

Basic Assessment Report

Upgrade of culverts and approximately 5.3km of gravel roads to blacktop
in the Peacevalley III area, Pietermaritzburg

Date: 07 December 2015

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Disclaimer

The information in this report is based on information supplied by the client, Henwood and Khumalo Consulting Engineers on behalf of the Msunduzi Local Municipality. All information is given in good faith, however, no physical testing or chemical analyses were performed by ECA Consulting during the course of this assessment.

Although every effort was made to request and obtain all pertinent information for this assessment ECA Consulting cannot be held accountable or accept responsibility for any discrepancies in this information or for the disclosure or review of information which has not been presented to the consultant. All reports presented to the consultant for review have been referenced.

As per the NEMA EIA regulations herewith the expertise of the EAP to carry out an environmental impact assessment;

ECA Consulting is an independent environmental consultancy that provides professional consulting expertise in accordance with legislative requirements and global environmental trends. ECA Consulting provides experienced handling and management of all aspects of Environmental Impact Assessments (EIAs), Basic Assessments (BAR), and Environmental Management Programmes (EMPr) in accordance with the National Environmental Management Act (107 of 1998). ECA Consulting also manages waste license applications as per the requirements of the National Environmental Management Waste Act (59 of 2008). With experience in over 50 to 80 EIAs and other environmental management areas, ECA Consulting offers a professional and timeous service in achieving environmental compliance and moving towards sustainable development.

ECA Consulting is headed by Leena Ackbar (Managing Director) and Manogrie Chetty (Operations Director). Leena Ackbar holds a Master of Science degree in Environmental Sciences with a focus on sustainable bioenergy crop cultivation in Angola. Leena is not only a qualified environmental scientist but is also suitably qualified environmental assessment practitioner. Manogrie Chetty (MSc in progress) is academically specialising in Environmental Impact Assessments in KZN. To date Leena and Manogrie has handled and project managed between 50 to 80 EIAs, BARs, EMPr, EMF/SEA, ECO sites, Water Use License Applications, etc. and other environmental management related areas. Leena has been the technical advisor and lead consultant on several complex projects including, strategic environmental work for the northern KZN region, mining EIAs, and management of ECOs on large construction sites. Leena and Manogrie have extensive environmental legal knowledge regarding not only the EIA process and requirements but also with regard to all other relevant environmental legislation at a national, provincial and local level and how these affect environmental management issues. Both Manage and Leena are registered with SACNASP as a Professional Natural Scientist.

Leena Ackbar has been trained by the Global Carbon Exchange on the Greenhouse Gas Protocol and has duly completed a number of carbon footprint assessments during her training. She has also set up the GHGEI collection for the King Shaka International Airport, Cargo Terminal for Dube Tradeport. ECA Consulting is an active member on the Durban Chamber of Commerce and Industry and has recently assisted the chamber in analysing and submitting comment on the National Treasury Discussion Paper on Carbon Taxation. Leena Ackbar is also an accredited Green Star SA Professional for New Buildings by the Green Building Council of South Africa.

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EXECUTIVE SUMMARY

Project Description

The applicant, Msunduzi Municipality, proposes to upgrade the existing Peacevalley III Roads from gravel to blacktop. This upgrade will also include the upgrade of the existing culverts. Eleven (11) of the existing culverts will be upgraded / replaced as part of this project. Please note that only the upgrade of the culverts trigger activities under the EIA Regulations that require a Basic Assessment process be undertaken, however details of the entire project will be presented to provide the reader with adequate information to be able to make an informed decision.

Alternatives

Three alternatives (including the no-go option) have been identified and will be assessed in detailed in the Basic Assessment Report (BAR):

Alternative S1&A1 (Preferred layout): Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using pre-cast concrete pipe culverts.

Alternative S1&A2 (Alternative layout): Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using concrete pipe culverts that will be cast on site.

No-go option: No upgrade of the culverts and existing road from gravel to blacktop and associated infrastructure in the Peacevalley III area, Pietermaritzburg.

Legislation and Guidelines considered

The following legislation and guidelines were considered in preparing this BAR as discussed in Section 6.0 of this report.

- National Environmental Management Act (Act 107 of 1998) (NEMA)
- National Environmental Management : Biodiversity Act (Act 10 of 2004)
- National Environmental Management Protected Areas Act (Act 57 of 2003)
- National Forest Act (Act 84 of 1998)
- National Heritage Resources Act (25 of 1999)
- Kwa-Zulu Natal Heritage Resources Act (Act 4 of 2008)
- Conservation of Agricultural Resources Act (Act 43 of 1983)
- Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)
- Paris Convention for the Protection of the World Cultural and Natural Heritage (1975)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- Bill of Rights (Chapter 2 (24) of the Constitution of the Republic of South Africa)
- National Water Act (Act 36 of 1998)
- National Water Resource Strategy (2013)
- National Environmental Management: Waste Management Act (Act 59 of 2008)
- Msunduzi Municipality Bylaws (Solid Waste)
- National Noise Control Regulations (1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989)
- Health and Safety Act (Act 85 of 1993)
- Hazardous Chemical Substance regulations 1995
- Construction Regulations (2003)
- National Environmental Management: Air Quality Act (Act 39 of 2004)
- NEMA Implementation Guidelines (GNR 603 of 2010)

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|--|---|
| • DEAT Guideline 5: Assessment of Alternatives | • National Environment Management Act: Environmental Impact Assessment (EIA) 2010 Regulations |
| • NEMA Public Participation Guideline | |
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EIA Process

The current proposal is undergoing a Basic Assessment (BA) process as per requirements of GNR 982, NEMA EIA Regulations (2014). The application is being assessed under the 2014 EIA Regulations.

Public Participation Process

A key part of the EIA process is public participation, whereby authorities, residents, neighbours and any organisation that may be interested in or affected by the proposed activity, are notified of the proposal so as to provide an opportunity for expression of comments/concerns throughout the EIA process. Public participation is a legislated requirement according to the EIA Regulations, 2014. As the independent Environmental Assessment Practitioner (EAP), ECA Consulting is required to involve the public in the following way:

- Provide written notice to adjacent occupiers of the site, the municipal ward councillor, ratepayers association, and any organ of state having jurisdiction in respect of any aspect of the activity;
- Place an advert in one local newspaper, and at least one provincial or national newspaper if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken;
- Fix a notice board (minimum size 60cm x 42cm) at a place conspicuous to the public at the boundary or on the fence of the site or any alternative site mentioned in the application.

Further to the public notification, the public may register as an I&AP to obtain further information and partake in the EIA process by way of comment.

Any comment / concern / query received from an I&AP and/or authority will be addressed and considered in the environmental assessment process.

Registered I&APs are entitled to comment in writing on all written submissions, including draft reports made to the competent authority (i.e. EDTEA) and to bring to the attention of the competent authority and EAP any issues which they believe may be of significance to the consideration of the application. These issues must be submitted within the timeframes approved or those as set by the competent authority.

I&APs are legally required to disclose any direct business, financial, personal or other interest which they may have in the approval or refusal of the application.

I&APs have 30 days to review this BAR and provide comment. The comment period commences on the 07 December 2015 and ends on 25 January 2016.

The public participation process followed to date and to be followed in the EIA phase is detailed in Section 7.0 of this report.

Specialist Studies

The following specialist studies will be undertaken and reviewed as part of the Scoping & EIA process:

- Ecological Assessment (Watercourse, Vegetation and Fauna)
- Heritage Assessment (Exemption Letter)
- Geotechnical Investigation
- Traffic Report
- Stormwater Management Plan

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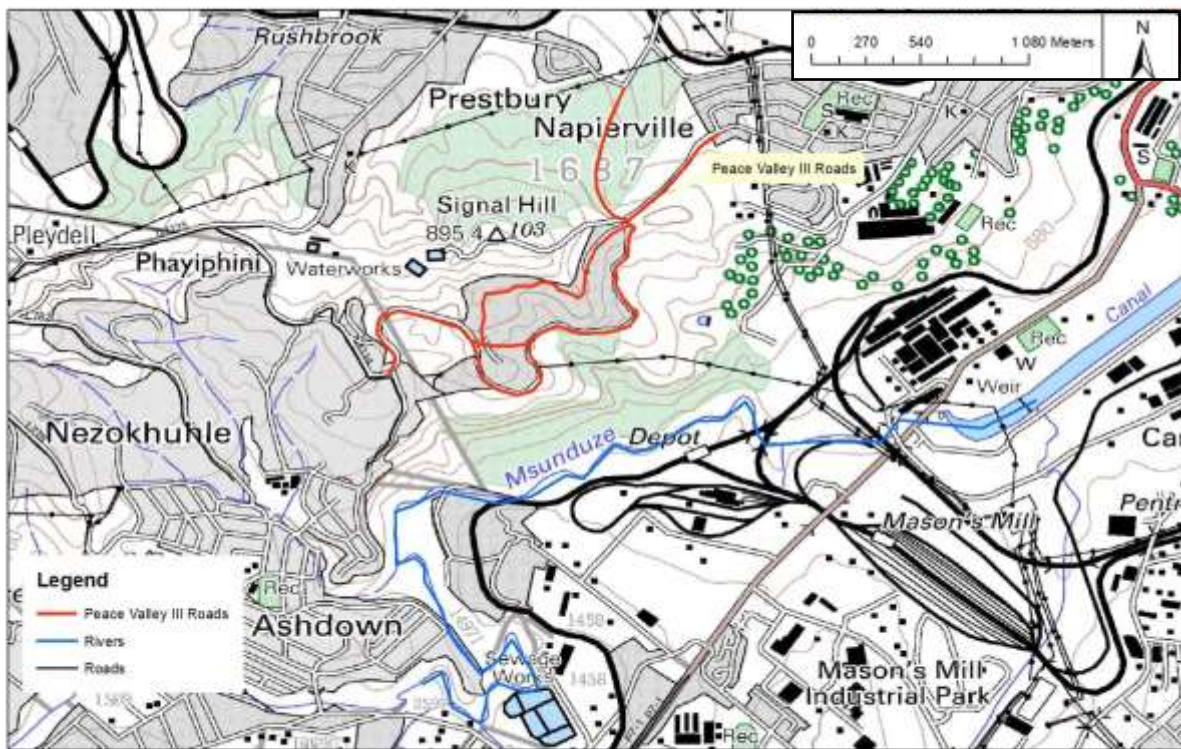
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1.0 Description of the Proposed Activity

1.1 Project Background

The applicant, Msunduzi Municipality, proposes to upgrade the existing Peacevalley III Roads (Figure 1) from gravel to blacktop. This upgrade will also include the upgrade of the existing culverts. Eleven (11) of the existing culverts will be upgraded / replaced as part of this project. Please note that only the upgrade of the culverts trigger activities under the EIA Regulations that require a Basic Assessment process be undertaken, however details of the entire project will be briefly discussed to provide the reader with adequate information to be able to make an informed decision. A 1:50 000 topographical map is attached as Appendix 3 to this report.



 ECA Consulting	Figure 1: Aerial map showing site in red (Source: Afzelia, 2015).		
Date: 25/08/2015	Peacevalley III Roads, Edendale, Pietermaritzburg	Version: 1.0	

The existing gravel road according to Henwood and Nxumalo (2015) is generally steep with the grade of up to 22%, which needs to be flattened down to 14%. The function of this road is to provide basic access to the informal settlement residents in the Peace Valley III area of Edendale and this road is only designed for a taxi route.

The Peace Valley III Road (as indicated in red in Figure 1) is 5.3km in length, and is an existing gravel road. The main road serves as a collector route for two residential streets and provides a link between Neville and Morcom Road. Once upgraded, this route is anticipated to attract increased volumes of traffic. A number of the residents living in this area have complained about poor accessibility and the increased levels of dust due to the road being gravel in nature. The applicant, Msunduzi Local Municipality, has therefore allocated funding for the improved alignment of Peace Valley III Road including the improvement of the associated storm water management system. (Henwood and Nxumalo, 2015).

1.2 Project Description¹

The road is situated within the Msunduzi Local Municipality which forms part of the uMgungundlovu District Municipality. The upgrade starts 800m away from the end of Neville Road at the gravel intersection, and run 5.3km to the next intersection where it intersects with L1114/Marcon Road. The Peacevalley III road is classified as a tertiary road and will be designed as such. The upgrade is designed as a collector road which has a 5m wide black top road, 1.5m walkway on one side of the road and associated cross drainage, lateral drainage and banks and gabions in steep sections. The road reserve will be 20m.

Mitre drains will be installed at regular intervals. Low level vented causeways will be used for crossings where the hydrology shows that water will accumulate, except existing box culverts all other cross drainage structures will be piped. Eleven (11) of the existing pipes and culverts will be repaired and /or replaced, thus constituting work within the watercourse, and it is estimated that this work will amount to more than 5m³.

The new culverts will be located as indicated in the Table 1, the diameter of each culvert is also provided together with the inlet and outlet invert levels. The layout and designs of the proposed culverts have been attached as Appendix 2.

PIPE No.:	Start (dd.mm.ss)	End (dd.mm.ss)	DIAMETER (mm)	INVERT LEVEL (m)	
				Inlet	Outlet
1	29°37'34,2814"S 30°20'09,849"E	29°37'34,6772"S 30°20'10,3126"E	750Ø	788.765	788.2
2	29°37'33,2199"S 30°20'11,5627"E	29°37'33,6329"S 30°20'12,0590"E	1200Ø	788	787.5
3	29°37'33,7223"S 30°20'16,7193"E	29°37'34,5148"S 30°20'16,4828"E	675Ø	786.567	785.9
4	29°37'34,9333"S 30°20'22,2690"E	29°37'36,4264"S 30°20'21,5914"E	1200Ø	776.25	772.38
5	29°37'40,5107"S 30°20'25,3304"E	29°37'40,5539"S 30°20'24,7469"E	600Ø	780.8	780.25
6	29°37'40,1094"S 30°20'32,2952"E	29°37'40,0037"S 30°20'34,0487"E	900Ø	762.5	761.35
7	29°37'37,7458"S 30°20'33,6967"E	29°37'38,1609"S 30°20'34,3886"E	1050Ø	767.3	766.7
8	29°37'35,3392"S 30°20'38,0808"E	29°37'36,2910"S 30°20'38,5164"E	1200Ø	755	754
9	29°37'36,0792"S 30°20'47,2396"E	29°37'36,9230"S 30°20'47,2986"E	675Ø	751.467	750.95
10	29°37'33,7422"S 30°20'50,6111"E	29°37'33,8618"S 30°20'51,5110"E	900Ø	751.743	751.3
11	29°37'18,5246"S 30°20'47,2736"E	29°37'17,1632"S 30°20'48,0674"E	1200Ø	797	793

Table 1: Location of Proposed Culverts

Please note that only the upgrade of the culverts will be assessed and discussed in detail in this Basic Assessment Report as work will take place within the watercourse which is anticipated to be more than 5m³. The upgrade of the existing road will not require environmental authorisation as this upgrade will be located outside of the watercourse.

The upgrade, may result in the relocation of Eskom poles and lines and water lines. Eskom and the water service provider (Umgeni Water) will be contacted for the relocation of these services where required.

¹ As provided by the engineer, Henwood and Khumalo, 2015.

Guardrails will be installed in areas where the fill will exceed 4m in height and at approaches to causeways. Speed limit and warning signs will be erected at relevant locations on the road. All pipe culverts and causeways will be marked with hazard markers as well the erection of sharp curve chevrons.

2.0 Description of the Need and Desirability of the Proposed Activity

The gravel road is generally steep and needs to be flattened down. The function of the road is to provide basic access to the informal settlement residents in the Peace Valley III area of Edendale. Peace Valley III is likely to attract high volumes of traffic in the near future and thus requires an upgrade. Several residents in the area have complained about poor accessibility and high levels of dust. The Municipality has therefore allocated funding for the improved alignment of Peace Valley III Road including the improvement of its storm water management.

The existing culverts need to be replaced as a number of the existing culverts are undersized and incorrectly placed, this can cause problems for water quality and aquatic organisms. Furthermore, poorly designed culverts can degrade water quality via scour and erosion and also restrict aquatic organisms from being able to move freely between upstream and downstream habitats. These structures are less likely to fail in medium to large scale rain events.

Due to the incorrect placement of some of the culverts, the natural disposition of stormwater flow may be impeded and debris may not be able to pass freely through the culvert resulting in plugging and often times complete destruction of the road prism.

3.0 Description of the Property on Which the Activity is to be Undertaken and the Location of the Activity on the Property

The Peacevalley III Road is an existing gravel road which is generally steep and surrounded by open space areas, forest areas and informal housing (Figures 2 and 3).



Figure 2: Photograph of informal housing units



Figure 3: Photograph of open space areas

The existing road is situated within the Edendale area of Pietermaritzburg with rural housing being the dominant land uses surrounding the road. A number of drainage lines were also noted on site. The GPS co-ordinates of the start point of the road are S29°37'43.8"; E30°20'10.74" and the end co-ordinates are S29°36'57.23"; E30°20'49.56". Figures 4, 5 and 6 show the location of the new road (in red) and culverts respectively. The topographical map has been attached as Appendix 3. The location of each culvert is provided in Table 1.

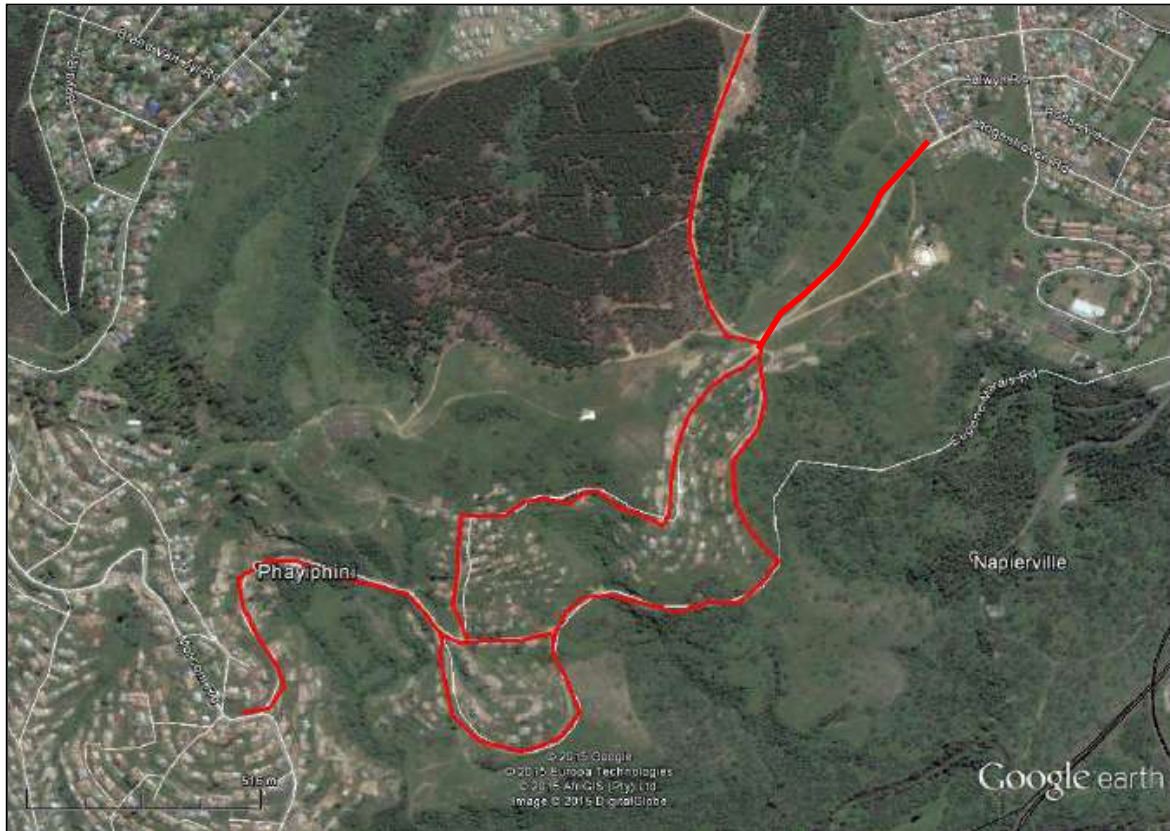


Figure 4: Aerial map showing location of the proposed upgrade in red (Source: Google Earth, 2015)



Figure 5: Aerial map showing location of the culverts 1 - 5 (Source: Google Earth, 2015)



Figure 6: Aerial map showing location of the culverts 6-11 (Source: Google Earth, 2015)

4.0 An Identification of All Legislation and Guidelines that Have Been Considered in the Preparation of the BAR

According to the National Environmental Management Act (NEMA) (Act 107 of 1998), EIA Regulations 2014, [GNR 983], the proposed development requires Environmental Authorisation via a BA process. The following activity applies to the upgrade of the culverts:

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;

(ii) the seashore; or

(iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater 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.

Activities 12 and 49 of GNR 983 were also considered as, this project will take place in a rural area and will occur within 32m of a watercourse, however as the road and culvert upgrade will be placed within an existing road, activities 12 and 49 will not be applicable.

Activity 18(Viii) of GNR 985 was considered as a portion of the existing road is located within a Critical Biodiversity Area 3. This activity refers to the widening of a road by more than 4m within a CBA area in KZN, this activity is not applicable as the widening of the road will be less than 4m in width.

It is important to note that notwithstanding the environmental authorisation, there is a number of additional legislation that governs the development. Of particular note is NEMA Section 28, Duty of Care, that places a duty on every person who causes, has caused or may cause significant pollution or degradation of the

environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

The following provides a description of the legislation, guidelines and regulations considered during the drafting of this report. This report is compiled in terms of the National Environmental Management Act (Act 107 of 2008): Environmental Impact Assessment (EIA) Regulations of 2014, promulgated on the 08 December 2014.

4.1 Environmental Resource Protection and Management

The environmental legislation allows for the effective protection of the environment. Development is considered to key to economic growth and has the potential to negatively impact the environment. The following is a list of legislation pertaining to Environmental Resource Protection and Management:

Table 2: Legislation Applicable to Environmental Resource Protection and Management

Applicable Legislation	Purpose and Applicability to Project
National Environmental Management Act (Act 107 of 1998) (NEMA)	<p>As stated in the act, it provides for co-operative environmental governance by establishing principles for decision- making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.</p> <p>The act further provides a framework for the protection and conservation of the environment.</p> <p><i>Applicability to project: The proposed project is located adjacent to and within watercourses and will require mitigation.</i></p>
National Environmental Management : Biodiversity Act (Act 10 of 2004)	<p>Purpose: "To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith."</p> <p><i>Applicability to Project: Aloe maculata was identified in the surrounding area and may not be removed</i></p>

	<i>without a permit from EKZN Wildlife.</i>
National Environmental Management Protected Areas Act (Act 57 of 2003)	<p>Purpose: “To provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.”</p> <p><i>Applicability to Project: Aloe maculata was identified in the surrounding area and may not be removed without a permit from EKZN Wildlife.</i></p>
National Forest Act (Act 84 of 1998)	<p>Purpose: “The purposes of this Act are to—</p> <ul style="list-style-type: none"> (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees; (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes; (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.” <p><i>Applicability to Project: Indigenous tree species were identified and the potential loss of such species has been assessed in this report.</i></p>
National Heritage Resources Act (25 of 1999)	<p>Purpose: “To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations; to lay down general principles for governing heritage resources management throughout the Republic; to introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa; to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management</p>

	<p>of heritage resources at national level; to set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance; to control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries; to enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; to provide for the protection and management of conservation-worthy places and areas by local authorities; and to provide for matters connected therewith.”</p> <p><i>Applicability to Project: A heritage specialist has been appointed to identify potential areas of heritage significance. There were no areas of heritage significance identified on site.</i></p>
Kwa-Zulu Natal Heritage Resources Act (Act 4 of 2008)	<p>Purpose: “To provide for the conservation, protection and administration of both the physical and the living or intangible heritage resources of the Province of KwaZulu-Natal; to establish a statutory Council to administer heritage conservation in the Province; to determine the objects, powers, duties and functions of the Council; to determine the manner in which the Council is to be managed, governed, staffed and financed; to establish Metro and District Heritage Forums to assist the Council in facilitating and ensuring the involvement of local communities in the administration and conservation of heritage in the Province; and to provide for matters connected therewith.”</p> <p><i>Applicability to Project: A heritage specialist has been appointed to identify potential areas of heritage significance. There were no areas of heritage significance identified on site.</i></p>
Conservation of Agricultural Resources Act (Act 43 of 1983)	<p>“To provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.”</p> <p><i>Applicability to Project: During both the construction and operational phase of this development provision</i></p>

	<i>has been made for the protection of watercourses and removal of declared weeds and alien invader plants. The culverts are located in an existing residential area, there are no agricultural areas on the proposed site.</i>
Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)	<p>“Requires developed country signatories to implement and/or further elaborate policies and measures in order to achieve quantified emission limitation and reduction commitments in order to promote sustainable development.”</p> <p><i>Applicability to Project: The development will use sustainable measures and resources where possible.</i></p>
Paris Convention for the Protection of the World Cultural and Natural Heritage (1975)	<p>This convention imposes an obligation on State Parties to ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory.</p> <p><i>Applicability to Project: A heritage impact assessment will be conducted to determine the occurrence of items of cultural and heritage significance. The assessment will be reviewed and assessed in this report.</i></p>
Convention on the Conservation of Migratory Species of Wild Animals(CMS)	<p>“As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.” “CMS acts as a framework Convention. The agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. The development of models tailored according to the conservation needs throughout the migratory range is a unique capacity to CMS.”</p> <p><i>Applicability to Project: Open space areas will be maintained to allow for migratory species. The culverts will be located on an existing road.</i></p>
Bill of Rights (Chapter 2 (24) of the Constitution of the Republic of South Africa)	<p>“Everyone has the right</p> <ol style="list-style-type: none"> to an environment that is not harmful to their health or well-being, and

	<p>b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that</p> <ul style="list-style-type: none"> i. prevent pollution and ecological degradation; ii. promote conservation, and iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.” <p><i>Applicability to Project: The aim of the project is to provide a safe access road to the residents of the Peacevalley III and surrounding residents.</i></p>
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4.2 Water Resource Protection

“Water is fundamental for all life. Without water no person, plant, animal or living organism can survive” (DWAF Guideline). South Africa is a dry country, with a low average rainfall. The rivers are small in comparison with other countries and a number of the larger rivers are shared with other countries. Many of South Africa’s existing water resources have been over-used or significantly altered. Every day people and organisations have an impact on the quality of South Africa’s rivers and streams, our groundwater, and wetlands (DWAF Guideline). The following is a list of legislation applicable to Water Resource Protection:

Table 3: Legislation Applicable to Water Resource Protection

Applicable Legislation	Purpose and Applicability to Project
National Water Act (Act 36 of 1998)	<p>Purpose: To ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account factors such as but not limited to facilitating social and economic development, protecting aquatic and associated ecosystems and their biological diversity, reducing and preventing pollution and degradation of water resources.</p> <p><i>Applicability to Project: The upgrade of the culverts will take place within the watercourse (drainage channels) and therefore requires a Water Use License.</i></p>
National Water Resource Strategy (2013)	<p>Purpose: The purpose of the second edition of the National Water Resource Strategy (NWRS) is to ensure that national water resources are managed towards achieving South Africa’s growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to 10 years.</p>

	<i>Applicability to Project: Water will be used during the construction phase from the municipal source. No abstraction of water will occur.</i>
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4.3 Waste Management

Waste will be produced during the construction and operation phases of this project. In South Africa, waste management is governed by the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and municipal by-laws. The following is a list of legislation applicable to Waste Management:

Table 4: Legislation Applicable to Waste Management

Applicable Legislation	Purpose and Applicability to Project
National Environmental Management: Waste Management Act (Act 59 of 2008)	<p>Purpose: “To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.”</p> <p><i>Applicability to Project: During the construction phase, the waste produced on site will be transported to the closest registered municipal landfill site.</i></p>
Msunduzi Municipality Bylaws (Solid Waste)	<p>Purpose: To ensure that waste management is undertaken by all persons within the local municipal area. The by-law specifies how different types of waste should be dealt with to prevent pollution and /or degradation of the environment.</p> <p><i>Applicability to Project: During the construction phase, the waste produced on site will be transported to the closest registered municipal landfill site.</i></p>

4.4 Noise Management

South Africa's primary law on noise or acoustics are the National Noise Control Regulations (1992) which form part of the Environmental Conservation Act. These regulations set out limitations to prevent noise pollution

that may result during the construction and operation phase of any development. The following is a list of legislation applicable to Noise Management:

Table 5: Legislation Applicable to Noise Management

Applicable Legislation	Purpose and Applicability to Project
National Noise Control Regulations (1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989)	<p>Purpose: These regulation set out general prohibitions and limitations for noise control.</p> <p><i>Applicability to Project: Noise generated during construction activities will be managed by the EMPr.</i></p>

4.5 Occupational Health and Safety

Health and safety is governed by the Occupational Health and Safety Act 1993. Construction workers must ensure compliance with the Act during the construction phase of the project to ensure safety of workers and surrounding community members. The following is a list of legislation applicable to Occupational Health and Safety:

Table 6: Legislation Applicable to Occupational Health and Safety

Applicable Legislation	Purpose and Applicability to Project
Health and Safety Act (Act 85 of 1993)	<p>Purpose: "To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; to provide for matters connected therewith."</p> <p><i>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</i></p>
Hazardous Chemical Substance regulations 1995	<p>Purpose: These regulations set out the requirements for storage and handling of hazardous chemical substances. In addition, it also provides guidelines for training of staff. Any hazardous chemical substances used in the construction phase pf this project must be identified, stored used and disposed of in accordance with this legislation.</p> <p><i>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</i></p>
Construction Regulations (2003)	<p>Purpose: These Regulations apply construction employees and provide guidelines for safe operation during construction.</p>

	<i>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</i>
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4.6 Air Quality Management

In terms of The National Environmental Management: Air Quality Act, the act binds South Africa to preventing pollution and to improving and maintaining air quality, not at the expense of socio-economic development but in a way that complements it. The proposed development is located in close proximity to an existing landfill site and as such this act has been considered in this report. The following is a list of legislation applicable to Air Quality Management:

Table 7: Legislation Applicable to Air Quality Management

Applicable Legislation	Purpose and Applicability to Project
National Environmental Management: Air Quality Act (Act 39 of 2004)	<p>Purpose: To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.</p> <p><i>Applicability to Project: The proposed upgrade may result in an increase in dust levels, however provided that the relevant mitigation measures are implemented, it is envisaged that the proposed impact can be mitigated.</i></p>

4.7 Guidelines

The following guidelines were reviewed and considered during the compilation of this report.

NEMA Implementation Guidelines (GNR 603 of 2010)

Purpose: The purpose/aim of this guideline is to provide a detailed consideration on the practical implementation of the EIA regulations. Specifically, the guideline provides clarity on the processes to be followed when applying for an environmental authorisation in terms of the EIA regulations and gives a comprehensive interpretation of the listed activities.

DEAT Guideline 5 (2006): Assessment of Alternatives and Impacts

Purpose: This guideline provides a basic guide to the assessment of alternatives and impacts which are key components of an EIA process. The purpose of the document is to create a common understanding amongst the different role-players what is required in the assessment of alternatives and impacts and alternatives.

NEMA Public Participation Guideline (2012)

Purpose: This guideline provides guidance on the procedures and the provisions of the public participation process in terms of NEMA and the associated EIA Regulations.

Western Cape DEA &DP (2010), Guideline on Alternatives.

Purpose: To provide guidance on the identification and assessment of alternatives.

4.7.1 Environmental Impact Assessment Regulations

The NEMA 2014 EIA Regulations are applicable to this project. The purpose of the EIA Regulations is to ensure that the impacts of activities for which environmental authorisations are necessary are adequately assessed to enhance the positive environmental impacts, and to ensure that activities which may have an unacceptable, negative effect on the environment are not authorised. Furthermore the regulations are there to ensure that those activities which are suitable for authorisation are approved, with conditions to avoid or mitigate possible detrimental effects.

The 2014 Environmental Impact Assessment (EIA) Regulations (Government Notice (GNR) 982) was promulgated in terms of Section 24(5) of NEMA. The regulations are divided into four listing notices, GNR 983, GNR 984, GNR 985 and GNR 986.

GNR983 defines activities which will trigger a Basic Assessment (BA) process and GNR 984 defines activities which trigger an Environmental Impact Assessment (EIA) process. Should activities from both listing notices be triggered, then an EIA process must be followed. GNR 985 defines certain geographically based listed activities per province for which a BA process must be undertaken. GNR 986 has not yet been promulgated.

Listed activities from these Regulations which will be triggered as part of the proposed project are provided in the table below.

Table 8: List of Applicable Activities as per the 2014 NEMA EIA Regulations

Listing Notice and Activity Number	Activity Description	Applicability to Project
GNR 983; Activity 19	<p><i>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></p> <p><i>(i) a watercourse;</i></p> <p><i>(ii) the seashore; or</i></p> <p><i>(iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving-</i></p> <p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or</i></p> <p><i>(c) falls within the ambit of activity 21 in</i></p>	<p>Eleven of the culverts will be repaired and/or replaced. The work will be undertaken within the watercourse and is anticipated to be more than 5m³.</p>

	<i>this Notice, in which case that activity applies.</i>	
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5.0 A Description of the Environment that may be Affected by the Activity and the Manner in which the Activity may be Affected by the Environment

5.1 Physical

Approximately 30% of the municipal area consists of topography having a gradient steeper than 1 metre in 3 metres (1:3) with more than half of this steep topography is located in the western quadrant of the municipal area particularly within the boundaries of the Greater Edendale-Imbali ABM and the Vulindlela ABM (Msunduzi SDF, 2015). The soils found in most parts of the Msunduzi region have a high clay content and are considered to be generally (Msunduzi SDF, 2015).

The entire site is underlain by massive to laminated carbonaceous siltstone and shale bedrock of the Pietermaritzburg Formation (Map Reference 2930 CB, Pietermaritzburg). Post Karoo dolerite intrusions have intruded the Pietermaritzburg Formation in places and during the invasive geotechnical investigation, wearing course gravel, colluvial, residual dolerite, residual shale and shale bedrock materials were encountered at various trial pit positions excavated along the centreline of the proposed roads (Terratest, 2015).

The general site area is generally steep, the vertical alignment of the existing roads vary as the site is considered to be mountainous (Terratest, 2015). There are a number of drainage lines that cross the existing roads.

Groundwater seepage was encountered along the main route (Terratest, 2015). No hydric soils were identified in any of the soil samples taken along the routes with the exception of samples taken in drainage channels (Afzelia, 2015).

There are a number of drainage lines present on site and these are discussed in more detail in section 5.2.3.

Potential Environmental Impact: *Potential instability of the upgraded culverts. Improper storm-water management – increase in surface run-off resulting in soil erosion. Potential contamination of groundwater.*

5.2 Biological (Afzelia, 2015)

5.2.1 Vegetation

Afzelia Environmental Consultants were appointed to undertake an ecological assessment for the proposed project, the following is a summary of their findings with respect to vegetation and the complete report is attached as Appendix 7.

The vegetation on site consists of grassland classified as Moist Coast Hinterland Grassland. This vegetation type consists of rolling and hilly landscapes dominated by dense tall sour grassland that consists mainly of Ngongoni grass (*Aristida junciformis*). This vegetation on site was not found to be in a poor condition and consisted of low species diversity.

The project area was found to be highly transformed and degraded due to surrounding human activities and can thus be classified as highly disturbed grassland. One of the areas (along the western boundary) within the site was found to consist of natural vegetation and was identified as good quality grassland, with some scattered trees, namely *Acacia sieberiana* var. (Paperbark Acacia). The vegetation type still resembles the baseline vegetation of the area.

The following species were identified on site: *Aristida junciformis* (Gongoni three-awn), *Cymbopogon validus* (Giant turpentine grass), *Sporobolus fimbriatus* (Dropseed grass) and *Eragrostis plana* (Tough love grass). The site was dominated by *Albizia adianthifolia* var. *adianthifolia* (Flatcrown). The following alien species were

identified on site: *Lantana camara* (Common Lantana), *Melia azedarach* (Syringa), *Ricinus communis* var. *communis* (Castor-oil plant), *Solanum mauritianum* (Bugweed) and *Jacaranda mimosifolia* (Jacaranda). The north to north west of the development area is classified as a Biodiversity Priority Area 33 (Figure 7).

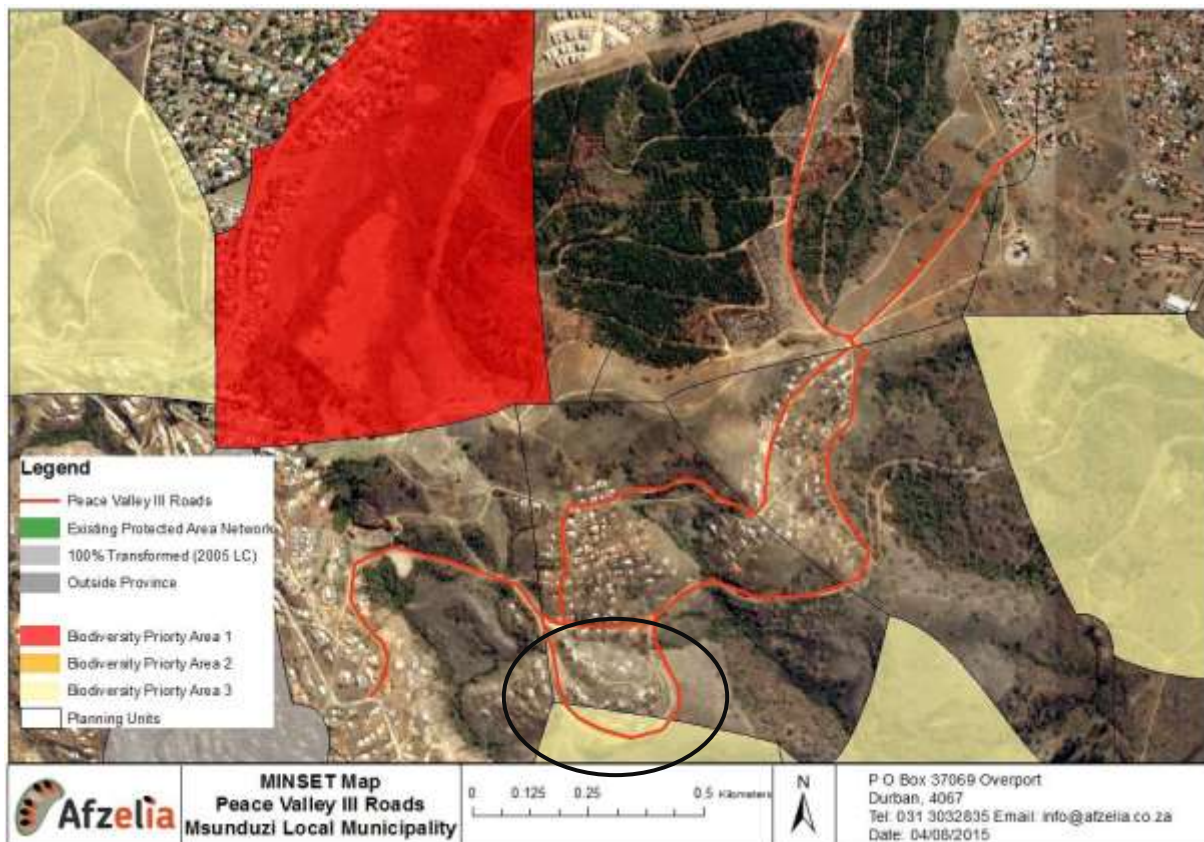


Figure 7: Aerial map showing location of the proposed upgrade in red in relation to the CBA areas (Source: Afzelia, 2015)

Aloe maculata was evident along the proposed road upgrade and within the transformed road reserves and surrounding project area (Figure 8). Permits from Ezemvelo KwaZulu-Natal Wildlife (EKZNW) will be required for the relocation of this species if this plant needs to be relocated. No threatened plant species have been recorded within the site.

Potential Environmental Impact: *Potential damage to or loss of indigenous vegetation species. Potential loss of habitat / ecosystems.*



Figure 8: Photograph of *Aloe maculata* identified on site

5.2.2 Fauna

The site is highly degraded and as such there was little evidence of mammalian activity. Most of the species likely to occur in this area dominated by rural homesteads are known as urban exploiters and include feral cats, feral dogs and house rats as well as livestock associated with human dwellings. This was supported by the presence of numerous goats, pigs and domestic dogs along the proposed route.

A troop of Vervet monkeys (*Cercopithecus aethiops*) was also observed foraging within the drainage line on the eastern boundary of the proposed development. Footprints and droppings of a mongoose (*Galerella sanguinea*) were observed near the drainage line. Both species have adapted to human dominated environments due to their generalist diet and habitat requirements. No endangered mammals were recorded within the study area.

Eighteen (18) bird species were recorded during the site visit by visual sightings and associated calls (Table 9). The species recorded are considered to be common, widespread and associated with degraded grassland/thornveld habitats.

Table 9: Bird Species Recorded During the Ecological Survey (Afzelia, 2015)

Common name	Scientific name
Common Myna	<i>Acridothermes tristis</i>
House Sparrow	<i>Passer domesticus</i>
Egyptian Goose	<i>Alopochen aegyptiaca</i>
Pied Crow	<i>Corvus albus</i>
Fork-Tailed Drongo	<i>Dicrurus ludwigii</i>
Hadedah Ibis	<i>Bostrychia hagedash</i>
Red-Eyed Dove	<i>Streptopelia semitorquata</i>
Laughing Dove	<i>Streptopelia senegalensis</i>
Speckled Mousebird	<i>Colius striatus</i>
Dark-capped (Black-eyed) Bulbul	<i>Pycnonotus barbatus</i>
Common Waxbill	<i>Estrilda astrild</i>
Black Collared Barbet	<i>Lybius torquatus</i>
Bronze Manikin	<i>Spermestes cucullatus</i>
Tawny-Flanked Prinia	<i>Prinia subflava</i>
Southern Fiscal	<i>Lanius collaris</i>
African Dusky Flycatcher	<i>Muscicapa adusta</i>
Red-Winged Starling	<i>Onychognathus morio</i>
Cape Wagtail	<i>Motacilla capensis</i>

Two reptile species were recorded during the survey, namely a Spotted Bush Snake (*Philothamnus semivariegatus*) and Variable Skink (*Trachylepis Mabuya varia*). No amphibian species were recorded during the brief field survey.

Potential Environmental Impact: *Potential loss of faunal species.*

5.2.3 Watercourses

No hydric soils were identified within 500m of the proposed development site. A number of drainage channels were identified intersecting the existing road. The channels identified on site can be classified as “B” section channels and are associated with the riparian zones (Figure 9).

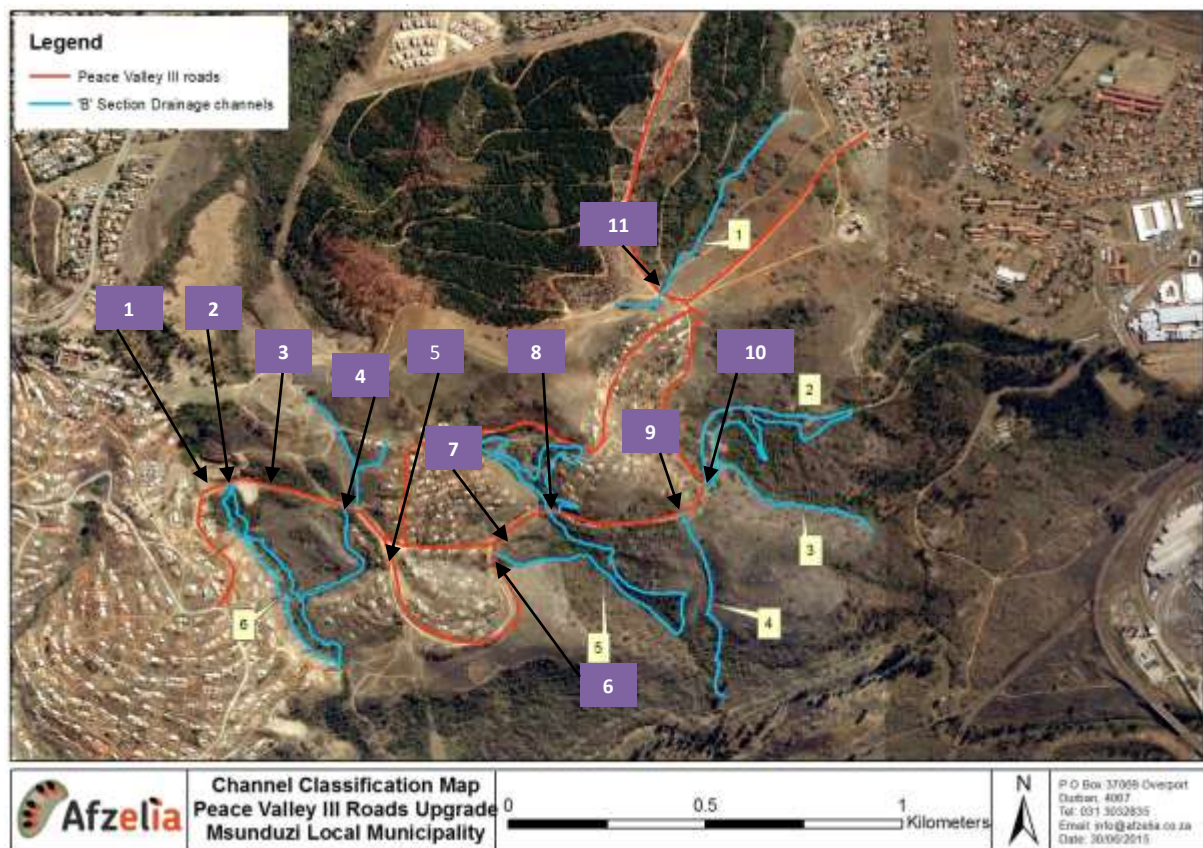


Figure 9: Aerial map showing location of the culverts (in purple) in relation to the drainage channels (Source: Afzelia, 2015)

The riparian zones (1,2,4 and 5) associated with the 'B' Section channels have been classified as (Class E) extensive loss of natural habitat, biota and basic ecosystems has occurred. The riparian zone associated with drainage channel 3 has been classified as Class F where modifications have reached a critical level with an almost complete loss of natural habitat and biota.

Potential Environmental Impact: *Potential destruction to drainage channels resulting in further degradation. Potential loss of indigenous species associated with the drainage channels. Potential dumping of litter in the drainage channels.*

5.3 Surrounding Land Use

The Peacevalley III Roads are existing gravel roads, surrounded mainly by rural homesteads and open space natural areas (Figure 10). The areas surrounding the road, has been selected for low cost housing development and is currently following the relevant EIA processes in a separate application.

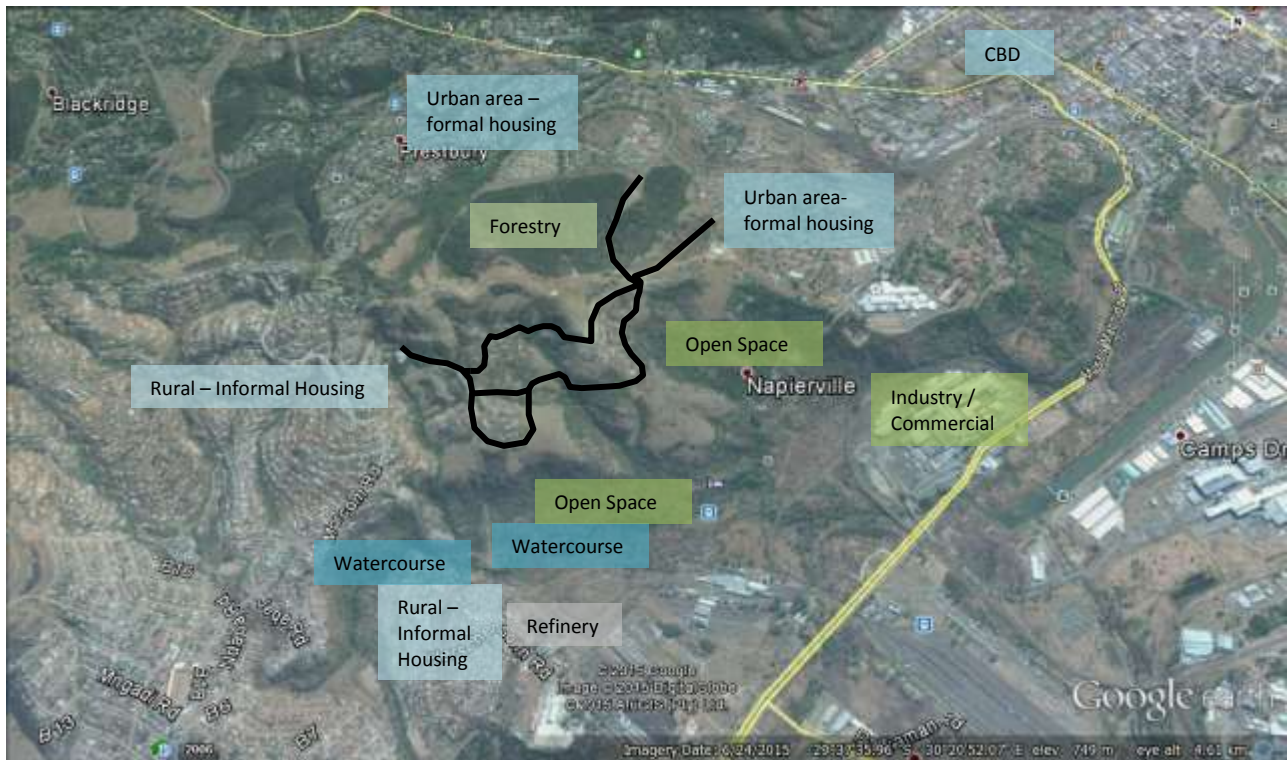


Figure 10: Aerial map showing location of the proposed upgrade in black in relation to surrounding areas (Source: Google Earth, 2015)

Potential Environmental Impact: *Potential positive impact – improvement in road quality. Potential negative health and safety impacts on surrounding community members due to construction activities. Potential increase in traffic.*

5.4 Infrastructure and Services

There are a number of services that may be affected by the upgrade. A number of existing culverts will be upgraded as part of this project (Figure 8). Eskom lines were evident alongside the road and underground services such as water pipes were also identified by the EAP (Figure 11).

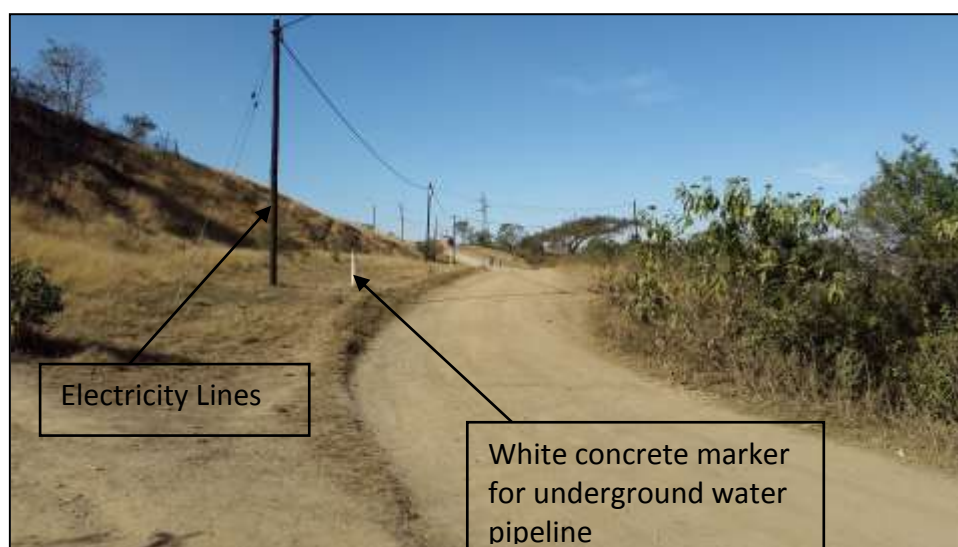


Figure 11: Photograph showing location of water line and electricity lines

Potential Environmental Impact: *Potential damage to existing services*

5.5 Social and Economic

There are approximately 618536² people residing within Msunduzi Municipal area. Msunduzi has established a strong industrial base with clothing and footwear manufacturing as well as food and aluminium production as some of the biggest industries in the city, has the second largest urban centre within the province of KwaZulu-Natal and the main economic hub within uMgungdlovu District Municipality.

The site is currently rural in nature and is in the planning stages of being changed into an urban area. There are number of informal (low income households) located in the areas adjacent to the site. Thirty three percent (33%) of the population within this municipal area is unemployed and only 33% of the population has completed matric³.

The proposed upgrade will result in improved access routes and will allow for the employment of local labour.

Potential Environmental Impact: *Positive impact - creation of local employment during construction and formalised access roads for community members. Potential negative health and safety impacts on community members arising from construction activities.*

5.6 Heritage

Umlando undertook a survey in June 2015 to identify any potential areas of heritage significance. There are no known heritage sites near the existing road. There are unlikely to be heritage sites affected by the road upgrade due to the steep gradient of the area and the site is developed with low cost housing and informal housing units (Anderson, 2015).

Potential Environmental Impact: *Potential unearthing of and damage to items of cultural and heritage significance during construction.*

5.7 Air Quality

The existing gravel road is located in a rural area and the site is surrounded mostly by open space areas and forestry. In terms of air quality, according to communications with the engineer, increased dust levels are a constant problem with these gravel roads and due to the close proximity of the residents to the road.

Potential Environmental Impact: *Potential negative air quality impacts from construction activities, increase in dust levels during construction.*

6.0 Description of Identified Potential Alternatives to the Proposed Activity, Including Advantages and Disadvantages that the Proposed Activity or Alternatives may have on the Environment and the Community that may be Affected by the Activity

The Western Cape Department of Environmental Affairs and Development Planning (DEA & DP) guideline on alternatives has been used as a guide to the identification of feasible alternatives to the proposed activity. The following criteria were used in identifying feasible and reasonable alternatives to the proposed activity:

- i. Is the alternative feasible and reasonable?
- ii. Does the alternative suit the general purpose of the proposed activity?
- iii. Does the alternative align with the need and desirability considerations of the proposed activity?
- iv. Is the alternative designed to prevent and minimise negative impacts and to maximise benefits?
- v. Does the alternative compromise the integrity of the proposal?

² <http://www.localgovernment.co.za/locals/view/88/Msunduzi-Local-Municipality#demographic>

³ <http://www.localgovernment.co.za/locals/view/88/Msunduzi-Local-Municipality#demographic>

vi. Does the alternative comply with policy and legal requirements?

According to the DEAT Guideline 5 (2006) on the Assessment of Alternatives and Impacts, the Regulations indicate that alternatives that are considered in an assessment process be reasonable and feasible. I&APs must be provided with an opportunity of providing inputs into the process of formulating alternatives. Once a full range of potential alternatives has been identified, the alternatives that could be reasonable and feasible should be formulated as activity alternatives for further consideration during the basic assessment or scoping and EIA process.

Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives, land use alternatives or the no-go alternative.

The number of alternatives that are selected for assessment should not be set arbitrarily, but should be determined by the range of potential alternatives that could be reasonable and feasible and should include alternatives that are real alternatives to the proposed activity. The process of selecting alternatives should be clearly documented.

According to the DEA&DP Guideline on Alternatives (2010), alternatives are defined in the NEMA EIA Regulations as “*different means of meeting the general purpose and requirements of the activity*”. The “*feasibility*” and “*reasonability*” of and the need for alternatives must be determined by considering, *inter alia*,

- a. the general purpose and requirements of the activity,
- b. need and desirability,
- c. opportunity costs,
- d. the need to avoid negative impact altogether,
- e. the need to minimise unavoidable negative impacts,
- f. the need to maximise benefits, *and*
- g. the need for equitable distributional consequences.

Based on the above, the following sections document the process of selecting the alternatives that have been considered for assessment.

6.1 Location / Site Alternative

The project is the upgrade of a road that is currently in place and as such no location or site alternatives have been considered.

Alternative S1: *Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg.*

6.2 Activity Alternatives

The type of culvert that will be used is influenced by both site and economic considerations. The following factors were considered in selecting the type and number of culverts to be used for this project:

- Construction cost;
- Ease of construction;
- Height of fill cover available;
- Potential for clogging debris;
- Allowable headwater depth;
- Aggressive or corrosive soil or water conditions; and
- Culvert abrasion by transported material (Email Communications, Henwood & Nxumalo, 2015).

The types of culverts which are often used are precast concrete pipes, corrugated metal pipes, precast concrete box culverts, cast in-situ concrete box culverts. Corrugated metal pipes are often prone to corrosion and subsequent structural failure and have limited life span. Concrete pipes and portal culverts are the most frequently used and accepted products for stormwater drainage, culverts, outfall sewers and many other

applications. Box culverts are normally used for bigger catchment area whereas concrete pipe culverts are used for small catchments, due the cost effectiveness. (Email Communications, Henwood & Nxumalo, 2015) An example of a concrete pipe presented in in Figure 12.



Figure 12: An example of a concrete pipe culvert

Cast in-situ culverts and precast culverts are the two feasible options that have been considered for this project. Cast in-situ often applies to large concrete portal culverts (rectangular cross section), concrete V-drains and headwall slabs. For this project, circular culverts will be used as these were found to be most suitable for this site. Circular culverts will be very expensive to cast on site as you will need to import the proper equipment and set up a casting yard, it is far more economical and cheaper to drop off pre-cast circular culverts on site.

Table 10 provides the advantages of using pre-cast concrete culverts in comparison to casting the culverts on site.

Table 10: Table highlighting the advantages of pre-cast in comparison to cast in-situ⁴

Key Concerns	Cast in-situ	Pre-Cast Concrete from ACP
Prep-Work	<ul style="list-style-type: none"> • You must haul, set and remove forms • You may wait for a concrete truck to arrive and concrete to cure • You have to worry about concrete setting up in the truck • You are responsible for performing on-site strength tests 	<ul style="list-style-type: none"> • With pre-cast concrete from ACP you simply dig a hole and we set your product in it.
Turnaround Time	<ul style="list-style-type: none"> • The tasks involved with a concrete pour (see above) can add 3 days to the length of your project 	<ul style="list-style-type: none"> • Stock standard pre-cast concrete structures can be on their way to you in just one hour. • Custom concrete can be delivered in 48-hours or less. • Your pre-cast concrete structures can be created in advance and held until the hour you need them or you can pick them up.
	<ul style="list-style-type: none"> • With cast-in-place, rain, sleet or snow can 	<ul style="list-style-type: none"> • With pre-cast, your structure is poured

⁴ http://www.advanceconcreteproducts.com/1/acp/precast_vs_cast_in_place.asp

Weather	<ul style="list-style-type: none"> delay your pour and your project. In cold temperatures and wet conditions, concrete is slow to set. 	in a controlled environment so weather is never a factor and your project is never delayed because of it.
Concrete Strength	<ul style="list-style-type: none"> A number of uncontrollable factors can decrease the strength and durability of freshly poured concrete including: extreme temperatures, fluctuations in temperature, humidity, etc. 	<ul style="list-style-type: none"> Controlled pour conditions, strict quality-control measures and factory strength testing ensure pre-cast concrete that meets strength and durability specifications.
Excavation Open Time	<ul style="list-style-type: none"> With cast-in-place, your excavation is open as long as there are forms to be delivered, trucks to arrive, concrete to pour and cure, and forms to be stripped. Best case scenario, your excavation is open 3 days. 	<ul style="list-style-type: none"> With pre-cast concrete from ACP you dig the hole in the morning, we set your structure midday, you backfill in the afternoon and you're done at the end of the day.
Last-Minute Changes	<ul style="list-style-type: none"> With cast-in-place, last-minute changes are difficult to make and cost money. 	<ul style="list-style-type: none"> Pre-cast Concrete from ACP gives you the flexibility to make changes to your structure right up until the minute the concrete is poured in the form.
Hardware	<ul style="list-style-type: none"> With cast-in-place, you must buy concrete from one company and hardware from others. 	<ul style="list-style-type: none"> Pre-cast concrete structures from ACP are delivered with all the equipment you need including electrical hardware, steel racks, cast iron frames and access covers.

The following two alternatives will thus be considered for this project:

Alternative A1: Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using pre-cast concrete pipe culverts.

Alternative A2: Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using concrete pipe culverts that will be cast on site.

Thus, in accordance with the DEA&DP guideline on assessment of alternatives, technology alternatives were considered and accepted based on the following:

Table 11: Consideration of Layout Alternatives

Activity Alternatives: Alternative A1: Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using pre-cast concrete pipe culverts. Alternative A2: Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using concrete pipe culverts that will be cast on site.	
Is the alternative feasible and reasonable?	Yes: Both alternatives would meet the requirements of this project.
Does the alternative suit the general purpose of the proposed activity?	Yes.

Does the alternative align with the need and desirability considerations of the proposed activity?	Yes.
Is the alternative designed to prevent and minimise negative impacts and to maximise benefits?	Alternative A2 may pose greater impacts during the construction phase than Alternative A1, however both will serve the same purpose during operation.
Does the alternative compromise the integrity of the proposal?	No.
Does the alternative comply with policy and legal requirements?	Yes.

6.3 The No-Go Alternative

According to the DEAT Guideline 5 (2006) on Assessing Alternatives and Impacts, The no-go alternative is the option of not undertaking the proposed activity or any of its alternatives. The no-go alternative also provides the baseline against which the impacts of other alternatives should be compared)

It should be noted that the no-go alternative may sometimes not be a “real” or “implementable” alternative (for example, where the capacity of a sewage pipeline has to be increased to cope with current demand). It should, however remain the default option and must always be included to provide the baseline for assessment of the impacts of other alternatives and also to illustrate the implications of not authorising the activity.

Therefore the No-Go Alternative for the proposed activity is as follows:

No-Go Alternative: No upgrade of the culverts will occur. The site will remain in its current condition. The need for a safe formalised accessed route will not be addressed.

Thus, the following alternatives will be carried through for assessment:

Alternative S1&A1 (Preferred layout): Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using pre-cast concrete pipe culverts.

Alternative S1&A2 (Alternative layout): Upgrade of approximately eleven (11) culverts in the Peacevalley III area, Pietermaritzburg using concrete pipe culverts that will be cast on site.

No-go option: No upgrade of the existing culverts will occur in the Peacevalley III area, Pietermaritzburg.

7.0 Details of the Public Participation Process Conducted in Terms of Regulation

A key part of the Basic Assessment process is public participation, whereby authorities, residents, neighbours and any organisation that may be interested in or affected by the proposed activity, are notified of the proposal so as to provide an opportunity for expression of comments/concerns throughout the process.

Public participation is a legislated requirement according to the EIA Regulations, 2014. As the independent Environmental Assessment Practitioner (EAP), ECA Consulting is required to involve the public in the following way):

- Provide written notice to adjacent occupiers of the site, the municipal ward councillor, ratepayers association, and any organ of state having jurisdiction in respect of any aspect of the activity;
- Place an advert in one local newspaper, and at least one provincial or national newspaper if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken;
- Fix a notice board (minimum size 60cm x 42cm) at a place conspicuous to the public at the boundary or on the fence of the site or any alternative site mentioned in the application.

With reference to the DEA (2010) guideline⁵ on public participation, the EAP has followed the public participation process as detailed on the following page, Figure 13. Proof of the public participation undertaken has been attached as Appendix 4.

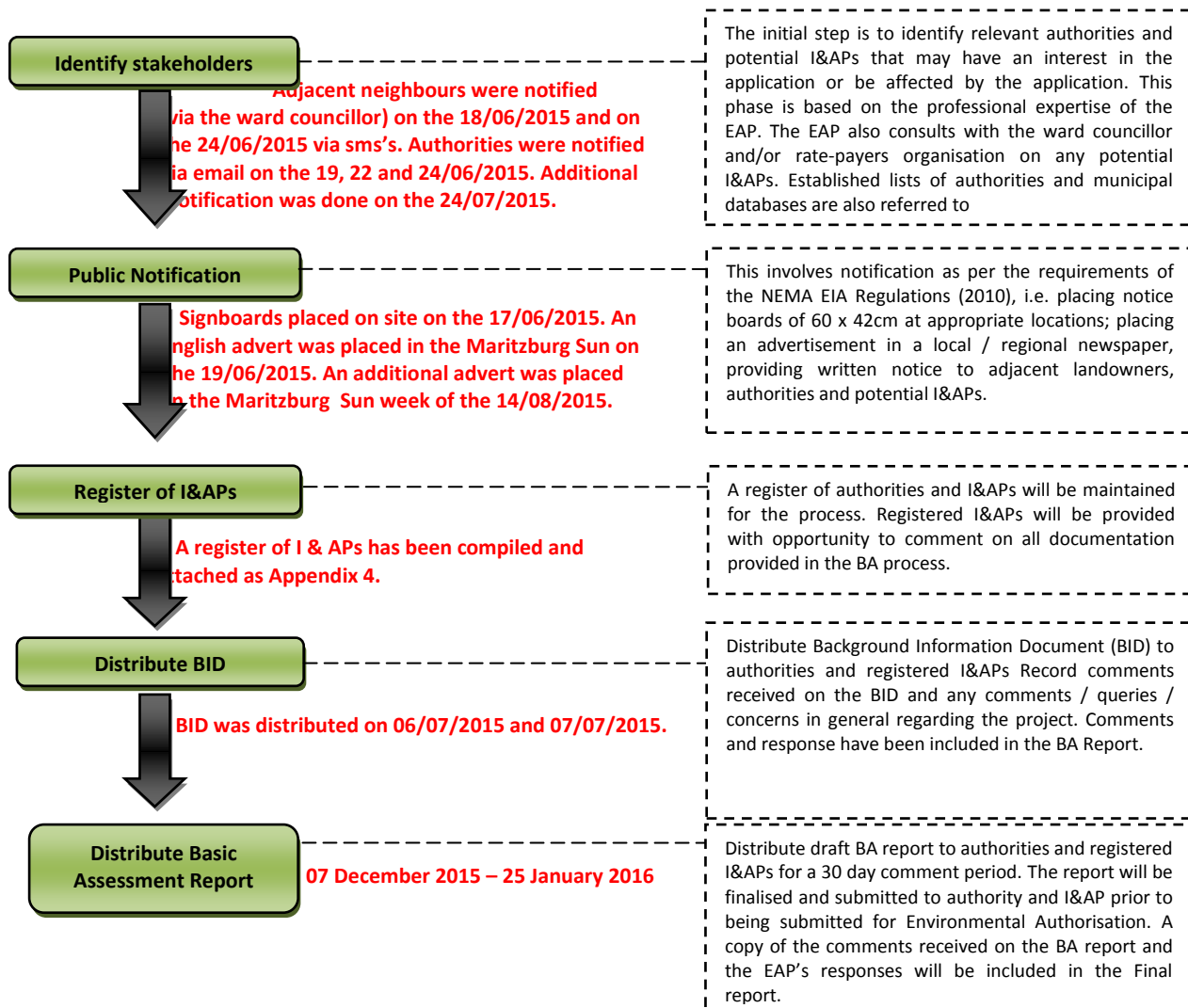


Figure 13: Summary of public participation process

⁵ Reference: DEA (2010). Public Participation 2010, Integrated Environmental Management Guideline Series 7. Department of Environmental Affairs, Pretoria, South Africa, 17pp.

According to Chapter 6 of the EIA Regulations, 2014 (GNR 982), registered I&APs are entitled to comment in writing on all written submissions, including draft reports made to the competent authority (i.e. EDTEA) and to bring to the attention of the competent authority and EAP any issues that may be of significance to the consideration of the application. These issues must be submitted within the timeframes approved or those as set by the competent authority. I&APs have 30 days within which to comment on this report. I&APs are legally required to disclose any direct business, financial, personal or other interest that they may have in the approval or refusal of the application.

7.1 Steps that were Taken to Notify Potentially Interested and Affected Parties of the Application

A list of Authorities and I&APs was compiled and is attached as Appendix 4 to this report. Authorities were notified via email on 19, 22 and 24 June 2015. Proof of notification is attached Appendix 4 to this report. The ward councillor was provided with copies of the notice (80 copies) and agreed to distribute these notices to community member directly affected by the proposed road upgrade, the letter signed by the ward councillor is attached as Appendix 4. These notices were made available in English and Zulu. The ward committee also assisted in the notification of residents within the settlement on 18 June 2015. A copy of the letter of receipt of notices for distribution by the ward councillor is attached as Appendix 4 to this report. SMS's were also sent to residents within the Peacevalley III area, proof of this has been attached as Appendix 4.

A notification register was maintained and is attached as Appendix 4 to this report.

7.2 Proof that Notice Boards, Advertisements and Notices Notifying Potentially Interested and Affected Parties of the Application have been Displayed, Placed or Given

Eight signboards, four in English and four in Zulu, were placed at strategic points in and around the site. Photographic proof of signboard placement is also attached as Appendix 4 to this report. An English advert was placed in the local newspaper, the Maritzburg Sun on the 19 June 2015 and the 14 August 2015. Proof of advert placement is attached as Appendix 4 to this report.

7.3 A list of all Persons or Organisations that were Identified and Registered as Interested and Affected Parties (I&APs) in relation to the application

Relevant state authorities were included as registered I & APs as well as any member of public that requested to be registered as an I & AP. A list of registered I&APs is attached as Appendix 4 to this report.

7.4 Summary of the Issues raised by I & APs

All comments received from I&APs have been tabulated and a response provided in Table 12. The original comments are also attached in Appendix 5. Below is a summary of comments / issues to date:

Table 12: Comment and Response Table

Comment	Details of I & AP and Date Received	Response
We have no objection to the proposed application as indicated in the BID	KZN Department of Transport 31 July 2015	Noted.
All river crossing structures on provincial declared roads must be registered and approved by this department's bridge office, Paul Dantuma (Tel: 033 355 0545). This automatically registers the project with a bridge, major culvert or		This road is not part of the provincial declared roads, it is a municipal road.

<p>causeway number for the bridge management system and auditor general enquiries. Unless this departments bridge office structure number is used on all reports and included in all communications, this departments bridge office is unable to respond.</p> <p>The bridge office requires co-ordinates of the location as well as the provincially declared road number. All designs must comply with the prescribed design and drawing standards of KZN DOT Bridge office.</p> <p>The bridge office can be contacted for further assistance and this correspondence does not grant authorisation or exemption from compliance with any other relevant and applicable legislation.</p>		<p>The co-ordinates are provided in Table 1.</p>
<p>The development footprint will mainly be located within the existing road, however, it is not clear yet whether there will be any realignments or road widening.</p> <p>The department requests that a vegetation assessment be conducted especially along the riparian zones. This study will assist in determining the impact that the development may have on indigenous trees and protected tree species in terms of the National Forests Act. Further comment will be issued upon receipt and review of the Draft BAR which should include the vegetation assessment.</p>	<p>DAFF 23 July 2015</p>	<p>The road will be widened to a total width of 6.5m which will include a 1.5m sidewalk. A vegetation assessment has been conducted and included in this BAR for review.</p>

8.0 Impact Assessment Methodology - Description of the Proposed Method of Assessing the Environmental Issues and Alternatives

The objective of an environmental assessment is to identify and assess all the significant potential impacts that may arise from the undertaking of an activity (DEAT, 2006). According to the DEAT Guideline on Assessment of Alternatives and Impacts (2006), an impact is the change in an environmental parameter that results from undertaking an activity – impacts occur over a specific period and within a defined area.

Against this definition, key to identifying an impact is the duration and extent of the impact.

Impacts may be direct, indirect or cumulative, meaning:

- (a) Direct: caused directly by the activity and generally occur at the same time and at the same place of the activity, e.g. noise generation during construction.

- (b) Indirect: are induced changes that occur as a result of the activity.
- (c) Cumulative: results from an incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur over a period of time and can include both direct and indirect impacts.

According to the NEMA EIA Regulations (2010), a significant impact is defined as *“an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment;”*

From this definition, the following criterion determines the significance of an impact:

- Magnitude (or intensity): refers to the severity of the adverse environmental impacts. The magnitude can be classed as either low, moderate, severe.
- Duration: refers to how long the impact will occur for. This could be classed as very short (0-1 years), short (2-5 years), medium term (5-15 years), long-term (>15 years) or permanent.
- Probability: describes the likelihood of the impact occurring and be classed as low, medium, high.

The EIA Regulations specifies that the environmental impact assessment report must include a description and assessment of the significance of any environmental impacts, including -:

- (i) Cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any consideration, erection or decommissioning associated with the undertaking of the activity;
- (ii) The nature of the impact;
- (iii) The extent and duration of the impact;
- (iv) The probability of the impact occurring;
- (v) The degree to which the impact can be reversed;
- (vi) The degree to which the impact may cause irreplaceable loss of resources; and
- (vii) The degree to which the impact can be mitigated.

Determining the significance of impacts also involves the undertaking of specialist studies for each issue where there may be significant impacts. Both the positive and negative environmental impacts and the measures to avoid or minimise significantly harmful impacts (i.e. mitigation measures) must be considered. Impacts must be assessed for all the identified alternatives, with the aim of identifying the most environmentally appropriate option. Public participation activities take place throughout the impact assessment phase (DEA, 2010).

The DEAT 2006 guideline on Assessment of Alternatives and Impacts, states the process of evaluating significance distinguishes between the impact before mitigation and the impact after mitigation. Also of importance in determining significance are:

- Environmental standards, guidelines and objectives,
- Level of public concern;
- Scientific and professional evidence
- Environmental loss and deterioration
- Social impacts resulting directly or indirectly from environmental change;
- Likelihood and acceptability of risk.

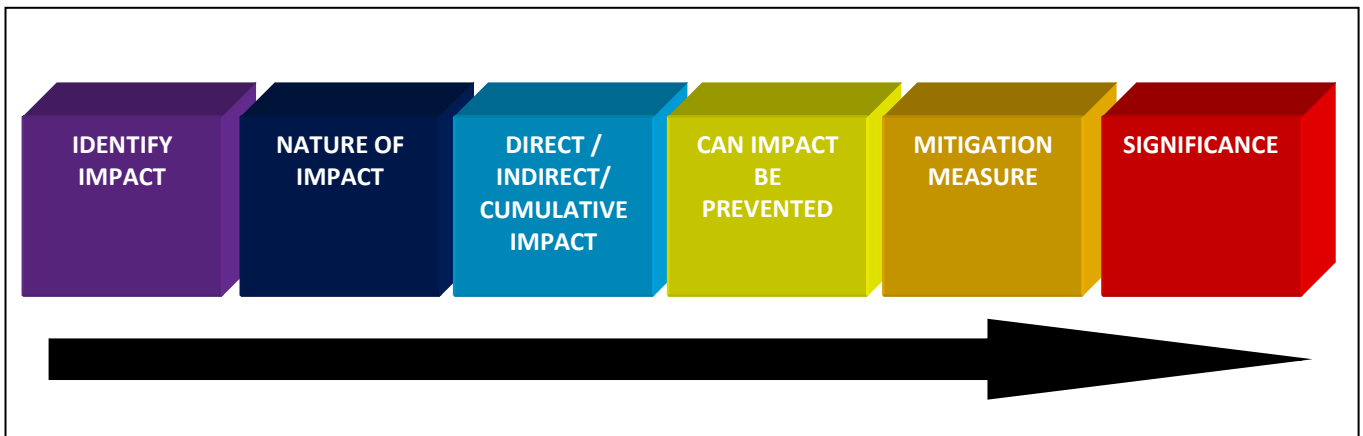
The Australian Government Department of the Environment (2013) defines a significant impact as *“an impact which is important, notable or of consequence, having to its context or intensity. Whether or not an action is*

likely to have a significant impact depends upon the sensitivity, value and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts."

It must be noted that there is no prescriptive or legislative methodology for the identification of impacts and assessment of significance. The approach to be taken by the EAP for the impact assessment is aimed to inform decision makers and is based on the following guidelines, legislation and information:

- (a) National Environmental Management Act (104 of 1998)
- (b) National Environmental Management Act, EIA Regulations (2014)
- (c) DEAT (2006) Guideline 5: Assessment of Alternatives and Impacts in support of the Environmental Impact Assessment Regulations, 2006. Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
- (d) Australian Government Department of the Environment (2013). Matters of National Environmental Significance, Significant Impact Guidelines 1.1., Environment Protection and Biodiversity Conservation Act 1999. 39pp.
- (e) Federal Environmental Assessment Review Office (1994). A reference guide for the Canadian Environmental Assessment Act, Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects.
- (f) Specialist studies undertaken for the proposed activity.
- (g) Issues raised by I&APs
- (h) The EAP's professional expertise and opinion.

The approach to describe and assess the significance of environmental impacts is summarised as follows:



- (a) Identify the impact
- (b) Describe the nature of the impact
- (c) Determine if the impact is direct, indirect or cumulative
- (d) Predict the magnitude, extent, duration, probability of the impact
- (e) Determine if the impact can be prevented, reversed or managed
- (f) Identify mitigation measures
- (g) Determine significance of the impact

Against the various pieces of guidelines for the assessment of impact significance, the EAP has adopted the following measures to determine significance:

Significance = (the extent of the impact + the duration of the impact + magnitude of the impact) in consideration of the probability of the impact occurring.

A scoring system will be applied and be used to compare alternatives. It must be noted that cognisance must be taken of the weightings of each environmental element. For example, the significance ratings must not purport that a low environmental significance is equivalent to a low social significance. Specifically, the significance of a loss of a wetland cannot be directly compared to generation of noise as these are separate elements and have their own significance in terms of magnitude, duration, extent and probability.

The scoring system will be used to compare impacts of alternatives for the same environmental element. For example, the area of wetland loss for alternative 1 will be compared with the area of wetland loss for alternative 2. It must also be noted that a comparative assessment will be done for only the main anticipated impacts that will distinguish between choosing the most feasible alternative.

The following scoring system will be used:

Criteria	Class	Score
Magnitude	Low (small and has no effect on the environment)	1
	Moderate (will result in process continuing but in a modified way)	2
	Severe (results in complete destruction of patterns and permanent cessation of patterns)	3
Extent	Site	1
	Surrounding area within 2km from project area	2
	Local between 2km to 50km	3
	Regional between 50km to 200km	4
	Provincial – impact of provincial significance	5
Duration	Very short term – during construction (0-1 yrs)	1
	Short term (2-5 yrs)	2
	Medium term (5-15 yrs)	3
	Permanent	4
Probability after mitigation	Low	1
	Medium	2
	High	3
	Very high	4
Reversibility	Can the impact be prevented?	1

	Can the impact be reversed?	2
	Can the impact be managed?	3
Will irreplaceable resources be lost?	No	0
	Yes	1

The final score to be compared to significance ratings as described below.

Comparative Assessment of Alternatives

According to the DEAT Guideline 5 (2006) on the Assessment of Alternatives and Impacts, the Regulations require that alternatives to a proposed activity be considered. Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the no-go alternative. (The no-go alternative is the option of not undertaking the proposed activity or any of its alternatives. The no-go alternative also provides the baseline against which the impacts of other alternatives should be compared). The Regulations indicate that alternatives that are considered in an assessment process be reasonable and feasible.

The assessment of alternatives should follow the impact assessment process and should, as a minimum, include the following:

- the consideration of the no-go alternative as a baseline scenario (even in cases where the no-go alternative is not a realistic alternative);
- a comparison of the selected alternatives; and
- the providing of reasons for the elimination of an alternative.

Each alternative will be comparatively assessed in summary form. This will form the basis of the Environmental Impact Statement.

E. g. of Comparative Assessment.

	Environmental Ecological	/ Surrounding Business / Communities	Economic feasibility
Alternative S1 & A1			
Alternative S1 & A2			
No-go option			

Significance ratings:

It must be note that the lowest obtainable score is 5 and the highest obtainable score is 20. Hence the classes range from 5 to 20.

Significance ratings	Low (5-9)	Acceptable impact that can be mitigated with no or little residual impact after mitigation. Impact is so inconsequential that it is of no significance at all /Acceptable impact that can be mitigated with low residual impact after mitigation.
	Medium (10-15)	Generally acceptable impact that can be mitigated with low to medium residual impact after mitigation. Sufficient magnitude and probability to warrant

		concern for careful mitigation of impacts.
	High (16-20)	Impact not acceptable – impacts cannot be mitigated and will cause detrimental impact on environment and society.

It must be noted the described scoring system is not prescriptive and will ultimately be interpreted by the EAP in terms of the geographic context of the project and the predicted main anticipated impacts. As such, the Environmental Impact Statement provides a discussion of the scores and the relative implications for this. The Environmental Impact Statement must be considered as the conclusive statement of the environmental impact assessment phase taking into consideration the assessment of potential impacts and the impact on the environment after the management and mitigation of impacts have been taken into account.

8.1 Impact Assessment

There are no impacts that are anticipated to arise from the design and planning phase of the proposed project. There are also no site alternatives, only activity alternatives and the no-go alternative.

8.1.1 Construction Phase

The following impacts are anticipated to occur during the construction phase of the proposed culvert upgrade. As mentioned earlier, Environmental Authorisation is only required for those activities that occur directly in the watercourse (i.e. only the construction activities relating to the replacement and or upgrade of the culverts pipes).

CONSTRUCTION IMPACT		Scores where applicable
Environmental Element	<i>Soil (A1 – using pre cast culverts)</i>	n/a
Nature of Impact	<i>(Direct) Contamination of soil, stormwater and/or the watercourses during concrete mixing.</i>	n/a
Extent of Impact	<i>Site</i>	1
Duration of Impact	<i>Very Short-term (During construction)</i>	1
Can impact be prevented/reversed or managed?	<i>Yes, can be prevented / managed</i>	1
Probability of impact occurring before mitigation	<i>Medium-High</i>	n/a
Mitigation Measure	<i>Cement mixing must take place on a hard surfaced area or cement mixing trays must be used. Cement mixing will not be permitted to occur where run off can enter stormwater drains. Cement mixing must be done in a controlled manner; cement bags must not be left open indefinitely to warrant run-off into the river in the event of a stormwater event. The Stormwater Management Plan as attached to Appendix 7 must be adhered to. No dumping of excess cement, cement bags or equipment contaminated with cement are permitted to enter the watercourses at any time.</i>	n/a

	<i>Pre-cast concrete culverts will be used thus minimising any potential contamination that may result from casting the culvert on site.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Soil (A2)</i>	<i>n/a</i>
Nature of Impact	<i>(Direct) Contamination of soil, stormwater and/or the watercourses during concrete mixing.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very Short-term (During construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes, can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium-High</i>	<i>n/a</i>
Mitigation Measure	<p><i>Cement mixing must take place on a hard surfaced area or cement mixing trays must be used. Cement mixing will not be permitted to occur where run off can enter stormwater drains. Cement mixing must be done in a controlled manner; cement bags must not be left open indefinitely to warrant run-off into the river in the event of a stormwater event. No dumping of excess cement, cement bags or equipment contaminated with cement are permitted to enter the watercourses at any time.</i></p> <p><i>The culvert will be cast on site and increases the risk of concrete spillage, which will be brought in as ready mix. Drip trays must be placed at the point where the concrete is poured out of the ready mix truck.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low – Medium</i>	<i>2</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	6
CONSTRUCTION IMPACT		
Environmental Element	<i>Soil (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Risk of oil / fuel spills from construction equipment contaminating soil, stormwater and or the watercourses.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very Short-term (During construction)</i>	<i>1</i>

Can impact be prevented/reversed or managed?	<i>Yes can be prevented / managed</i>	1
Probability of impact occurring before mitigation	<i>Medium-high</i>	n/a
Mitigation Measure	<p><i>Any construction equipment that could leak oil must be placed on a drip tray. All equipment must be regularly serviced and maintained to reduce the likelihood of oil leaks. Any re-fuelling of equipment must occur in a designated refuelling area where any spills can be contained. Servicing and re-fuelling of vehicles is not permitted on site where oil, diesel or hydrocarbons can enter the wetland and river system. Oil or fuel spills near stormwater drains must be cleaned immediately to avoid direct contamination and/or contaminated run-off from entering the stormwater system.</i></p> <p><i>The Spill Contingency Plan as prescribed in the EMPr must be followed in the event of a spill.</i></p>	n/a
Probability of impact occurring after mitigation	<i>Low</i>	1
Magnitude	<i>Low</i>	1
Will irreplaceable resources be lost?	<i>No</i>	
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Soil(A1 and A2)</i>	n/a
Nature of Impact	<i>Risk of spills during storage of hazardous materials (cement, oils etc.) during construction.</i>	n/a
Extent of Impact	<i>Site</i>	1
Duration of Impact	<i>Very short-term (during construction)</i>	1
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	1
Probability of impact occurring before mitigation	<i>Medium</i>	n/a
Mitigation Measure	<p><i>All hazardous materials to be used during construction must be stored in a designated hard surfaced area that is bunded and under cover. Hazardous storage areas must be bunded and be within an impermeable surface and must be protected from the rain to prevent contamination of stormwater. The hazardous store area must be at least 30m away from the watercourse. The hazardous store is not permitted in any area that has the potential to contaminate stormwater or the run-off.</i></p> <p><i>In the event of soil contamination by chemical or hazardous substances during construction, the</i></p>	n/a

	<i>contaminated soil must be removed, stored in a sealed container and disposed of at a licensed facility.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Soil (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Poor stormwater management during construction can cause erosion and loss of soil.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented/managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>The contractor must prepare a Stormwater Control Plan to ensure that all construction methods adopted on site do not cause, or precipitate, soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, usually the contractor, shall ensure that no construction work takes place before the stormwater control measures are in place.</i></p> <p><i>In addition, where vegetation removal is required, there should be phased removal of vegetation to minimise the presence of bare soil that could lead to erosion in a heavy rainfall event. Further measures to reduce the risk of erosion include keeping the disturbance footprint to a minimum, including the areas traversed by trucks and machinery and limited to a specific operational area.</i></p> <p><i>Suitable erosion control measures must be implemented at erosion sensitive areas such as near water supply points and/or edges of slopes. These measures include use of sand bags or Hessian sheets, prompt rehabilitation of exposed soil with indigenous vegetation, prevent the unnecessary removal of vegetation especially on steep areas.</i></p>	
Probability of impact occurring after mitigation	<i>Low-medium</i>	<i>1.5</i>
Magnitude	<i>Low-medium</i>	<i>1.5</i>

Will irreplaceable resources be lost?	No	0
	Significance rating	6
CONSTRUCTION IMPACT		
Environmental Element	Waste (A1 and A2)	n/a
Nature of Impact	<i>Improper disposal of general waste, hazardous waste or rubble i.e.: burying or neglecting building rubble can cause direct mechanical damage to surrounding vegetation and lead to untidiness of the site.</i>	n/a
Extent of Impact	Site	1
Duration of Impact	Very short-term (during construction)	1
Can impact be prevented/reversed or managed?	Yes impact can be prevented / managed	1
Probability of impact occurring before mitigation	Medium	n/a
Mitigation Measure	<p><i>Skips / appropriate storage containment must be provided for rubble which can only be stored on site temporarily. All excess rubble and building material must be removed from the site. Waste must be separated and stored on site. Disposal slips must be obtained and kept on site.</i></p> <p><i>Should rubble be used as fill material, this must be done under the supervision of the engineer and ECO.</i></p> <p><i>No burning of waste is permitted on site as a final disposal. The contractor is responsible for the safe disposal of waste of site and must obtain safe disposal certificates.</i></p> <p><i>Dumping is not permitted in the watercourse or any open space areas.</i></p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	Ablution facilities (A1 and A2)	n/a
Nature of Impact	<i>Improper management of ablution facilities causing a health and safety hazard; ablution facilities causing potential pollution to the watercourse.</i>	n/a
Extent of Impact	Site	1
Duration of Impact	Very short-term (during construction)	1

Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>Chemical ablation facilities during the construction phase must be located at least 50m away from the watercourse. It should be regularly cleaned and serviced so as to not pose a health and safety risk to construction staff and/or the public. The chemical ablation facility must be removed from site when construction is complete.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Cultural/ Heritage (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Unearthing and damage to items of cultural or historical significance.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Permanent as items of cultural or historical significance will be destroyed if impact occurs.</i>	<i>4</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<i>n/a</i>
Mitigation Measure	<i>Should any item of cultural or heritage significance be encountered during construction, construction activities must cease immediately and the relevant authority be notified. Construction should cease until further notice.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>Yes, only if items of cultural or heritage significance are unearthed and destroyed.</i>	<i>1</i>
	Significance rating	9
CONSTRUCTION IMPACT		
Environmental Element	<i>Watercourse (A1)</i>	<i>n/a</i>
Nature of Impact	<i>Pollution of watercourse and soil through contamination</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>3</i>
Duration of Impact	<i>During the construction phase</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>The impact can be prevented and managed</i>	<i>1</i>
Probability of impact occurring	<i>High</i>	<i>n/a</i>

before mitigation		
Mitigation Measure	<p><i>All waste generated during construction is to be disposed of as per the Environmental Management Programme and no washing of paint brushes, containers, wheelbarrows, spades, picks or any other equipment adjacent or in the drainage channel is permitted.</i></p> <p><i>Proper management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the road.</i></p> <p><i>No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the watercourse.</i></p> <p><i>Portable toilets must be placed outside 50m away from the watercourse.</i></p> <p><i>Do not locate the construction camp or any depot for any substance which causes or is likely to cause pollution within a distance of 50m of the watercourse.</i></p> <p><i>Spillages of cement, fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area rehabilitated immediately – consult with an aquatic specialist if spills occur in the watercourse.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	Low	<i>1</i>
Magnitude	Low	<i>1</i>
Will irreplaceable resources be lost?	No	<i>0</i>
	Significance rating	8
CONSTRUCTION IMPACT		
Environmental Element	Watercourse (A2)	<i>n/a</i>
Nature of Impact	<i>Pollution of watercourse and soil through contamination</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>3</i>
Duration of Impact	<i>During the construction phase</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>The impact can be mitigated and managed</i>	<i>3</i>
Probability of impact occurring before mitigation	High	<i>n/a</i>
Mitigation Measure	<i>The culverts will be cast on site and as such will significantly increase the risk of contamination. All waste generated during construction is to be disposed of as per the Environmental Management</i>	<i>n/a</i>

	<p><i>Programme and no washing of paint brushes, containers, wheelbarrows, spades, picks or any other equipment adjacent or in to the drainage channel is permitted.</i></p> <p><i>Proper management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the road.</i></p> <p><i>No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the watercourse.</i></p> <p><i>Portable toilets must be placed outside 50m away from the watercourse.</i></p> <p><i>Do not locate the construction camp or any depot for any substance which causes or is likely to cause pollution within a distance of 50m of the watercourse.</i></p> <p><i>Spillages of cement, fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area rehabilitated immediately – consult with an aquatic specialist if spills occur in the watercourse.</i></p>	
Probability of impact occurring after mitigation	Low- Medium	1.5
Magnitude	Low - Moderate	1.5
Will irreplaceable resources be lost?	No, Yes if pollution occurs, this will destroy remaining riparian habitat.	0
	Significance rating	11
CONSTRUCTION IMPACT		
Environmental Element	Watercourse (A1 and A2)	n/a
Nature of Impact	Potential dumping of construction waste, rubble, litter, etc.	n/a
Extent of Impact	Site	1
Duration of Impact	Very short-term (during construction)	1
Can impact be prevented/reversed or managed?	Yes impact can be prevented	1
Probability of impact occurring before mitigation	Medium	n/a
Mitigation Measure	Dumping or disposal of waste into watercourse is strictly prohibited. The working area must be clearly demarcated prior to construction. Contractors must be given environmental training during which staff must be made aware of the importance of the riparian system and	n/a

	<p>watercourses. Construction activities will be managed by a site specific EMPr (Appendix 6) and will be monitored by an ECO who will ensure compliance with the construction EMPr.</p> <p>Waste must be disposed of into the appropriate skips and disposed of at a registered landfill site.</p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	Flooding during construction activities (A1 and A2)	n/a
Nature of Impact	Risk of flooding / excessive stormwater flow on site during construction activities that may result from blocked stormwater drains.	n/a
Extent of Impact	Site	1
Duration of Impact	Very short-term [during construction only]	1
Can impact be prevented/reversed or managed?	Yes impact can be prevented	1
Probability of impact occurring before mitigation	Medium-high	n/a
Mitigation Measure	<p>The contractor, in conjunction with the engineer, must prepare a Stormwater Control Plan to ensure that all construction methods adopted on site do not cause, or precipitate, soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, usually the contractor, shall ensure that no construction work takes place before the stormwater control measures are in place.</p> <p>Stormwater drains must be regularly checked and monitored during the construction to ensure that it is not blocked.</p> <p>The stormwater control plan must include a Flood Emergency Response Plan prepared by the contractor for the site. Should the contractor or engineer be aware of a potential flood event, it must be ensured that the site is prepared to handle the flood event, such that hazardous construction material are removed from site so as to not contaminate run-off. Structures and equipment must be stabilised to reduce mobility in the event of flooding. Stockpiles must be removed or protected from washing away during a flood event. It is the responsibility of the contractor to ensure site</p>	n/a

	<i>preparedness in the event of flooding. Construction staff must be made aware of the risk of a flooding during construction and be educated on containing the flood and clean-up operations. Under the guidance of the engineer, sand bags may be appropriately positioned to contain the flood.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Sustainability (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Sourcing of raw materials i.e.: (gravel, stone, sand, cement and water) from unsustainable sources resulting illegal sand winning and mining operations causing significant environmental damage.</i>	<i>n/a</i>
Extent of Impact	<i>Potential regional impact if unsustainable practices occurs</i>	<i>4</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium-high</i>	<i>n/a</i>
Mitigation Measure	<i>All materials must be obtained from a registered and sustainable source and all delivery notes and slips must be made available to the Environmental Control Officer. Mined material such as stone must only be obtained from permitted quarries. Municipal water will most likely be used for dust suppression. If however, water is to be extracted from a river then the amount must not exceed the limit of 50 000 litres per day. If this limit is exceeded then a permit will be required from DWS. If this limit is exceeded then a permit will be required from DWS. Volumes extracted and used must be kept on record. This project will require a Water Use License, this is a separate process to this EIA process and must be completed prior to commencement of construction activities.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	8
CONSTRUCTION IMPACT		
Environmental Element	<i>Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Soil erosion and sedimentation</i>	<i>n/a</i>

Extent of Impact	<i>Site - local</i>	<i>3</i>
Duration of Impact	<i>Short to long term</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented, mitigated and managed</i>	<i>1.5</i>
Probability of impact occurring before mitigation	<i>Medium-high</i>	<i>n/a</i>
Mitigation Measure	<p><i>In order to minimise soil erosion as an existing serious impact (as a result of the lack of overall stormwater management), care should be taken at the design stage that the correct placement of water directing equipment within the road reconstruction area be designed and specified in a manner that will best mitigate the effects of stormwater runoff.</i></p> <p><i>The use of erosion protection measures such as energy dissipaters to slow the velocity of water coming from stormwater pipes will lower the potential of soil erosion adjacent to the road.</i></p> <p><i>No stockpiling of any materials may take place adjacent to the drainage channels.</i></p> <p><i>Erosion control measures must be implemented in areas sensitive to erosion and where erosion has already occurred such as edges of slopes, exposed soil etc. These measures include but are not limited to - the use of sand bags, hessian sheets, silt fences, fibre mats and fibre netting, and retention or replacement of vegetation.</i></p> <p><i>Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. No scupper pipes may be placed onto any watercourse crossings.</i></p> <p><i>Vegetation clearing must be undertaken as and when necessary. The entire construction area must not be stripped of vegetation prior to commencing construction activities.</i></p> <p><i>Disturbed sites must be rehabilitated as soon as construction in an area is complete or near complete and not left until the end of the project to be rehabilitated.</i></p> <p><i>Use vehicular digging of the banks of the streams associated with channelled valley bottom wetlands only in areas where this is deemed absolutely</i></p>	<i>n/a</i>

	<p><i>necessary. Working during the winter months will reduce soil erosion potential in disturbed areas.</i></p> <p><i>There shall be no mining of soil/sand required for construction purposes from the banks of rivers, channels, or wetlands. Sand must be brought in, if needed for construction purposes from sustainable sources. This must also be stockpiled away from the edge of the watercourse, more than 20m away.</i></p> <p><i>Steep areas along the river bank which have been disturbed must be protected. One way to do this is through the use of gabion baskets placed at strategic locations where steep areas have been disturbed.</i></p> <p><i>Increases in the turbidity of the channel must be monitored and controlled. Ways to control turbid water include passing it through sediment traps or sediment curtains.</i></p> <p><i>Erosion protection measures must be installed at any pipe culverts or stormwater drainage pipes located along the route.</i></p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	8.5
CONSTRUCTION IMPACT		
Environmental Element	Vegetation (A1 and A2)	n/a
Nature of Impact	Spread of alien invasive species	n/a
Extent of Impact	Site - local	2
Duration of Impact	Short-term	2
Can impact be prevented/reversed or managed?	Yes impact can be prevented	1
Probability of impact occurring before mitigation	Low-medium	n/a
Mitigation Measure	<p><i>An alien invasive management plan / programme must be incorporated into the EMPr.</i></p> <p><i>Ongoing alien plant control must be undertaken in areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien species.</i></p>	n/a

	<i>Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	7
CONSTRUCTION IMPACT		
Environmental Element	<i>Habitat (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Loss of indigenous vegetation and faunal habitat; loss of protected vegetation.</i>	<i>n/a</i>
Extent of Impact	<i>Site - local</i>	<i>2</i>
Duration of Impact	<i>Short-term – long-term</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development must be kept to a minimum. In particular, care must be taken in the vicinity of the drainage channels and existing roads must be used for access during construction.</i></p> <p><i>Prior to construction a suitably qualified ecologist/Environmental Control Officer (ECO) should closely examine the proposed construction area along the upgrade route for the presence of any protected / threatened plant or faunal species and relocate these species to an appropriate habitat away from the affected area. The Aloe Maculata must be protected and clearly demarcated, should it need to be removed, then a permit must be obtained from KZN Wildlife.</i></p> <p><i>During the construction phase workers must be limited to areas under construction within the reserve and access to the undeveloped areas, such as the Eastern drainage line must be strictly regulated ("no-go" areas during the construction phase).</i></p> <p><i>Any natural areas beyond the development footprint, which have been affected by the</i></p>	<i>n/a</i>

	<p><i>construction activities, must be rehabilitated using indigenous plant species.</i></p> <p><i>Education and awareness campaigns on indigenous and protected plant species, faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.</i></p> <p><i>No faunal species should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. Protected plant species such as the Aloe maculata must be clearly demarcated as these species cannot be removed without a permit.</i></p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	7
CONSTRUCTION IMPACT		
Environmental Element	Fauna (A1 and A2)	n/a
Nature of Impact	Disturbance or loss of fauna	n/a
Extent of Impact	Site - local	2
Duration of Impact	Short-term – long-term	2
Can impact be prevented/reversed or managed?	Yes impact can be prevented	1
Probability of impact occurring before mitigation	Low-medium	n/a
Mitigation Measure	<p><i>Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO).</i></p> <p><i>No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place.</i></p> <p><i>Should any Red Data faunal species be noted within the development footprint areas, these species must be relocated to similar habitat within the vacant land to the east of the development area with the assistance of a suitably qualified ecologist.</i></p> <p><i>Any fauna directly threatened by the construction activities must be removed to a safe location by the</i></p>	n/a

	<p><i>ECO or qualified Ecologist.</i></p> <p><i>All staff and contractors must undergo an environmental induction course held by the ECO as well as faunal education and awareness programmes.</i></p> <p><i>Strict control must be maintained over all activities during construction, in line with an approved Construction EMPr.</i></p> <p><i>Any Red Data species identified in this report observed to be roosting and/or breeding in the vicinity, the ECO must be notified.</i></p> <p><i>The above mitigation measures pertain to the construction phase and no mitigation measures put in place during the operation phase will reduce the negative impacts associated with the road upgrade.</i></p>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	7
CONSTRUCTION IMPACT		
Environmental Element	<i>Noise</i>	<i>n/a</i>
Nature of Impact	<i>Noise generated by construction workers, machinery and construction vehicles disturbing surrounding residents and businesses.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>Excessive noise must be controlled on site. All construction workers must be aware of the close proximity to neighbouring residences and all precautions must be taken to ensure that noise generation is kept to a minimum. If excessive noise is anticipated during certain stages of the construction, all neighbouring residences and businesses must be notified of the events timeously.</i></p> <p><i>Signage must be posted at the entrance to the site that displays contact numbers for complaints. A complaints register must be maintained on site at all times.</i></p>	<i>n/a</i>

	<i>An Environmental Management Programme (EMPr) has been designed to manage construction activities and is attached to this BAR.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	
Magnitude	<i>Low</i>	
Will irreplaceable resources be lost?	<i>No</i>	
	Significance rating	6
CONSTRUCTION IMPACT		
Environmental Element	<i>Dust pollution</i>	<i>n/a</i>
Nature of Impact	<i>Construction activities resulting in excessive dust production.</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented/managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>The contractor must ensure that measures to control dust are put in place. These include replanting of cleared surfaces, dampening of access roads/ stockpiles and platforms.</i> <i>An Environmental Management Programme (EMPr) has been designed to manage construction activities. Construction activities will be monitored by an ECO who will ensure compliance with the construction EMPr.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	5
CONSTRUCTION IMPACT		
Environmental Element	<i>Air pollution</i>	<i>n/a</i>
Nature of Impact	<i>CO₂ Emissions generated from construction vehicles.</i>	<i>n/a</i>
Extent of Impact	<i>Local (between 2km – 5km)</i>	<i>2</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be managed</i>	<i>3</i>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<i>n/a</i>
Mitigation Measure	<i>During construction, it is anticipated that tailpipe emissions from construction vehicles are the only</i>	<i>n/a</i>

	<i>air emissions. These emissions will be minimal and is not expected to significantly affect surrounding residents and businesses.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	8
CONSTRUCTION IMPACT		
Environmental Element	<i>Traffic</i>	<i>n/a</i>
Nature of Impact	<i>Potential increase in traffic disruptions on surrounding access roads.</i>	<i>n/a</i>
Extent of Impact	<i>Local (>2km)</i>	<i>1.5</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be managed</i>	<i>3</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>Should it be anticipated that construction activities will cause traffic disruptions, flagmen must be posted especially during peak traffic hours. Appropriate signage must also be placed as well as visible beacons to direct traffic.</i></p> <p><i>Potential traffic impacts include traffic disruptions during the construction period when construction vehicles are entering and exiting the site. The construction phase will be monitored by an independent Environmental Control officer against the Environmental Management Programme (EMPr). Flagmen must be posted to control flow of traffic. Should a phase of the construction anticipate major traffic disruption and/or road closure, residents / businesses must be timeously notified and flagmen must adequately direct traffic to ensure free flow of traffic and safety of pedestrians and vehicles in the area.</i></p> <p><i>During the construction phase, trucks are not permitted to park on verges and cause traffic and safety risks. It is the responsibility of the applicant to ensure that trucks entering and leaving the site during construction abide by traffic regulations and do not compromise pedestrian and vehicle safety.</i></p> <p><i>Access disruption and restricted access must be kept to minimum hours and is not preferred. All effort must be made to ensure free flow of traffic at all times. The site is located in an area where pedestrians, children and farm animals utilise the road, special measures must be incorporated as</i></p>	<i>n/a</i>

	<i>and when required.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	7.5
CONSTRUCTION IMPACT		
Environmental Element	<i>Bulk services</i>	<i>n/a</i>
Nature of Impact	<i>Potential damage to existing services (electricity, water, etc.)</i>	<i>n/a</i>
Extent of Impact	<i>Local (between 2km-5km)</i>	<i>2</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>All services must be identified prior to construction. Should it be anticipated that a service may be disrupted during construction, the affected neighbours/residents/businesses and relevant authority must be notified timeously.</i></p> <p><i>Should a service line be damaged by construction activities, construction activities must cease immediately and the relevant authority be notified.</i></p> <p><i>It is the contractor's responsibility to repair a service line, pipe or pole that is damaged by the construction activities.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	6
CONSTRUCTION IMPACT		
Environmental Element	<i>Geotechnical</i>	<i>n/a</i>
Nature of Impact	<i>Potential instability of the site where the culverts will be installed</i>	<i>n/a</i>
Extent of Impact	<i>Site</i>	<i>1</i>
Duration of Impact	<i>Very short-term (during construction)</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be managed</i>	<i>3</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>The recommendations of the geotechnical specialist must be adhered to where possible .The foundation investigations for each culvert site must</i>	<i>n/a</i>

	<p><i>undertaken prior to commencement of construction (Terratest, 2015). The</i></p> <p><i>Should water be extracted from any watercourse, it must be confirmed with the Department of Water Affairs, whether a license will be required for the abstraction prior to construction.</i></p> <p><i>At present the current roads cross the drainage lines via culverts. The integrity of these structures must be examined and widened where the width is not adequate. As such foundation investigations will require to be undertaken at these crossing points prior to construction.</i></p> <p><i>The material from the local borrow pit would need to be examined further when more competent shale bedrock is exposed during the course of working the borrow pit. A better quality material can be obtained. The relevant permits must be applied for from DMR where required.</i></p> <p><i>The founding strata for the culverts on the road must be confirmed before construction works proceed.</i></p>	
Probability of impact occurring after mitigation	Low-medium	1.5
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	7.5
CONSTRUCTION IMPACT		
Environmental Element	<i>Positive Impacts</i>	<i>n/a</i>
Nature of Impact	<i>Potential for job creation during construction period.</i>	<i>n/a</i>
Extent of Impact	<i>Local (between 2km-50km)</i>	<i>2</i>
Duration of Impact	<i>Very short-term [during construction]</i>	<i>1</i>
Can impact be prevented/reversed or managed?	<i>Not required</i>	<i>0</i>
Probability of impact occurring before mitigation	<i>n/a – no mitigation deemed necessary as this is a positive impact.</i>	<i>n/a</i>
Mitigation Measure	<i>The development is foreseen to have a potential positive impact on surrounding residential areas by affording employment opportunities during the construction phase.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>High</i>	<i>3</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	7

CONSTRUCTION IMPACT		
Environmental Element	<i>Positive Impacts</i>	<i>n/a</i>
Nature of Impact	<i>Improved access roads which include functional culverts</i>	<i>n/a</i>
Extent of Impact	<i>Site - Local</i>	<i>2</i>
Duration of Impact	<i>Long –term</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>Not required</i>	<i>0</i>
Probability of impact occurring before mitigation	<i>n/a – no mitigation deemed necessary as this is a positive impact.</i>	<i>n/a</i>
Mitigation Measure	<i>The upgrade will provide better stormwater infrastructure.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>High</i>	<i>3</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	8
CONSTRUCTION IMPACT		
Environmental Element	<i>Indirect Impacts</i>	<i>n/a</i>
Nature of Impact	<i>Potential for waste to be disposed of at incorrect landfill resulting in contamination at the landfill site.</i>	<i>n/a</i>
Extent of Impact	<i>Local at landfill site; potential to become regional if impact leads to groundwater contamination</i>	<i>3</i>
Duration of Impact	<i>short (2-5 years) / Potential long-term</i>	<i>2</i>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented/managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>All waste must be separated and stored in their appropriate storage areas. Hazardous waste must not be mixed with solid or general waste. All waste must be disposed of at the appropriate landfill site and safe disposal certificates must be obtained.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	8
CONSTRUCTION IMPACT		
Environmental Element	<i>Cumulative Impacts</i>	<i>n/a</i>
Nature of Impact	<i>Increase in waste being sent to landfill.</i>	<i>n/a</i>
Extent of Impact	<i>Local – at landfill site</i>	<i>2</i>
Duration of Impact	<i>Very short-term [during construction]</i>	<i>1</i>

Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>Where possible, recycling measures must be considered prior to disposal of waste. If material cannot be recycled, this must be disposed of at the appropriate registered landfill site. Plastics, cans, tins and paper are examples of items that can be sent to recycling centres.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	Significance rating	6

8.1.2 Operation Phase

OPERATIONAL IMPACTS		
Environmental Element	<i>Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Pollution of watercourse through contamination and waste</i>	<i>n/a</i>
Extent of Impact	<i>Site -Local</i>	<i>3</i>
Duration of Impact	<i>Medium</i>	<i>3</i>
Can impact be prevented/reversed or managed?	<i>The impact can be prevented and managed</i>	<i>1</i>
Probability of impact occurring before mitigation	<i>High</i>	<i>n/a</i>
Mitigation Measure	<p><i>Proper management and disposal of waste must occur during maintenance of the road and culverts. The road must be regularly maintained and the stormwater drains and culverts must be regularly checked to remove any blockages. Residents must be made aware of the potential impacts associated with dumping litter or any other waste such as oils etc. into the culverts and watercourse. This is not allowed and must be enforced by the municipality.</i></p> <p><i>No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the watercourse.</i></p> <p><i>The relevant authorities must be contacted in the event of any spillages of cement, fuels, oils and other potentially harmful chemicals. Any contaminated soil must be removed and the affected area rehabilitated immediately.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low - Medium</i>	<i>1.5</i>

Magnitude	Low - Moderate	1.5
Will irreplaceable resources be lost?	No	0
	Significance rating	10
OPERATIONAL IMPACTS		
Environmental Element	Flooding during operation (A1 and A2)	n/a
Nature of Impact	<i>Risk of flooding / excessive stormwater flow on site during operation that may result from blocked culverts.</i>	n/a
Extent of Impact	Site - local	2
Duration of Impact	Long term	3
Can impact be prevented/reversed or managed?	Yes impact can be prevented	1
Probability of impact occurring before mitigation	Medium-high	n/a
Mitigation Measure	<i>Culverts must be regularly checked and maintained by the municipality to ensure that it is not blocked to prevent flooding of the roads.</i>	n/a
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	Significance rating	8

8.1.3 Decommissioning Phase

Decommissioning Impacts: Alternative A1 & A2		Scores where applicable
Environmental Element	Erosion	n/a
Nature of Impact	<i>Decommissioning activities disrupting the watercourse and causing erosion / contamination of the watercourse.</i>	n/a
Extent of Impact	Site	1
Duration of Impact	Very short-term	1
Can impact be prevented/reversed or managed?	Yes impact can be managed	3
Probability of impact occurring before mitigation	Medium	n/a
Mitigation Measure	<i>The contractor and construction staff must be made aware of the sensitive areas i.e. the watercourse. Careful decommissioning under the guidance of a decommissioning EMP must be enforced. Any damage to the drainage channel must be immediately rehabilitated.</i>	n/a

	<i>Exposed areas must be rehabilitated immediately to prevent erosion or sedimentation of the watercourse. Disruption to the flow of the watercourse must be kept to a minimum and rehabilitation must follow as soon as possible.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	1
Magnitude	<i>Moderate</i>	2
Will irreplaceable resources be lost?	<i>No</i>	0
	Significance rating	8
Decommissioning Impacts: Alternatives A1 & A2		
Environmental Element	<i>Vegetation</i>	n/a
Nature of Impact	<i>Damage to riparian vegetation, indigenous or protected plant species.</i>	n/a
Extent of Impact	<i>Site</i>	1
Duration of Impact	<i>Very short-term</i>	1
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	1
Probability of impact occurring before mitigation	<i>Low-medium</i>	n/a
Mitigation Measure	<i>The contractor and construction staff must be made aware of the sensitive areas i.e. the riparian areas and any indigenous or protected vegetation. Careful decommissioning under the guidance of a decommissioning EMPr must be enforced. Any damage to the vegetation must be immediately rehabilitated.</i>	n/a
Probability of impact occurring after mitigation	<i>Low</i>	1
Magnitude	<i>Low</i>	1
Will irreplaceable resources be lost?	<i>No</i>	0
	Significance rating	5
Decommissioning Impacts: Alternatives A1 & A2		
Environmental Element	<i>Soil</i>	n/a
Nature of Impact	<i>Waste produced from removing culverts, stormwater drains</i>	n/a
Extent of Impact	<i>Site</i>	1
Duration of Impact	<i>Very short-term</i>	1

Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	1
Probability of impact occurring before mitigation	<i>Low-medium</i>	n/a
Mitigation Measure	<i>Waste should be recycled where possible. Waste that cannot be recycled should be disposed of at a registered landfill site and in accordance with a decommissioning EMP.</i>	n/a
Probability of impact occurring after mitigation	<i>Low</i>	1
Magnitude	<i>Low</i>	1
Will irreplaceable resources be lost?	<i>No</i>	0
	Significance rating	5

8.1.4 No-Go Option

Should the project not go-ahead, the site will remain in its existing condition, the open space areas will continue to be degraded. Dust will continue to pose an issue to residents and there is risk that the culverts will not function effectively as some of the structures are incorrectly placed. Dumping in the drainage channels will continue to take place and will not be rectified.

No-Go Option		
Environmental Element	<i>Traffic / Infrastructure</i>	n/a
Nature of Impact	<i>Continued lack of access to tarred roads with inadequate stormwater infrastructure and incorrectly sized culverts</i>	n/a
Extent of Impact	<i>Site</i>	1
Duration of Impact	<i>Long term</i>	3
Can impact be prevented/reversed or managed?	<i>The impact can be managed</i>	3
Probability of impact occurring before mitigation	<i>Low-medium</i>	n/a
Mitigation Measure	<i>This impact cannot be mitigated against as the road will remain gravel and if the upgrade does not go ahead then the stormwater infrastructure and culverts will remain in its existing condition and will not function appropriately.</i>	n/a
Probability of impact occurring after mitigation	<i>Medium –High</i>	3
Magnitude	<i>Medium – High</i>	2

Will irreplaceable resources be lost?	No	0
	Significance rating	12
No-Go Option		
Environmental Element	Health and Safety	n/a
Nature of Impact	<i>Instability of existing culverts, associated safety issues, collapse of culverts making to road inaccessible.</i>	n/a
Extent of Impact	Site	1
Duration of Impact	Long term	3
Can impact be prevented/reversed or managed?	The impact can be managed	3
Probability of impact occurring before mitigation	Low-medium	n/a
Mitigation Measure	<i>This impact cannot be mitigated against as the road will remain gravel and if the upgrade does not go ahead then the stormwater infrastructure and culverts will remain in its existing condition and will not function appropriately. The culverts may collapse thus preventing the further use of this road and this will create access issues.</i>	n/a
Probability of impact occurring after mitigation	Medium –High	3
Magnitude	Medium – High	2
Will irreplaceable resources be lost?	No	0
	Significance rating	12
No-Go Option		
Environmental Element	Vegetation	n/a
Nature of Impact	<i>Continued encroachment of alien vegetation</i>	n/a
Extent of Impact	Site	1
Duration of Impact	Long term	3
Can impact be prevented/reversed or managed?	The impact can be managed	3
Probability of impact occurring before mitigation	Low-medium	n/a
Mitigation Measure	<i>The municipality is responsible for management of open space areas within this site and as such must be responsible for the removal of alien vegetation in this area.</i>	n/a

	<i>If the alien vegetation continues to encroach into surrounding areas, any indigenous vegetation and protected species may be completely destroyed.</i>	
Probability of impact occurring after mitigation	<i>Medium – High</i>	3
Magnitude	<i>Medium – High</i>	2
Will irreplaceable resources be lost?	<i>No</i>	0
	Significance rating	12

8.2 Comparative Assessment of Alternatives

	Environmental / Ecological	Surrounding Business / Communities	Economic feasibility
Alternative A1 / S1 (pre cast culverts)	This option will potentially have an impact on the surrounding environment, however provided that the mitigation measures are implemented the potential impacts can be prevented reduced and managed.	Both alternatives will have the same positive impact on the surrounding community members in terms of tarred access roads with efficient stormwater infrastructure and culverts.	This option is the most cost-effective method.
Alternative A2 / S1 (cast in-situ culverts)	The potential impacts imposed on the environment as a result of this option will be slightly greater than using precast culverts. There will be a greater risk of contamination of the watercourse due the pouring of concrete on site; this option will also require more working space.		This option is more than expensive than using precast culverts.
No-go option	No construction activities will occur on site. The site will continue to be invaded by alien vegetation and the watercourses will be at risk from the incorrectly placed culverts inefficient stormwater infrastructure. Dust will also continue to be an issues.	This option will not benefit the community as the stormwater infrastructure and culverts will continue to be inadequate and dust will still be an issue.	The culverts and stormwater infrastructure need to be repaired and the road needs to be upgraded. If left in its current condition the repairs will amount to more than what is proposed for the upgrade.

9.0 EIA Timeframes and An indication of the Stages at which the Competent Authority will be Consulted

Authorities such as eThekweni Municipality, Department of Water and Sanitation, EKZN Wildlife, Department of Agriculture Forestry and Fisheries (DAFF), Department of Transport (DoT), AMAFA, Department of Human Settlements, Ward Councillor and the Ratepayers Association will be provided with all documentation and reports for review and comment. The Provincial Department of Economic Development, Tourism and Environmental Affairs (EDTEA) is the competent authority on this application; final reports will be submitted to this department for acceptance and authorisation.

Table 13: EIA Timeframes

Tasks	Timeframe
Notification of I&APs	17 – 24 June 2015
Placement of signboards	17 June 2015
Notification of Authorities	19 – 24 June 2015
Placement of adverts	19 June 2015 and 14 August 2015
Distribution of BID to I&APs and Authorities	06 and 07 July 2015
Submission of Application form to EDTEA	27 January 2016
Acknowledgment of receipt by EDTEA	10 February 2016
Distribution of draft BAR to I&APs and Authorities (30 day comment period)	07 December 2015 – 25 January 2016
Distribution of final BAR to I&APs and Authorities (14 day comment period)	27 January 2016 – 10 February 2016
Submission of final BAR to EDTEA for authorisation	27 January 2016

10.0 Assumptions, Uncertainties, Limitations and Gaps in Information

Assumption: It is assumed that all information provided by the applicant is true and accurate.

11.0 Proposed Monitoring and Auditing

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

Alternative S1 (preferred site)

Construction phase:

Compliance monitoring will be conducted weekly/monthly to ensure compliance with the Environmental Management Programme (EMPr). The audit must be conducted by an independent Environmental Control Officer (ECO).

Operational phase:

Monitoring through the EMPr. Routine checks must be made on the road, culverts and associated stormwater infrastructure to ensure that the watercourse is not damaged in any way and the systems are effectively functioning.

Alternative A1 (preferred alternative)

Construction phase:

Compliance monitoring will be conducted weekly/monthly to ensure compliance with the Environmental Management Programme (EMPr). The audit must be conducted by an

Alternative A2

Construction phase:

Compliance monitoring will be conducted weekly/monthly to ensure compliance with the Environmental Management Programme (EMPr). The audit must be conducted by an

independent Environmental Control Officer (ECO). Operational phase: Monitoring through the EMPr. Routine checks must be made on the road, culverts and associated stormwater infrastructure to ensure that the watercourse is not damaged in any way and the systems are effectively functioning.	independent Environmental Control Officer (ECO). Operational phase: Monitoring through the EMPr. Routine checks must be made on the road, culverts and associated stormwater infrastructure to ensure that the watercourse is not damaged in any way and the systems are effectively functioning.
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12.0 Environmental impact statement

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

A1/S1

The applicant, Msunduzi Municipality, proposes to upgrade approximately 5.3km of road in the Peacevalley III area of Edendale. The road will be upgraded from gravel to tar and will include the upgrade of stormwater infrastructure and culverts. Eleven (11) culverts will be replaced and/or repaired. **Please note that only the upgrade of the culverts will be assessed in this Basic Assessment Report as work will take place within the watercourse which are anticipated to be more than 5m3. The upgrade of the existing road will not require environmental authorisation as this upgrade will be located outside of the watercourse.**

This alternative will make use of pre-cast culverts for the upgrade. The potential impacts posed by the upgrade have been identified and assessed. The most significant impacts related to the potential damage to the watercourse including contamination of the watercourse and riparian habitat, potential risk of spillages and increased in traffic and during the construction phase. The potential loss of habitat including potential damage to indigenous and / or protected vegetation and fauna was also identified as a significant impact. This project will have a positive impact in terms of local employment and upgrade of infrastructure. Provided that all the mitigation measures are adhered to, it is anticipated that impacts posed by the proposed project will be minimal and of low significance. The area is degraded with evidence of litter and encroachment of alien vegetation, it is anticipated that the proposed upgrade will positively affect the community.

The proposed upgrade is anticipated to pose minimal impact during the operational phase provided that the culverts, stormwater infrastructure and tarred road are regularly maintained by the applicant.

Provided the mitigation measures, specialist recommendations and EMPr are followed, the EAP is of the opinion that all impacts raised and assessed can be mitigated against.

A2/S2

The applicant, Msunduzi Municipality, proposes to upgrade approximately 5.3km of road in the Peacevalley III area of Edendale. The road will be upgraded from gravel to tar and will include the upgrade of stormwater infrastructure and culverts. Eleven (11) culverts will be replaced and/or repaired. **Please note that only the upgrade of the culverts will be assessed in this Basic Assessment Report as work will take place within the watercourse which are anticipated to be more than 5m3. The upgrade of the existing road will not require environmental authorisation as this upgrade will be located outside of the watercourse.**

This alternative will not make use of pre-cast culverts for the upgrade, instead, the culverts will be cast on site. The potential impacts posed by the upgrade have been identified and assessed. The most significant impacts

related to the potential damage to the watercourse including contamination of the watercourse and riparian habitat, potential risk of spillages and increased in traffic and during the construction phase. The potential loss of habitat including potential damage to indigenous and / or protected vegetation and fauna was also identified as a significant impact. This project will have a positive impact in terms of local employment and upgrade of infrastructure. Provided that all the mitigation measures are adhered to, it is anticipated that impacts posed by the proposed project will be of low - medium significance. The area is degraded with evidence of litter and encroachment of alien vegetation, it is anticipated that the proposed upgrade will positively affect the community.

The proposed upgrade is anticipated to pose minimal impact during the operational phase provided that the culverts, stormwater infrastructure and tarred road are regularly maintained by the applicant.

Provided the mitigation measures, specialist recommendations and EMPr are followed, the EAP is of the opinion that all impacts raised and assessed can be mitigated against. However, this alternative will pose a slightly higher risk of contamination of the watercourse and riparian habitat due to the pouring of concrete on site, in comparison to alternative A1 which will make use of precast culverts. This option is also slightly more costly to implement than alternative A1.

No Go-Alternative

The no-go option would mean that the site will remain in its existing condition. The culverts are currently located in the incorrect places and not aligned properly with the existing gravel road. This will continue to pose a potential risk to community members in terms of dust levels and inefficient functioning of the stormwater infrastructure. The site will become further degraded and the entire site will be invaded by alien vegetation. Litter and dumping into the watercourses will continue to destroy the functioning of the watercourse and ecological system.

13.0 Recommendation of EAP

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

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

YES	NO
X	
N/A	

If "YES", please attach the draft EMPr as Appendix 6 to this report and list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

1. It is recommended that alternative A1 and S1 be accepted as the preferred alternative from an ecological and social perspective.
2. All mitigation measures made in section 8 of this BAR and by the specialist must be adhered to where relevant.
3. The EMPr as attached in Appendix 6 of this BAR must be strictly adhered to. An independent Environmental Control Officer (ECO) must be appointed to monitor compliance of the proposed activity in relation to this BAR and EMPr.
4. The upgrade of the culverts will take place within a watercourse and will require a Water Use License (WUL), the applicant must ensure that the DWS is contacted and the relevant licenses are applied for where applicable.
5. It is the responsibility of the applicant to ensure compliance with all other relevant and applicable legislation, regulations and guidelines.
6. Upon completion of construction activities, the site must be rehabilitated. Any damaged infrastructure or service lines must be immediately repaired. A post construction audit must be undertaken prior to the contractors leaving the site.

7. The Environmental Authorisation is required only for the construction phase of this project and should be valid for the next five years as the commencement of construction is also dependant on the WUL application process.

14.0 References

Afzelia, 2015. Ecological Impact Assessment. Upgrade of Peacevalley III Roads, Pietermaritzburg, Msunduzi Municipality, Kwa-Zulu Natal.

Anderson, 2015. Letter of Exemption for the Peace Valley III Road Upgrade.

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DEAT (2006) Guideline 5: Assessment of Alternatives and Impacts in support of the Environmental Impact Assessment Regulations, 2006. Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DWAF (2005). Guide to the National Water Act. Accessed online via <https://www.dwa.gov.za/documents/publications/NWAGuide.pdf> on 05/11/2015.

Henwood and Nxumalo, 2015. Design Report for the Peacevalley III Road Upgrade.

Shaw and Escott, 2011. KwaZulu – Natal Vegetation Type Description Document for Vegetation Map 2011: kznveg05v2_1_11_wll.shp. Accessed online via http://bgis.sanbi.org/BGISdownloads/Documents/KZN/KZN_vegetationtypes_descriptionsVer2_1.pdf on 05/11/2015.

Terratest (2015). Peace Valley III Roads Upgrade Pietermaritzburg (Geotechnical Investigation).

Western Cape (DEA&DP, 2010). Guideline on Alternatives, 13pp. Available online: http://www.westerncape.gov.za/other/2010/8/dea&dp_eia_guideline_on_alternatives_aug2010.pdf

Appendix 1: Curriculum Vitae of EAP and EAP Declaration

Appendix 2: Layout Plans and Designs of Culvert

Appendix 3: 1:50 000 Topographic Map and Google Earth Maps

Appendix 4: Proof of Public Participation

- **Copy of Notice of Application and Copy of Advert**
- **Proof of Advert Placement**
- **Proof of Notification (on site and electronic)**
- **Notification Letter to Ward Councillor**
- **Proof of Signboard Placement**
- **Register of Interested and Affected Parties (I & APs)**
- **BID and Distribution of BID**
- **Communications with I & APs**

Appendix 5: Actual Comment received form I&AP

Appendix 6: Environmental Management Programme (EMPr)

Appendix 7: Specialist Studies
