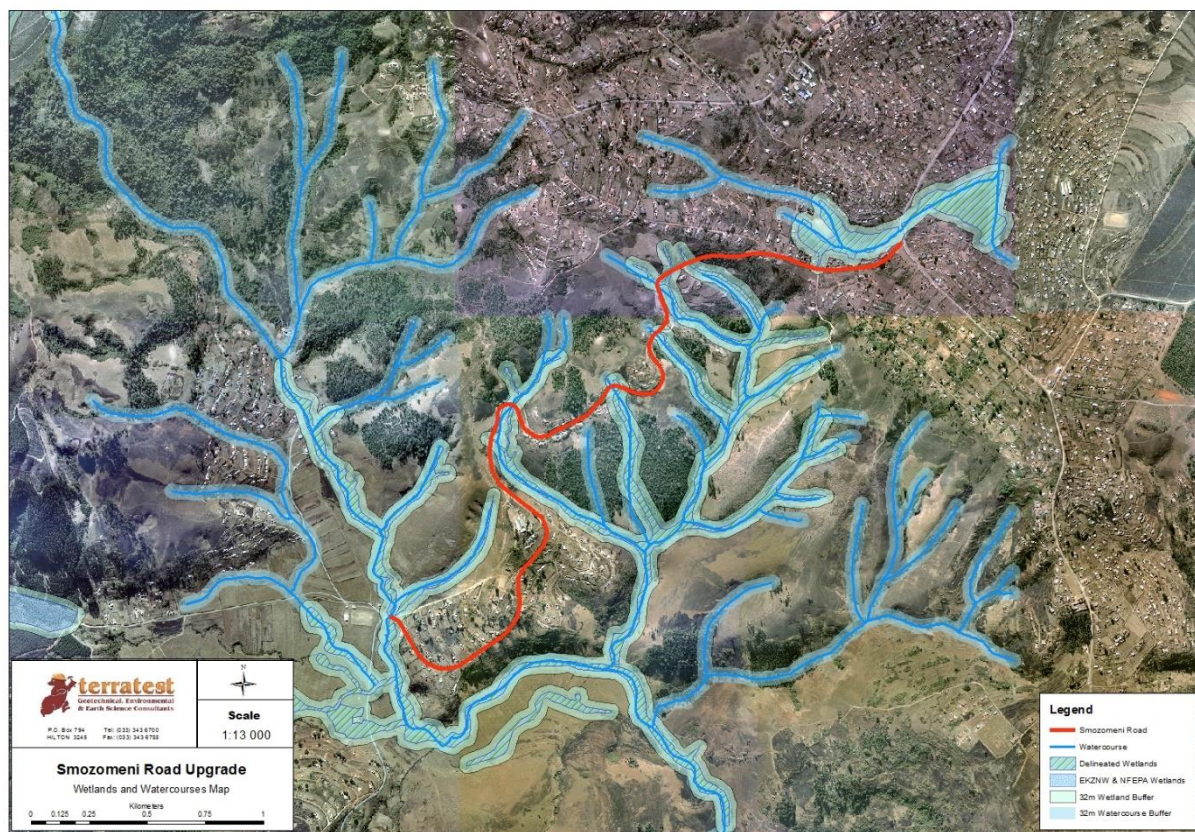


Figure 9: Watercourses (including wetlands) with 32 metre buffers in relation to the study area.

10.4.2 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREA (NFEPA) STATUS

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach to the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the National Water Act (Act 36 of 1998). This directly applies to the National Water Act, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives. The NFEPA's are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's biodiversity goals (NEMBA) (Act 10 of 2004), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act.

NFEPA's for sub-quaternary catchment areas

The Smozomeni Road upgrade site falls within a tributary of a single sub quaternary reach (SQR): Mkobeni U10J-4713. There were 5 registered wetland NFEPA ecosystem types for Mkobeni SQR U10J-4713.

10.5 WETLANDS

Earth Water Environmental Science cc was commissioned to undertake a Wetland Functionality and River Health Assessment in the vicinity of the proposed road resurfacing and upgrade project.

In the northeast, the road crosses an unchannelled valley bottom system at the top of the hilltop. In the southwest the road crosses a channelled valley bottom wetland system, with the main stream flowing under the present bridge and culvert system. The remainder of the drainage line crossings in the steeper hillslope

portions of the road did not show any wetland indicators as the slopes are too steep for wetland conditions to occur. These areas are considered to be susceptible to erosion.

The wetlands identified during the Wetland Functionality and River Health Assessment include the Channelled Valley Bottom System (HGM 1), the Hillslope Seep connected to channel (HGM 2), and the Unchannelled Valley Bottom (HGM 3) at the top of the scarp (refer to Figure 10 below). The Unchannelled Valley Bottom system downstream of the lower bridge crossing was assessed along with the HGM 3 unit.

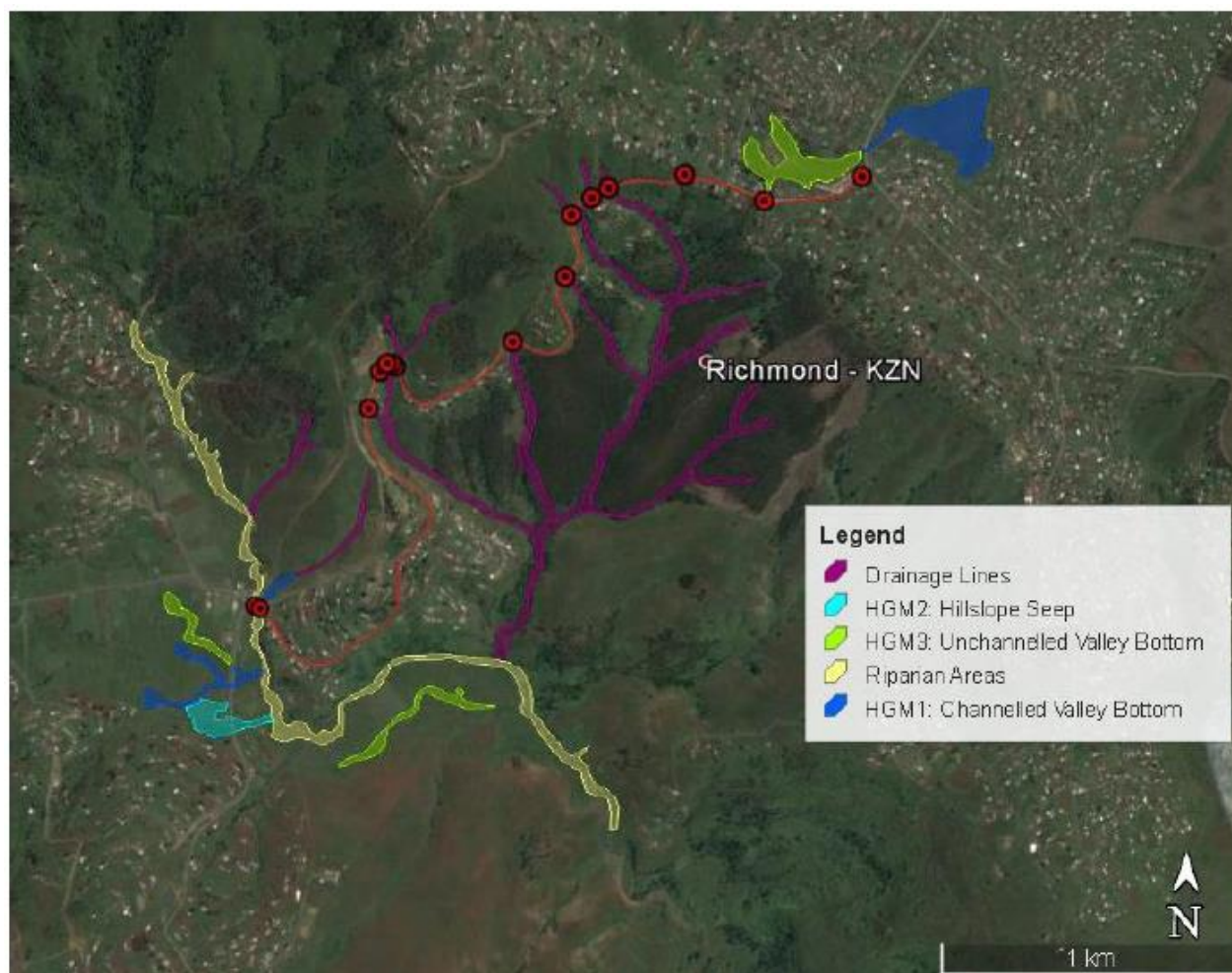


Figure 10: Delineated wetlands in close proximity to the road

HGM 1: Channelled Valley Bottom

The HGM 1 wetland system forms part of a tributary of the Mkobeni River. The existing road crossing is rudimentary which impacts on the natural wetland development and health.

The soils found within the wetland unit do not show any permanent zones with seasonal zones being prominent, with the occurrence of the Westleigh soils. The remainder of the catchment consists of freely drained red and yellow soils with shallow rocky soils on the steeper slopes.

HGM 2: Hillslope Seep

The Hillslope Seep was found on the south western corner of HGM 1, it forms on the mid-slope position and slopes towards a dirt road, where it flows through a culvert towards the HGM 1 channel.

The soils are dominated by Westleigh and some Katspruit soils in the centre of the wetland. The vegetation was dominated by wetland species in the wetland portion with grass encroaching into the system.

There are crops being grown on the edge of this system with some infrastructure splitting the wetland. The dirt road impacts on the wetland unit by altering the wetland extent and the natural flow of the system.

HGM 3: Unchannelled Valley Bottom

The Unchannelled Valley Bottom system to the north eastern side of the project area, is situated at the top of the scarp and does not drain towards HGM 1. The wetland unit is surrounded by infrastructure and crops are being grown on its edges. There is a flattened raised section in the centre of this unit being used as a sports field at present. The inflows to this unit has been channelized to reduce the size of wetland zones upstream for rural development. The wetland unit drains towards the tar road to the east and then is channelized into a culvert to pass under the road. The wetland unit then turns into a Channelled Valley Bottom system.

10.6 ECO REGIONS

In terms of the Department of Water and Sanitation's ecoregions for aquatic ecosystems, the project area falls within the South Eastern Uplands. There are a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

The Ecoregion information for the South Eastern Uplands (Zone 16) is given in Table 5.

TABLE 5: The Ecoregion Information for the South Eastern Uplands Zone

Main Attributes	South Eastern Uplands
Terrain Morphology: Broad division (dominant types) (Primary)	Plain Low Relief (limited); Plains moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to High Relief; Closed Hills; Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Secondary)	Coast Hinterland Bushveld; Eastern Thorn Bushveld; Subarid Thorn Bushveld (very limited); Short Mistbelt Grassland; North Eastern Mountain Grassland; Moist Upland Grassland ; Coastal Grassland (very limited); South Eastern Mountain Grassland (very limited); AltMountain Grassland (very limited); Patches Afromontane Forest
Altitude (m a.m.s.l) (secondary)	300-500 (limited), 500-1700, 1700-2300 (limited)
MAP (mm) (modifying)	500 to 1000
Coefficient of Variation (% of annual precipitation)	<20 to 30
Rainfall concentration index	15 to 60
Rainfall seasonality	Early to very late summer
Mean annual temp. (°C)	10 to 22
Mean daily max. temp. (°C): February	20 to 30
Mean daily max. temp. (°C): July	12 to 24
Mean daily min. temp. (°C): February	8 to 20
Mean daily min temp. (°C): July	0 to 10
Median annual simulated runoff (mm) for quaternary catchment	40 to >250

10.7 VEGETATION

The dominant vegetation within the Smozomeni road upgrade area is the Ngongoni Veld (SVs 4; Mucina and Rutherford, 2006) (refer to Figure 11).

The Ngoni veld consists of dense tall grasslands, dominated by the unpalatable Ngongoni Grass (*Aristida junciformis*). This grass type dominates and as a result there is a low species diversity present. Wooded areas are found in the valleys at lower altitudes.

The vegetation unit is classified as vulnerable. According to the National Biodiversity Assessment (NBA) (2011), the study area is not located within either a formal or an informally protected area, and is currently not protected.

At a finer scale, the KZN Vegetation Layer (Ezemvelo KZN Wildlife, 2011) classifies the primary vegetation type as being Moist Coast Hinterland Grassland (refer to Figure 12).

Figure 13 confirms that the majority of the project area falls within Critical Biodiversity Areas labelled, 'Optimal'. This means that these areas have significant potential for biodiversity conservation, however, if these identified areas are developed, the conservation targets can be met elsewhere, as the areas in question are not considered 'irreplaceable' or 'high irreplaceable' (mandatory for conservation in terms of biodiversity sector and regional plans).

The project area is not situated within 5 km of a Protected Area. Roselands Nature Reserve, an Ezemvelo KZN Wildlife Stewardship Site, was however identified to be located 4.6 km west of the project area (refer to Figure 14).

In summary, while there are important biodiversity features within 5 km of the proposed project site, none of these represent 'no-go' scenarios. Moreover, the proposed project seeks to remain as far as possible within the footprint of the existing road, with the resurfacing activities and the establishment of improved stormwater drainage. This will ensure that potential impacts to biodiversity features and indigenous vegetation are largely mitigated.

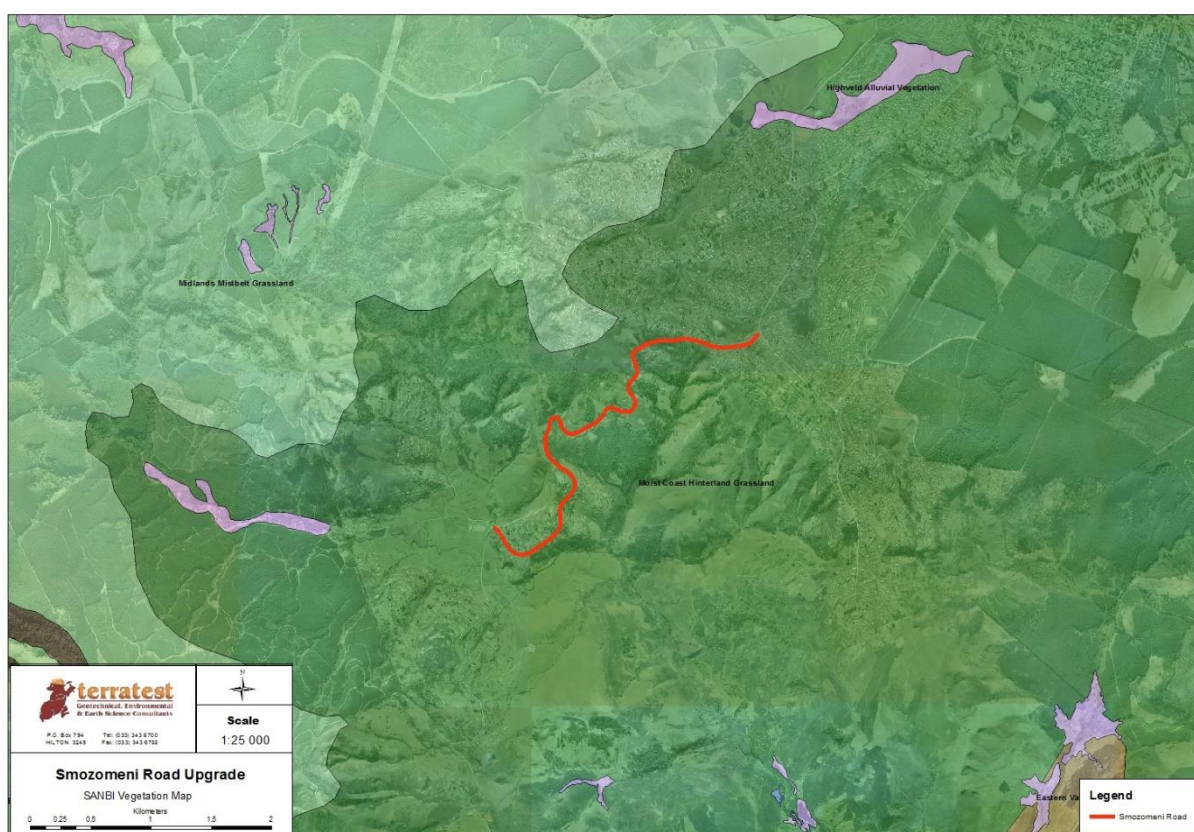


Figure 11: SANBI Vegetation Map

Figure 13: Ezemvelo KZN Wildlife Critical Biodiversity Areas

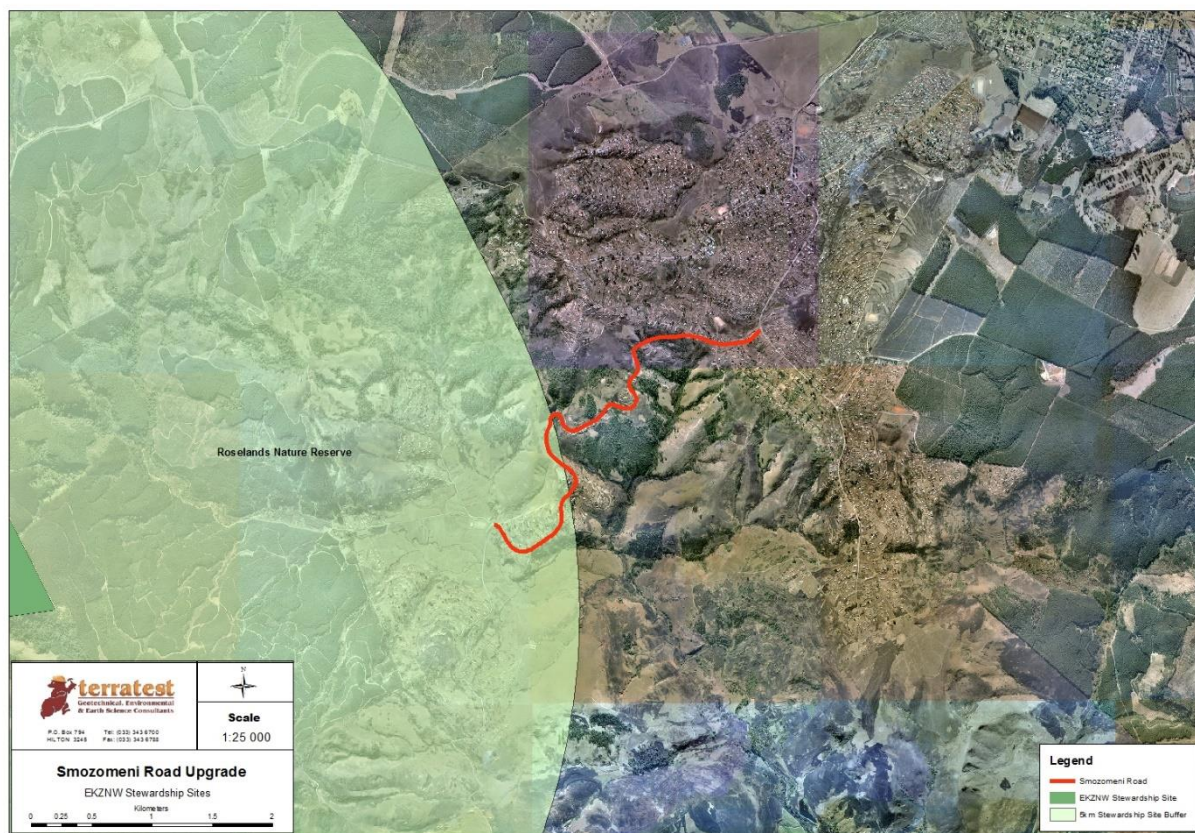


Figure 14: Proximity of Project Area to Ezemvelo KZN Wildlife Stewardship Sites

10.8 FAUNA

10.8.1 Fish

An expected fish species list for the Mkobeni SQR U10J-4713 was obtained from the following sources: Skelton (2001) and DWS (2013). Based on this, 8 fish species are expected to occur in the project area (refer to Table 6).

It should be noted that these expected species lists are compiled on a SQR basis and not on a site specific basis. It is therefore highly unlikely that all of the expected species will be present at every site in the SQR with habitat type and availability being the main driver of species present. Therefore Table 6 should be viewed as a list of potential species rather than an expected species list.

TABLE 6: Expected species list for the sub-quaternary catchment

Scientific name	Common name	IUCN Status
<i>Anguilla mossambica</i>	African longfin eel	LC
<i>Amphilius natalensis</i>	Natal Mountain Catfish	LC
<i>Barbus anoplus</i>	Chubby head barb	LC

<i>Barbus gurneyi</i>	Redtail Barb	LC
<i>Clarias gariepinus</i>	Sharptooth Catfish	LC
<i>Labeobarbus natalensis</i>	Natal yellowfish	LC
<i>Oreochromis mossambicus</i>	Mozambique Tilapia	NT
<i>Tilapia sparrmanii</i>	Banded Tilapia	LC

LC- Least Concern

DD- Data Deficient

NT- Near Threatened

The conservation statuses of the indigenous fish species were assessed in terms of the IUCN Red List of Threatened Species (IUCN, 2015). Based on this assessment 7 of the expected fish species are currently listed as Least Concern (LC) and a single species as Near Threatened (NT) (Table 6).

Species that are listed as LC are considered to be widespread and abundant with no immediate threat of extinction. A species is listed as NT when it does not currently qualify for a Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) status but is close to qualifying or is expected to qualify in the near future.

Oreochromis mossambicus (Mozambique tilapia) is currently listed as Near Threatened (NT). The most serious threat facing *O. mossambicus* is hybridization with the rapidly spreading introduced species *Oreochromis niloticus* (Nile tilapia) (IUCN, 2015). Hybridization has already been documented throughout the northern part of the species' range, with most of the evidence coming from the Limpopo River catchment (IUCN, 2015). Given the rapid spread of *O. niloticus*, it is anticipated that *O. mossambicus* will qualify as threatened under Criterion A due to rapid population decline through hybridization (IUCN, 2015). *Oreochromis mossambicus* occurs in all but fast flowing waters and is tolerant of high salinities. It feeds on algae and invertebrates.

The clearest morphological indicator of hybridization between *O. mossambicus* and *O. niloticus* is barring on the caudal fin. No traces of hybridization were recorded amongst the *O. mossambicus* recorded in the project area although DNA analysis would be needed in order to confirm this.

10.8.2 Aquatic Macroinvertebrates

The aquatic macroinvertebrate results for the sampling site are presented in Table 7.

TABLE 7: Macroinvertebrate assessment results recorded during the wet season survey (SMO1)

	SMO1
SASS Score	168
No. of Taxa	28
ASPT*	6.0
Category	C

*ASPT: Average score per taxon

10.8.3 Biotic Integrity based on SASS5 Results

Biotic integrity at the SMO1 site was categorised as moderately modified (PES Class C) (refer to Table 7). This indicates that the macroinvertebrate assemblage is in an impacted state. The low diversity of Ephemeroptera, Plecoptera and Trichoptera taxa indicates poor instream habitat diversity and availability, such as stones in riffles, runs and pools. A number of highly sensitive taxa were collected, including,

Amphipoda, Tricorythidae, and Chlorocyphidae, indicating good water quality conditions, however, the ASPT score indicates a high percentage of moderately tolerant taxa were recorded. The macroinvertebrate assemblage indicates that the biotic integrity of the Mkobeni River tributary system is moderately modified.

10.9 CULTURAL, HISTORICAL AND ARCHAEOLOGICAL RESOURCES

An Heritage Impact Assessment (HIA) was undertaken. The road is an area of moderate palaeontological sensitivity. However, this is a road upgrade with minimal subsurface activity. The road upgrade will thus not affect any possible palaeontological sites. Only one heritage site is located near the road upgrade. This site is a cemetery in the one corner and is unlikely to be affected. The cemetery will need to be demarcated before road construction. No fatal flaws were found. The HIA Report is discussed in detail in Section 11.1 and is attached as Appendix 7.

Amafa KwaZulu-Natal (Amafa), the authority responsible for KwaZulu-Natal's heritage, has been contacted regarding the proposed development and the associated HIA Report submitted to them for comment.

11 SPECIALIST STUDIES

11.1 HERITAGE IMPACT ASSESSMENT

Umlando: Archaeological Surveys and Heritage Survey (Umlando) was appointed to undertake a Heritage Impact Assessment (HIA) for the Smozomeni Road upgrade. Umlando previously surveyed the ePhateni water pipeline in 2012. The pipeline runs adjacent to the road in several places, and the road was driven (and surveyed).

The resultant HIA Report is attached as Appendix 7. The relevant details of the Specialist are noted in Table 8.

TABLE 8: Details of Heritage Specialist

Name of specialist	Education qualifications	Field of expertise	Title of specialist report/ s as attached in Appendix D
Mr Gavin Anderson	M. Phil in Archaeology/Social Psychology	Heritage Impact Assessment	Proposed Smozomeni Road Upgrade

Only one site is located near the road upgrade: EPA02. This site is a cemetery in the one corner and is unlikely to be affected. The coordinates of the cemetery site are detailed in Table 9.

TABLE 9: Coordinates of cemetery site

Name	Latitude	Longitude	Description
EPA02A	-29.910086	30.227829	Cemetery corner
EPA02B	-29.909695	30.228139	Cemetery corner
EPA02C	-29.909876	30.227068	Cemetery corner
EPA02D	-29.909121	30.227812	Cemetery corner

EPA02 is located near the Sekusile Crèche and the Esimozomeni School. The site is a large cemetery that appears to have been in use for several years, and there are few recent graves. The graves are difficult to

observe due to the dense vegetation. The cemetery is approximately 120m x 80m in size, at the maximum distances.

Significance: The site is of high significance.

Mitigation: The cemetery will need to be fenced off on the roadside and clearly demarcated before the construction phase.

The road is an area of moderate palaeontological sensitivity. However, this is a road upgrade with minimal subsurface activity. The road upgrade will thus not affect any possible palaeontological sites.

11.2 WETLAND & RIPARIAN ASSESSMENT

Earth Water Environmental Science was appointed to undertake a detailed survey of the wetlands, rivers and drainage lines located along the proposed pipeline corridor alignment. The resultant Wetland and Riparian Assessment Report is attached as Appendix 8. The relevant details of the Specialist who undertook the work is noted in Table 10.

TABLE 10: Details of Wetland Specialist

Name of specialist	Education qualifications	Field of expertise	Title of specialist report/ s as attached in Appendix D
Mr. Wayne Jackson	B.Sc. degree (Soil Science and Hydrology)	Soil surveying using the South African taxonomic classification system, soil sample analysis, fertilizer recommendations, wetland delineation and functionality assessments, rehabilitation strategies, land contamination assessments, water resources analyses, drainage designs, water reticulation systems (Bulk & infield), crop water demand assessments, Compliance Monitoring and Integrated Waste Management Plans	Wetland Functionality & River Health Assessment for the Smozomeni Road Upgrade Project Near Richmond in KwaZulu-Natal

A wetland and river health assessment of the proposed Smozomeni road upgrade project site was undertaken and a summary of the findings and mitigation recommendations of the specialist assessment are provided below.

The Present Ecological State of the three identified HGM units were assessed and the results are summarised as follows:

HGM 1: The channelled valley bottom unit had some gully erosion in the channel which affected the rating of the hydrology and geomorphology assessments. The vegetation has been changed predominantly to grazing and some areas of subsistence farming. This wetland unit has an overall PES score of C, and has been moderately modified. It is anticipated that by an upgrade in the culvert system at the road crossing, the change trajectory for hydrology would increase the conditions of the system. However the geomorphology and vegetation factors will deteriorate over time and the change trajectory for these components will decrease the wetland function. The overall combined change trajectory will remain the same.

HGM2: The Hillslope Seep connected to the HGM 1 Channel was a small wetland area, which remained mostly undisturbed with the edges being grazed and cropped. The dirt road crossing alters the hydrology and geomorphology slightly. It is anticipated that the change trajectory for all the assessment components of this wetland will decrease due to pressures being put on the system from the community.

HGM 3: The Unchannelled Valley Bottom system at the top of the reach has been largely disturbed by rural development. The edges are being encroached on heavily by housing, grazing and some subsistence

cropping. The road crossing affects the hydrology at the toe of this system by channelling it through culverts. It is anticipated that the change trajectory for this wetland unit will predominantly be a negative change due to the communities influence.

The EIS assessment was applied to the three HGM units described in previous sections in order to assess the levels of sensitivity and ecological importance of the wetland. The results of the assessment is shown in Table 11. The wetlands in the area are considered to have a high ecological importance and sensitivity with a Class B importance, the hydrological importance is however a Class C with a moderate importance, and the direct human benefits have a low importance class of D.

TABLE 11: The EIS results for Smozomeni road upgrade

WETLAND IMPORTANCE AND SENSITIVITY		
<i>Smozomeni Wetlands</i>		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.3 (B)	3.3
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.5 (C)	3.0
DIRECT HUMAN BENEFITS	1.0 (D)	2.5

The impact assessment findings in relation to the proposed construction activities focussed on 1) Loss of natural resources; 2) Loss of habitat; and 3) Loss of ecological function/structure.

The Wetland Specialist for that the biggest impact would occur during the construction phase with medium impacts predicted. However if the proposed mitigation measures are followed, the impacts can all be prevented or reduced to low.

The Wetland and Riparian Assessment Report (Appendix 7) notes the key issues associated with road upgrade. These include:

- Site clearing, the removal of vegetation, soil compaction/disturbance - leads to increased runoff and erosion with increased sedimentation in river/wetland habitat;
- Contamination of soil and water resource during construction phase;
- Disturbing the sediments in the river during the construction process can have a negative impact on downstream aquatic ecosystems;
- Infestation of alien vegetation post construction;
- Increase traffic (causing contamination), improper design of stormwater discharge points at bridges and culvert design not allowing fish migrations.
- Impacts on the ecological function of the wetland and aquatic environment past construction.

In order to mitigate these impacts, the following recommendations are made:

- Soil erosion prevention measures should be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. The sites should be monitored weekly for any signs of off-site siltation. All areas impacted by earth-moving activities should be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. All exposed earth should be rehabilitated promptly with suitable vegetation to stabilize the soil;
- The areas surrounding watercourse crossings must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken;
- Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. It is important to note, that the use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into drainage lines, rivers, wetlands or the dams, to avoid any possible eutrophication impacts;

- Special care and erosion prevention measures must be taken when working in areas where naturally dispersive soils occur. Final designs must take into account specialised recommendations made by the geotechnical engineers for sensitive areas which may be naturally prone to soil erosion;
- The footprint area associated with the upgrade must be minimised, avoiding the riparian areas where possible. Areas earmarked for construction must be marked to ensure a controlled disturbance footprint area;
- The upgrade of the bridges must make use of the existing road as much as possible, before adjacent areas are considered for the widening of the road;
- The V-drain installation should take into account the scouring action of high flows, and gabion structures should be placed on both sides of the V-drain on the river bank both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the V-drain aiding in the protection of the structure;
- It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;
- The contractors used for the road upgrade should have spill kits available to ensure that any fuel or oil spills are cleaned-up and discarded correctly;
- It is also deemed important that any river reach located in close proximity (approx. 50m) to the road be demarcated as sensitive areas, and no construction activity, lay-down yards, camps or dumping of construction material are to be permitted within the sensitive zones;
- Contamination of the river system with unset cement or cement powder should be negated as it is detrimental to aquatic biota. Pre-cast bridges should be made use of to avoid the mixing of these materials on site, reducing the likelihood of cement in the river system;
- Focus should be placed on monitoring species with specific habitat preferences, this includes macroinvertebrate taxa from the Ephemeroptera, Plecoptera and Trichoptera family groups;
- This should be catered for with adequate hardened surface stormwater drainage depressions and channels that channel these flows into the river in a controlled manner
- It is recommended that the formalised V-drain construction/installation take into account fish migration and allow for the movement of fish, particularly for the smaller Barb species. This can be achieved by placing the V-drain low in the river bed to allow the lowest of low flows to flow through the structure without the presence of any drops offs at the downstream side of the structure.
- All disturbed soils must be rehabilitated with local plant species to ensure that alien vegetation does not invade the area.
- A wetland rehabilitation assessment is recommended post construction monthly as to assess the rehabilitation of the area;
- An aquatic monitoring survey needs to be conducted after the construction activities so that impacts can be assessed and adaptive management practices implemented if necessary. A number of sensitive aquatic biota should be specifically monitored to identify fluctuation in abundances and diversity, including fish and macroinvertebrates. The frequency of the monitoring programme should be as follows;
- Shortly after construction of the bridge; and,
- Bi-annually for at least one year after the first monitoring survey.

12 IMPACT ASSESSMENT AND MITIGATION MEASURES

12.1 IMPACT ASSESSMENT METHODOLOGY

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

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

In terms of these Regulations, the following should be considered when undertaking an Impact Assessment:

A description and assessment of the significance of any environmental impact including:

- Cumulative impacts that may occur as a result of the undertaking of the activity during the project life cycle;
- Nature of the impact;
- Extent and duration of the impact;
- The probability of the impact occurring;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and,
- The degree to which the impact can be mitigated.

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

The interpretation of the overall significance of impacts is presented in Table 12.

TABLE 12: Interpretation of the significance scoring of a negative impact / effect.

Scoring value	Significance
>35	High - The impact is total / consuming / eliminating - In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. Mitigation may not be possible / practical. <u>Consider a potential fatal flaw in the project.</u>
25 - 35	High - The impact is profound - In the case of adverse impacts, there are few opportunities for mitigation that could offset the impact, or mitigation has a limited effect on the impact. Social, cultural and economic activities of communities are disrupted to such an extent that their operation is severely impeded. Mitigation may not be possible / practical. <u>Consider a potential fatal flaw in the project.</u>
20 – 25	Medium - The impact is considerable / substantial - The impact is of great importance. Failure to mitigate with the objective of reducing the impact to acceptable levels could render the entire project option or entire project proposal unacceptable. <u>Mitigation is therefore essential.</u>
7 – 20	Medium - The impact is material / important to investigate - The impact is of importance and is therefore considered to have a substantial impact. <u>Mitigation is required to reduce the negative impacts and such impacts need to be evaluated carefully.</u>

Scoring value	Significance
4 – 7	Low - The impact is marginal / slight / minor - The impact is of little importance, but may require limited mitigation; or it may be rendered acceptable in light of proposed mitigation.
0 – 4	Low - The impact is unimportant / inconsequential / indiscernible – no mitigation required, or it may be rendered acceptable in light of proposed mitigation.

The significance rating of each identified impact / effect was further reviewed by the Environmental Assessment Practitioner (EAP) by applying professional judgement.

For the purpose of this assessment, the impact significance for each identified impact was evaluated according to the following key criteria outlined in the sub-sections below.

NATURE OF IMPACT

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

SPATIAL EXTENT

This addresses the physical and spatial scale of the impact. A series of standard terms and ratings used in this assessment relating to the spatial extent of an impact / effect are outlined in Table 13.

TABLE 13: Rating scale for the assessment of the spatial extent of a predicted effect / impact

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

SEVERITY / INTENSITY / MAGNITUDE

This provides a qualitative assessment of the severity of a predicted impact / effect. A series of standard terms and ratings used in this assessment which relate to the magnitude of an impact / effect are outlined in Table 14.

TABLE 14: Rating scale for the assessment of the severity / magnitude of a predicted effect / impact¹

RATING	MAGNITUDE DESCRIPTOR
7	Total / consuming / eliminating - Function or process of the affected environment is altered to the extent that it is permanently changed.
6	Profound / considerable / substantial - Function or process of the affected environment is altered to the extent where it is permanently modified to a sub-optimal state.
5	Material / important - The affected environment is altered, but function and process continue, albeit in a modified way.
4	Discernible / noticeable - Function or process of the affected environment is altered to the extent where it is temporarily altered, be it in a positive or negative manner.
3	Marginal / slight / minor - The affected environment is altered, but natural function and process continue.
2	Unimportant / inconsequential / indiscernible - The impact temporarily alters the affected environment in such a way that the natural processes or functions are negligibly affected.
1	No effect / not applicable

DURATION

This describes the predicted lifetime / temporal scale of the predicted impact. A series of standard terms and ratings used in this assessment are included in Table 15.

TABLE 15: Rating scale for the assessment of the temporal scale of a predicted effect / impact.

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

IRREPLACEABLE LOSS OF RESOURCES

Environmental resources cannot always be replaced; once destroyed, some may be lost forever. It may be possible to replace, compensate for or reconstruct a lost resource in some cases, but substitutions are rarely ideal. The loss of a resource may become more serious later, and the assessment must take this into account. A series of standard terms and ratings used in this assessment are included in Table 16.

TABLE 16: Rating scale for the assessment of loss of resources due to a predicted effect / impact.

RATING	RESOURCE LOSS DESCRIPTOR
7	Permanent – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, <u>or by artificial means.</u>
5	Long term – The loss of a non-renewable / threatened resource which cannot be renewed / recovered with, or through, natural process in a time span of over 15 years, <u>but can be mitigated by other means.</u>

¹ **Source:** adapted from Glasson J, Therivel R & Chadwick A. Introduction to Environmental Impact Assessment, 2nd Edition. 1999. pp 258. Spoon Press, United Kingdom.

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

REVERSIBILITY / POTENTIAL FOR REHABILITATION

The distinction between reversible and irreversible impacts is a very important one and the irreversible impacts not susceptible to mitigation can constitute significant impacts in an EIA (Glasson et al, 1999). The potential for rehabilitation is the major determinant factor when considering the temporal scale of most predicted impacts. A series of standard terms and ratings used in this assessment are included in Table 17.

TABLE 17: Rating scale for the assessment of reversibility of a predicted effect / impact.

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

PROBABILITY

The assessment of the probability / likelihood of an impact / effect has been undertaken in accordance with ratings and descriptors provided in Table 18.

TABLE 18: Rating scale for the assessment of the probability of a predicted effect / impact²

RATING	PROBABILITY DESCRIPTOR
1.0	Absolute certainty / will occur
0.9	Near certainty / very high probability
0.7 – 0.8	High probability / to be expected
0.4 - 0.6	Medium probability / strongly anticipated
0.3	Low probability / anticipated
0.2	Possibility
0.0 - 0.1	Remote possibility / unlikely

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

12.2 MITIGATION

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

13 IMPACTS IDENTIFIED

As discussed in Section 8, the preferred site alternative is the footprint of the existing road. No other site alternative exists which can satisfy the need and desirability of the Application.

The preferred technology alternative is to maximise the use of labour to enhance the positive impact on job opportunities created and the stimulation of the local economy. No other practical technology alternatives exists that would meet the need and desirability of this Application and the job creation imperatives of the MIG funders for this Municipal project.

The No-go Alternative is to not undertake the road upgrade. The no-go alternative is not a feasible alternative in the short term (failure to meet municipal planning and service delivery imperatives) or the medium and long term (neglect of an infrastructural asset).

The impacts identified for the proposed road upgrade project, and the associated mitigation measures, are provided in Table 19.

TABLE 19: Construction Phase Impacts identified and associated mitigation measures

Impact	Description	Mitigation
Soil	<ul style="list-style-type: none"> • Potential disturbances include compaction, physical removal and potential pollution; • The exposed soil surfaces have the potential to erode easily if left uncovered which could lead to the loss of vegetation. • Potential loss of stockpiled topsoil and other materials if not protected properly; • Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding watercourses; • River bank instability alongside watercourses; • Increased erosion could result in increased sedimentation which could impact on ecological processes; • The additional hardened surfaces created during construction could increase the amount of stormwater runoff, which has the potential to cause erosion; • Physical disturbance of the soil and plant removal may result in soil erosion/loss; and • Erosion and potential soil loss from cut and fill activities and areas where naturally dispersive soils occur. 	<ul style="list-style-type: none"> • Soil erosion prevention measures should be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. The sites should be monitored weekly for any signs of off-site siltation. All areas impacted by earth-moving activities should be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. All exposed earth should be rehabilitated promptly with suitable vegetation to stabilize the soil; • The areas surrounding watercourse crossings must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. It is important to note, that the use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into drainage lines, rivers and wetlands, to avoid any possible eutrophication impacts. • Special care and erosion prevention measures must be taken when working in areas where naturally dispersive soils occur. Final designs must take into account specialised recommendations made by the geotechnical engineers for sensitive areas which may be naturally prone to soil erosion.
Vegetation and fauna	<ul style="list-style-type: none"> • Disturbance of the site may lead to encroachment of alien plant species on-site and to the surrounding areas; • Increase in alien invasive species, therefore a possible loss in biodiversity; • Potential off-site pollution as a result of accidental spillages of petrochemicals or bituminous substances; • Potential loss of important / protected floral species; and, • Unnecessary loss of vegetation and trees as a result of unregulated vegetation clearance. 	<ul style="list-style-type: none"> • Identify and demarcate sensitive fauna and flora prior to construction works commencing. This is to be undertaken by a suitably qualified environmental / biodiversity specialist/s who must be required to identify any features which require permit applications prior to their removal / destruction. Any required permits must be obtained prior to the feature being removed or destroyed; • Site personnel must undergo Environmental Training and be educated on keeping any vegetation disturbance to a minimum; • Poaching or harvesting of indigenous flora / fauna must be strictly forbidden; • Alien plant encroachment must be monitored and prevented as outlined in the EMPr; • All exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. Necessary rehabilitation measures (e.g. burning,

Impact	Description	Mitigation
		<p>seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation;</p> <ul style="list-style-type: none"> • No hunting is permitted on-site or the surrounding areas; • No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area. All construction personnel on the property should be informed of this ruling; and, • Any construction personnel found to be poaching in the area should be subjected to a disciplinary hearing.
Air quality and noise pollution	<ul style="list-style-type: none"> • Potential dust generation from soil stripping, vehicle traffic on access roads and motor vehicle fumes will have an impact on air quality; • Potential increase in noise from the operation of machinery and equipment, as well as the construction vehicle traffic; and, • Dust and noise will be created during the Construction Phase, which may impact on the local community. 	<ul style="list-style-type: none"> • All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum, as per the requirements of the EMPr; • Road dampening or alternative dust suppression measures must be undertaken to prevent excess dust during construction. • Operational Hours: No works must be executed between sunset and sunrise and on the non-working and special non-working days as stated in the Contract Data unless otherwise agreed between the Engineer and Contractor; and, • Construction personnel must be made aware of the need to prevent unnecessary noise such as hooting and shouting.
Traffic	<ul style="list-style-type: none"> • Increase in construction vehicles in the area; • Possible lane closures, traffic delays and congestion during the construction phase; • Slow-moving construction vehicles on the surrounding roads may cause accidents; and • If not properly maintained, increased road use to existing surrounding road infrastructure, for access purposes by construction personnel, may cause damage to the existing infrastructure and private access roads. 	<ul style="list-style-type: none"> • Appropriate temporary traffic control (e.g. 'stop-go' operation) and warning signage must be erected and implemented on all affected roads in the vicinity of the construction zones; • Construction workers / construction vehicles must take heed of normal road safety regulations, thus all personnel must obey and respect the law of the road. A courteous and respectful driving manner must be enforced and maintained so as not to cause harm to any individual; • Any damage cause to surrounding roads as a result of construction activities must be repaired as soon as possible to prevent further deterioration to the private or public road network; and, • Construction vehicles and plant must not be permitted outside of the demarcated construction working zone unless it is on a public road. The

Impact	Description	Mitigation
		<p>use of private access roads must be strictly forbidden unless a prior agreement has been entered into with the affected landowner.</p>
<p>Waste</p>	<ul style="list-style-type: none"> • There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil / cement, bitumen spills, litter from personnel on-site, sewage from portable ablutions etc.); and • Waste generation could be in the form of the following: <ul style="list-style-type: none"> - Solid waste - plastics, metal, wood, concrete, stone, asphalt; - Chemical waste- petrochemicals, resins and paints; and - Sewage as may be generated by employees. 	<ul style="list-style-type: none"> • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; • All solid wastes must be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers must be supplied at site camps and the work front to control solid waste on-site; • It should be ensured that existing waste disposal facilities in the Richmond area are able to accommodate the increased waste generated from the proposed construction; • Chemical waste must be stored in appropriate containers and disposed of at a licensed disposal facility by a licensed service provider; • Portable sanitation facilities must be erected for construction personnel. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation). These facilities must also be monitored and serviced regularly so as to prevent contamination of the water resources. A minimum of one toilet for every 20 site staff must be maintained. These facilities must be located no further than 100m from the work front. • The construction site should be inspected for litter on a daily basis. Extra care should be taken on windy days. Precautions must be taken to avoid litter from entering watercourses; • Soil that is contaminated with, e.g. cement, petrochemicals or paint, must be disposed of at a registered waste disposal site by a licence service provider and is NOT to be disposed of in watercourses; • It must be ensured that all hazardous contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination). Hazardous substance storage must not take place within 100m of a wetland or within the 1:100 year floodline of a watercourse; and, • Any significant spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation / EDTEA / Municipality etc.) and must be remediated as per the requirements of the EMP.

Impact	Description	Mitigation
Social and Socio-Economic	<ul style="list-style-type: none"> • Creation of job opportunities for skilled personnel (e.g. engineers, specialists etc.) and non-skilled personnel (e.g. labourers); • Skills development of the local community through employment opportunities; • Social anxiety may arise should the surrounding community not be adequately notified of the proposed activity; • Possible economic benefits to suppliers of building materials in Richmond as goods and services may be purchased from these entities during the construction phase; and, • Social impacts arising from foreign workers entering the area. 	<ul style="list-style-type: none"> • Inform the surrounding communities and general public of the proposed activity as soon as possible. This will serve to ease potential social anxiety. Such notification can be conducted through the Public Participation Process and must be ongoing during the construction phase; • No private lands outside of the construction zone may be accessed without the permission of the landowner; • Local people must be employed where ever possible; • Materials for construction must be sourced from local suppliers wherever possible and feasible; and, • No staff accommodation must be provided on site or in the more rural areas immediately surrounding the project. Foreign site staff should preferably be housed in the Town of Richmond and transported to the work front on a daily basis.
Existing infrastructure / heritage resource disturbance	<ul style="list-style-type: none"> • If not properly designed, services such as telecommunication lines, pipelines, electrical and sewage services etc. could be damaged during construction activities; • Potential for grave disturbance during construction activities; • Potential for heritage resource disturbance / destruction during construction activities; and • Potential for damage to private property as a result of construction activities. 	<ul style="list-style-type: none"> • Prior to construction activities commencing the contractor and project manager must ensure that the adequate measures have been taken to identify underground / hidden services and potential features of heritage significance which could potentially be on / at the specific site. The construction and design requirements of the owners of any underground services must be adhered to at all times. Should any features of heritage of significance or graves be identified / uncovered during construction events then work in that area must cease immediately until an archaeologist has inspected the feature and is satisfied, or the necessary authorisations to continue with work have been obtained from AMAFA. • Notify IAPs as soon as possible of the commencement of construction in areas close to their services, such as SANRAL; DoT, Transnet, Eskom and Telkom; • No-go areas must be clearly demarcated, such as graves and other sensitive features, and must be afforded an appropriate no-go buffer to prevent disturbance; and • The recommendations of the Heritage Impact Assessment report and any comment received from AMAFA must be adhered to at all times (Appendix 7).
Site safety and security	<ul style="list-style-type: none"> • There is potential for construction labour to trespass onto neighbouring properties; and • Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users, landowners and local residents. 	<ul style="list-style-type: none"> • No construction staff must be permitted to trespass on private land. Any construction personnel found to be trespassing on private land must be immediately subjected to a disciplinary hearing; • Construction workers / construction vehicles must take heed of normal road safety regulations, thus all personnel must obey and respect the law

Impact	Description	Mitigation
		<p>of the road. A courteous and respectful driving manner must be enforced and maintained so as not to cause harm to any individual; and</p> <ul style="list-style-type: none"> • A safe designated speed limit must be set by the project managers to limit possible road strikes and accidents.
<p>Water Resources</p>	<ul style="list-style-type: none"> • Contamination of ground and surface water, and soil; • The watercourses within and surrounding the construction zone may be polluted due to accidental spillages of petrochemicals from vehicles and equipment, or concrete from the construction activities; • The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion and create turbidity in nearby watercourses; • Possible damage to the riparian surrounds; and • Risk of initiating erosion gullies which could spread into the floodplain. • Risk of eutrophication of watercourses through inappropriate / excess applications of fertiliser during rehabilitation. 	<ul style="list-style-type: none"> • Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development; • An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the Construction Phase. These must be maintained in a satisfactory condition and a minimum of 100m away from any water resources and outside of the 1:100 year floodline of a watercourse; • Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or water-proof drums, and must not be allowed to enter into the natural drainage systems / watercourse / wetlands; • The Construction Camp should be positioned on previously disturbed areas (if possible) and must be located outside of the 1:100 yr floodline of a watercourse and more than 100m away from any other water resource; • Soil erosion prevention measures must be implemented such as gabions, sand bags etc. whilst energy dissipaters must be constructed at any surface water outflow points. The site must be monitored by the Contractor weekly for any signs of off-site siltation. All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding; • Appropriate silt control mechanisms must be installed around all soil excavations to prevent silt from entering surrounding watercourses; • Should any excavations require dewatering, this is to occur through an adequately designed silt trap prior to discharge. All silt traps are to be regularly monitored and maintained to ensure efficient and effective use; • Special care must be taken in regard to the stability of the watercourse banks once the road has been upgraded. It is strongly recommended that the rehabilitation measures be undertaken with emphasis on the use of plants to protect disturbed watercourse banks. Hard structures such as gabions and mattresses should be avoided if possible since they may well lead to bank erosion in the long term;

Impact	Description	Mitigation
		<ul style="list-style-type: none"> • All recommendations noted in the Wetland and Riparian Assessment Report (Appendix 8) must be adhered to; and • At the end of the construction phase, the site must be fully re-vegetated to match as closely as possible the pre-construction condition.

14 IMPACT ASSESSMENT

Table 15 presents the impact assessment findings in relation to the proposed construction activities.

TABLE 20: Assessment of Impacts

	Nature of project impact	Spatial extent		Severity / intensity / magnitude		Duration		Resource loss	Reversibility		Probability		Significance without mitigation	Significance with mitigation
		Without	With	Without	With	Without	With		Without	With	Without	With		
CONSTRUCTION IMPACTS	Soil impacts	2	1	5	2	7	1	3	7	1	0.5	0.2	12.0	1.6
	Flora and fauna impacts	2	2	3	2	3	3	3	3	3	0.4	0.2	5.6	2.6
	Air quality and noise pollution impacts	2	2	3	2	1	1	1	1	1	0.8	0.4	8.0	3.6
	Traffic impacts	2	2	5	3	1	1	1	1	1	0.9	0.4	10.8	4.0
	Waste impacts	2	2	4	2	3	1	2	1	1	0.8	0.3	10.4	2.7
	Existing infrastructure and heritage resource disturbance	2	1	4	3	1	1	3	7	1	0.3	0.1	5.1	0.9
	Safety and security impacts	3	3	5	3	1	1	7	3	3	0.5	0.2	7.5	2.6
	Water resource impacts	2	1	4	2	1	1	2	1	1	0.5	0.2	5.5	1.6
	Average Negative Impacts												8.1	2.5
	Social and Socio-economic impacts	4	4	4	5	3	3	2	1	1	0.4	0.8	6.0	12.8
Average Positive Impacts												6.0	12.8	

14.1 SIGNIFICANCE

Based on the outcome of the significance scoring noted in Table 15, the overall significance of negative impacts without mitigation, is considered to be MEDIUM, with an average score of 8.1. With mitigation, the overall significance of negative impacts is reduced to LOW, with an average score of 2.5. Of the eight negative impacts identified, five impacts in the absence of mitigation measures were calculated to be of MEDIUM significance. All of these impacts are reduced to LOW significance when mitigation measures are factored into the assessment. As such, there is no significant reason why the Preferred Site Alternative and the Preferred Technology Alternative put forward in this application should not be adopted.

In the absence of impact enhancement measures, the positive social and socio-economic impacts of the road upgrade project were considered to be of LOW significance, with a score of 6.0. However, with impact enhancement measures the impact significance was improved to MEDIUM, with a score of 12.8 (due to anticipated increases in the magnitude and probability of the positive impact).

15 ENVIRONMENTAL IMPACT STATEMENT

Assuming all phases of the project adhere to the conditions stated in the EMPr (Appendix 6) it is believed that the negative impacts associated with the proposed construction will have no significant, adverse, long term environmental impact on the surrounding environment.

Positive impacts associated with construction include:

- Provision of improved road infrastructure;
- Employment opportunities and skills development; and,
- Stimulation of the local economy during the construction phase.

The need and desirability for this road upgrade has been clearly established.

It must be ensured that the construction phase, in no way, hampers the health of any of the ecological systems or items of heritage significance identified on and surrounding the site, and that post-construction rehabilitation leaves the surrounding environments in an as good, if not better, state.

On completion of construction activities for the project, the contractors must ensure that all construction related waste and hazardous materials are removed from the site and that rehabilitation of land is undertaken according to the requirements of the EMPr.

Any alien plant management programmes that are implemented during the construction phase must be maintained during the construction defects liability period. It is also critically important that the watercourses, wetlands and drainage lines are kept free of alien plant infestation.

16 RECOMMENDATIONS OF THE EAP

The proposed development should not result in impacts on the natural or social environment that are highly detrimental, nor result in undue risks to the natural environment if proper mitigation measures are implemented. The nature and types of negative impacts do not outweigh the potential benefits of this project, provided that the short term localised impacts of the construction phase are adequately mitigated. In this regard, an EMPr has been compiled and is attached to this report (see Appendix 6), this must be implemented by the Applicant, as well as his appointed Project managers and Contractors. It is recommended that external monthly EMPr monitoring takes place by an independent Environmental Control Officer (ECO) to ensure that the requirements of the EMPr are being correctly implemented, thus ensuring the protection of the surrounding environments during construction.

It is the recommendation of the EAP that the following management and mitigation measures be incorporated into any project approvals which may be issued:

- The recommendation noted in the **Heritage Impact Assessment** (Appendix 7) be adopted and followed by the contractor, these include *inter alia*:
 - The cemetery is to be demarcated as a ‘no-go’ area.

Additionally the following must be undertaken:

- Should any features of heritage significance / graves be identified during construction, the following procedure is to be followed:
 - Amafa should be contacted if any heritage objects are identified during earthmoving activities and all development should cease until further notice;
 - No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa;
 - No activities are allowed within 50m of a site which contains rock art;
 - No stone walling may be damaged without permission from the archaeologist and/or Amafa KZN.
 - Amafa should be contacted if any graves are identified during construction and the following procedure is to be followed:
 - Stop construction;
 - Report finding to local police station; and
 - Report to Amafa to investigate.
- All recommendations noted in the **Wetland and Riparian Assessment Report** (Appendix 8) be adopted and followed by the contractor, these include *inter alia*:
 - Soil erosion prevention measures should be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. The sites should be monitored weekly for any signs of off-site siltation. All areas impacted by earth-moving activities should be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. All exposed earth should be rehabilitated promptly with suitable vegetation to stabilize the soil;
 - The areas surrounding watercourse crossings must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken;
 - Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. It is important to note, that the use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into drainage lines, rivers, wetlands or the dams, to avoid any possible eutrophication impacts;
 - Special care and erosion prevention measures must be taken when working in areas where naturally dispersive soils occur. Final designs must take into account specialised recommendations made by the geotechnical engineers for sensitive areas which may be naturally prone to soil erosion;
 - The footprint area associated with the upgrade must be minimised, avoiding the riparian areas where possible. Areas earmarked for construction must be marked to ensure a controlled disturbance footprint area;
 - The upgrade of the bridges must make use of the existing road as much as possible, before adjacent areas are considered for the widening of the road;
 - The V-drain installation should take into account the scouring action of high flows, and gabion structures should be placed on both sides of the V-drain on the river bank both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the V-drain aiding in the protection of the structure;
 - It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;
 - The contractors used for the road upgrade should have spill kits available to ensure that any fuel or oil spills are cleaned-up and discarded correctly;
 - It is also deemed important that any river reach located in close proximity (approx. 50m) to the road be demarcated as sensitive areas, and no construction activity, lay-down yards, camps or dumping of construction material are to be permitted within the sensitive zones;

- Contamination of the river system with unset cement or cement powder should be negated as it is detrimental to aquatic biota. Pre-cast bridges should be made use of to avoid the mixing of these materials on site, reducing the likelihood of cement in the river system;
- Focus should be placed on monitoring species with specific habitat preferences, this includes macroinvertebrate taxa from the *Ephemeroptera*, *Plecoptera* and *Trichoptera* family groups;
- This should be catered for with adequate hardened surface stormwater drainage depressions and channels that channel these flows into the river in a controlled manner
- It is recommended that the formalised V-drain construction/installation take into account fish migration and allow for the movement of fish, particularly for the smaller Barb species. This can be achieved by placing the V-drain low in the river bed to allow the lowest of low flows to flow through the structure without the presence of any drops offs at the downstream side of the structure.
- All disturbed soils must be rehabilitated with local plant species to ensure that alien vegetation does not invade the area.
- A wetland rehabilitation assessment is recommended post construction monthly as to assess the rehabilitation of the area;
- An aquatic monitoring survey needs to be conducted after the construction activities so that impacts can be assessed and adaptive management practices implemented if necessary. A number of sensitive aquatic biota should be specifically monitored to identify fluctuation in abundances and diversity, including fish and macroinvertebrates. The frequency of the monitoring programme should be as follows;
- Shortly after construction of the bridge; and,
- Bi-annually for at least one year after the first monitoring survey.

Further, in terms of Environmental Monitoring, the following is recommended for the project:

- An independent ECO must audit the construction site during the Construction Phase on a monthly basis; and,
- The Project Manager must be responsible to ensure that Environmental Audit Reports are submitted to the EDTEA: Compliance and Monitoring Department for the duration of the construction and rehabilitation phases of the project.

All of the above recommendations have been incorporated into the EMPr where necessary (Appendix 6) which must be approved and implemented for the construction phase of the project.

Based on the above, it is the opinion of the EAP that the Application should be granted a positive decision on the Application for Environmental Authorisation for the proposed road upgrade project.

17 CONSTRUCTION TIMEFRAMES

Construction timeframes have not been confirmed as yet, however it is estimated that the proposed construction will take approximately 24-36 months to complete. Further, it is requested that the Environmental Authorisation, if issued by the Competent Authority, be granted with a validity period of five (5) years from the date of signature.

18 SUBMISSION AND CONSIDERATION OF DOCUMENTATION BY THE COMPETENT AUTHORITY

It is to be noted that in terms of Section 43(2) of the EIA Regulations (GN R. 982 of 2014), all State Departments that administer a law relating to a matter affecting the environment, specific to the Application, must submit comments within 30 days of the receipt of this report to the EAP. Should no comment be received within the 30 day commenting period, it will be assumed that the relevant State Department has no comment to provide.

All comments received in response to the Basic Assessment Report will be attached to, summarised and responded to in a comments and responses report, which will be included in the final submissions to the Competent Authority, (i.e. EDTEA) for consideration in terms of issuing a decision on the Application for Environmental Authorisation.

19 UNDERTAKING

Terratest (Pty) Ltd hereby confirms that the information provided in this report is correct at the time of compilation and was compiled with technical information provided by the Richmond Local Municipality.

Terratest (Pty) Ltd further confirms that all comments received from Stakeholders and IAPs have been included in this report where necessary. A record has been kept to-date, and will continue to be kept, of all comments. These will be consolidated and incorporated into all subsequent reports, either submitted for comment to IAPs, or to the EDTEA for consideration and decision-making.

The EAP has endeavoured to include all inputs and recommendations from the specialist reports into this document.

For Terratest (Pty) Ltd:

Warren Hale
Environmental Scientist

20 REFERENCES

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Richmond Local Municipality (2015). Richmond Municipality: Final Integrated Development Plan.

APPENDIX 1: Curriculum Vitae of the EAP

APPENDIX 2: Affected Property Details

APPENDIX 3: A3 Locality MAP & Pipeline Corridor Layout Plans

APPENDIX 4: Environmental Authorisation Application

APPENDIX 5: Engineering Drawings

APPENDIX 6: Environmental Management Programme (EMPr)

APPENDIX 7: Heritage Impact Assessment

APPENDIX 8: Wetland & Riparian Assessment Report

APPENDIX 9: IAP Register