ETHEKWINI MUNICIPALITY: ROADS PROVISION DEPARTMENT

PROPOSED CULVERT UPGRADING ON ROAD A637, FOLWENI

DRAFT BASIC ASSESSMENT REPORT

AUGUST 04, 2017

PUBLIC

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TYPE OF DOCUMENT (VERSION)
PUBLIC

PROJECT NO.: 48465
DATE: AUGUST 2017

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QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Draft			
Date	August 2017			
Prepared by	Bathabile Msomi			
Signature	Msomi, Bathabile Digitally signed by Msomi, Bathabile DN: cn=Msomi, Bathabile, ou=Durban (Langford Road), email=Bathabile.Msomi@wsp.com Date: 2017.08.14 10:00:05 +02'00'			
Checked by	Hilary Konigkramer			
Signature	Konigkramer, Hilary 2017.08.14 10:06:26 +02'00'			
Authorised by	Hilary Konigkramer			
Signature	Konigkramer, Hilary 2017.08.14 10:06:39 +02'00'			
Project number	48465			
Report number	001			
File reference	G:\000 NEW Projects\48465_Proposed Culvert Ugrade_Draft BAR			

SIGNATURES

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Hilary Konigkramer, Director

WAIVER

Purpose and basis of preparation of this Report.

This Basic Assessment Report has been prepared by WSP Environmental Proprietary Limited (WSP) on behalf and at the request of eThekwini Municipality: Roads Provision Department, to provide the Client an understanding of the Relevant Documents.

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report and except where otherwise indicated in the Report.

PRODUCTION TEAM

CLIENT

Civil Engineering Technologist	Viren Beeharilal

WSP

Project Director	Hilary Konigkramer
Project Manager	Bathabile Msomi

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

EThekwini Municipality, Engineering Unit: Roads Provision Department (eThekwini) are proposing the upgrade of a culvert and gravel Road A637 in Folweni, KwaZulu-Natal. The upgrading of the existing culvert is subject to an Environmental Authorisation (EA) by the Department of Economic Development, Tourism and Environmental Affairs (EDTEA) in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 as amended, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

WSP Environmental (Pty) Ltd (WSP) has been appointed by eThekwini to undertake the function of independent Environmental Assessment Practitioner (EAP) to facilitate the basic assessment (BA) process (Reference Number: DM/0023/2017) in accordance with the 2014 EIA Regulations.

1.2 PROJECT BACKGROUND

The A637 road is located within Ward 67 in Folweni which is south of Durban (Figure 1). The A637 is an existing gravel road, which serves as a taxi route between the A640 and Sbu Magwanyane Highway (MR35). The proposed culvert and road upgrade is part of a larger project being undertaken by eThekwini where existing gravel roads are being formally upgraded. The proposed road upgrade does not require EA prior to construction because the proposed activity does not trigger any of the EIA listed activities. However, the proposed culvert requires EA because it will result in the depositing and infilling of material from a watercourse. A general authorisation (GA) water use license application (WULA) is also being undertaken as part of this BA process.

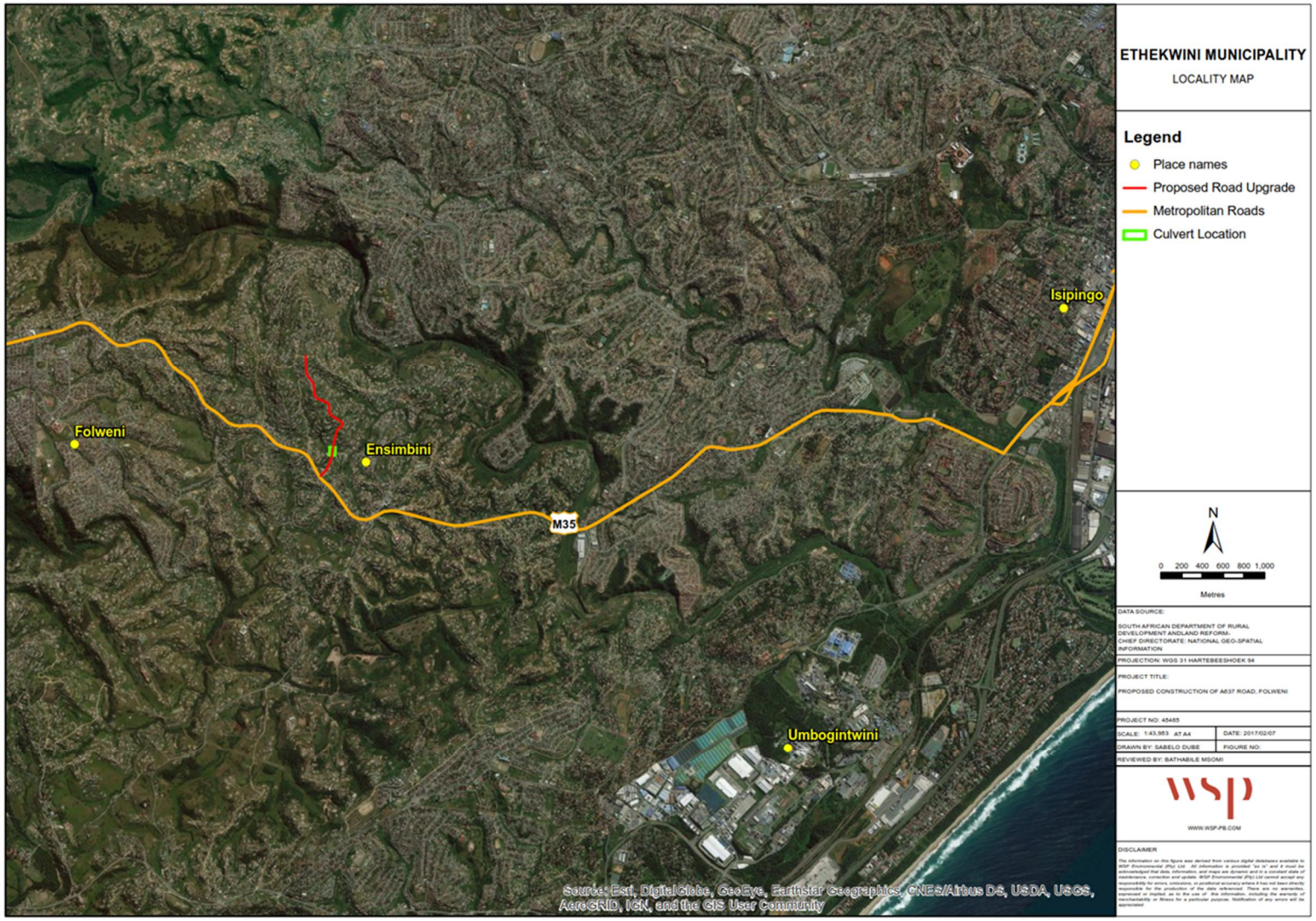


Figure 1: Locality Map (WSP GIS, 2017)

1.3 PROJECT PROPONENT

The details of the project proponent are provided in Table 1.

Table 1: Details of the Proponent

Item	Description
Proponent:	eThekwini Municipality: Roads Provision Department
Contact Person:	Viren Beeharilal
Physical Address:	30 Archie Gumede Place Durban 4001
Telephone:	031 311 7655
Email:	viren.beeharilala@durban.gov.za

1.4 COMPETENT AUTHORITY

The competent authority in terms of the application for EA are provided in Table 2.

Table 2: Competent Authority

Aspect	Competent Authority	Contact Details
Environmental Authorisation	EDTEA (EThekwini District)	Natasha Brijlal 031 366 7317/19

1.5 ENVIRONMENTAL ASSESSMENT PRACTIONER AND PROJECT TEAM

Details of the EAP are described in Table 3. Curriculum Vitae are attached as Appendix A of this report.

Table 3: EAP Details

Name	Role	Qualifications	Experience (years)
Hilary Konigkramer	Project Director	Hons. Environmental Management (University of Natal)	16 years
Bathabile Msomi	Project Manager (EAP)	Hons. Environmental Management (University of KwaZulu-Natal)	4 years

2 SCOPE OF WORK AND METHODOLOGY

2.1 OBJECTIVES OF THE BASIC ASSESSMENT PROCESS

The BA process has been undertaken in accordance with Appendix 1 of GNR 326 of the NEMA EIA Regulations, culminating in the compilation of the Draft Basic Assessment Report (BAR) (this document). The objectives of the BA process are:

- To determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- To identify the alternatives considered, including the activity, location, technology alternatives and no go option;
- To describe the need and desirability of the proposed alternatives;
- To determine the nature, significance, consequence, extent, duration and probability of the impacts occurring;
- To determine the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated;
- To identify and motivate a preferred site, activity and technology alternative;
- To identify suitable measures to avoid, manage or mitigate identified impacts; and,
- To identify residual risks which need to be managed and monitored.

2.2 STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder engagement is a fundamental part of the BA process and aims to include interested and affected parties in the process by notifying them of the proposed project. The stakeholder engagement process was initiated in February 2017. The process employed a number of techniques to establish contact and raise awareness amongst stakeholders with reference to the application. The objectives of the stakeholder engagement process are to:

- Ensure an open and transparent BA and consultation process;
- Enable stakeholders to register their interest, share information and provide input into the BA process; and,
- Ensure that all relevant issues are addressed as part of the BA process.

A Stakeholder Engagement Report is included in Appendix E, detailing the project's compliance with Chapter 6 of the NEMA EIA Regulations.

2.3 IMPACT ASSESSMENT METHODOLOGY

The key objectives of the risk assessment methodology will be to validate impacts identified through a matrix, identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts.

The Hackings risk assessment methodology has been used for the ranking of the identified environmental impacts (Hacking, 2001b). The significance of environmental aspects can be determined and ranked by considering the criteria presented in Table 4.

Table 4: Criteria Used to Determine the Significance of Environmental Aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

Where significant environmental aspects are present ("high" or "moderate"), significant environmental impacts may result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

SEVERITY OF IMPACTS

Table 5 presents the ranking criteria that can be used to determine the severity of impacts on the biophysical and socio-economic environment. Table 6 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 5: Criteria for Ranking the Severity of Environmental Impacts

	Negative			Positive		
Criteria	High-	Medium-	Low-	Low+	Medium+	High+
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration. Discomfort.	Minor deterioration. Nuisance or minor irritation.	Minor improvement.	Moderate improvement.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favourable publicity

Table 6: Criteria for Ranking the Severity of Negative Impacts on the Biophysical Environment

	Ranking Criteria		
	Low (L-)	Medium (M-)	High (H-)
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Flora and Fauna)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

SPATIAL EXTENT AND DURATION OF IMPACTS

The duration and spatial scale of impacts can be ranked using the criteria in Table 7.

Table 7: Ranking the Duration and Spatial Scale of Impacts

	Ranking Criteria		
	Low (L-)	**Medium (M-)**	**High (H-)**
Duration	Quickly reversible. Less than the project life. Short-term	Reversible over time. Life of the project. Medium-term	Permanent. Beyond closure Long-term
Spatial Scale	Localised. Within site boundary	Fairly widespread. Beyond site boundary Local	Widespread. Far beyond site boundary. Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

CONSEQUENCE OF IMPACTS

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the qualitative guidelines in Table 8.

Table 8: Ranking the Consequence of an Impact

Severity = Low (L)

Spatial Scale			Localised - within site boundary	Beyond site boundary	Far beyond site boundary
			Low	Medium	High
DURATION	Long Term	High	Medium	Medium	Medium
	Medium Term	Medium	Low	Low	Medium
	Short Term	Low	Low	Low	Medium

Severity = Medium (M)

Spatial Scale			Localised - within site boundary	Beyond site boundary	Far beyond site boundary
			Low	Medium	High
DURATION	Long Term	High	Medium	High	High
	Medium Term	Medium	Medium	Medium	High
	Short Term	Low	Low	Medium	Medium

Severity = High (H)

Spatial Scale			Localised - within site boundary	Beyond site boundary	Far beyond site boundary
			Low	Medium	High
DURATION	Long Term	High	High	High	High
	Medium Term	Medium	Medium	Medium	High
	Short Term	Low	Medium	Medium	High

To use Table 9, firstly go to one of the three "layers" based on the severity ranking obtained from Table 5 and/ or Table 6. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

OVERALL SIGNIFICANCE OF IMPACTS

Combining the consequence of the impact and the probability of occurrence, as shown by Table 9 provides the overall significance (risk) of impacts.

Table 9: Ranking the Overall Significance of Impacts

Consequence (from Table 14-15)			Low	Medium	High
PROBABILITY	Definite Continuous	High	Medium	Medium	High
	Possible Frequent	Medium	Medium	Medium	High
	Unlikely Seldom	Low	Low	Low	Medium

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making (Table 10):

Table 10: Guidelines for decision-making

Significance of Impact	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

3 LEGAL FRAMEWORK

3.1 NATIONAL ENVIRONMENTAL MANAGAMENT ACT

The NEMA provides the environmental legislative framework for South Africa. The 2014 EIA Regulations (as amended), promulgated under the NEMA, contain Listed Activities that require either a BA or Scoping and EIA procedure in order to obtain EA from the relevant authority. The proposed upgrading of the culvert at a stream crossing triggers a BA. The listed activities which are applicable to the proposed development for which EA is being applied for is presented in Table 11 below

Table 11: NEMA Scheduled Activity

Activity number	Listed activity	Description of project activity
GN R327, April 2017		
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from- (i) a watercourse;	The upgrade of the existing culvert over a stream will require the infilling and depositing of material from the watercourse.

3.2 NATIONAL WATER ACT

The National Water Act (Act No.36, 1998) (NWA) aims to control the use of water, which may affect water resources through the licencing of specific water uses in terms of Section 21 of the act. A water use must be licensed unless it (a) is listed in Schedule 1, (b) is an existing lawful use, (c) is permissible under a GA; or (d) if a responsible authority waives the need for a licence. If none of these exclusions are relevant a Water Use Licence (WUL) must be applied for and obtained prior to the commencement of such listed activity. A WUL is being applied for as the proposed culvert construction intercepts a drainage line. The Section 21 water uses listed below (Table 5) are applicable to the proposed culvert construction and a GA is being applied for in conjunction to this BA process.

Table 12: Section 21 Water Uses

Relevant NWA section	Water Use Description	Relevance to proposed activity
21 (c)	Impeding and diverting the flow of water in a watercourse;	The construction activities associated with the upgrade of the culvert will require a temporary diversion of the stream.
21 (i)	Altering the bed, banks, course and characteristics of a watercourse.	The temporary diversion of the watercourse during construction will alter the characteristics of the watercourse.

3.3 NATIONAL HERITAGE ACT

The National Heritage Resources Act (Act No. 25 of 1999) (NHRA) established the South African Heritage Resources Agency (SAHRA) in 1999. SAHRA is tasked with protecting heritage resources of national significance. Under Section 38 "(1)…any person who intends to undertake a development categorised as – (a) the construction of a road exceeding 300m in length; and (i) any development or activity exceeding 5 000m^2 in extent…must at the earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. (2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection (1) ….notify the person who intends to undertake the development to submit an impact assessment report….or (b) notify the person concerned that this section does not apply".

The proposed culvert will not exceed an extent of 5 000m^2 therefore does not trigger the requirement of an HIA. The section of road that is proposed to be upgraded exceeds 300m length. As the road is existing and the area is highly transformed, it is highly unlikely that the upgrade of the road will require a HIA. This component of the project may require an exclusion from an HIA, which will be confirmed with the relevant authority.

4 PROJECT DESCRIPTION

4.1 PROJECT LOCATION

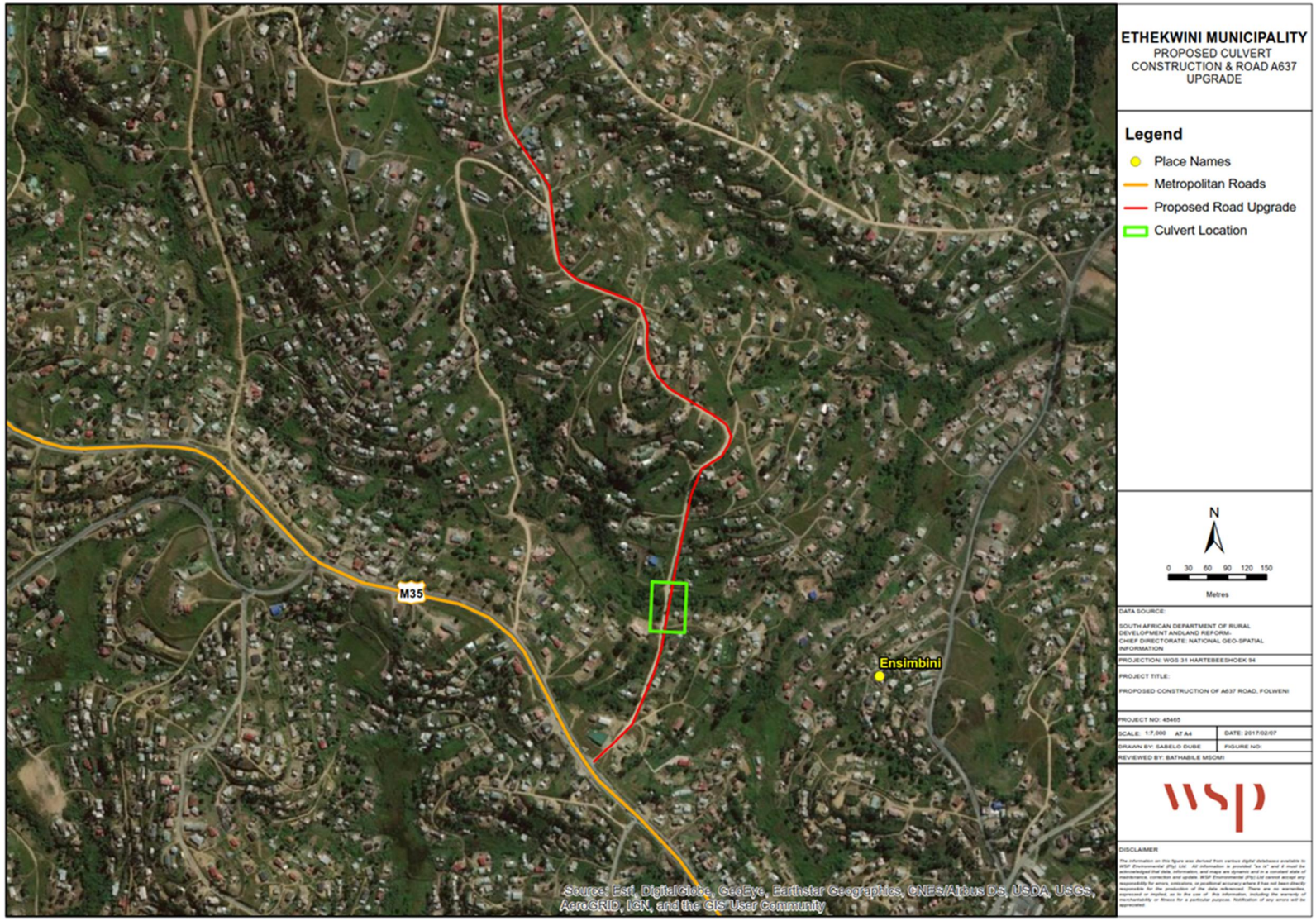
The proposed activity is located within Ward 67 in the Mthombeni VD settlement, within Folweni of the eThekwini Metropolitan area at the geographical coordinates outlined in Table 6. The site is located in an area under the ownership of the Ingonyama Trust. The area is a peri-urban environment with existing residential dwellings located adjacent to the road. The inhabitants are holders of a 'Permission to Occupy' document, which allows for occupancy and de facto ownership. The site has no surveyor general code digits however; the geographical co-ordinates are outlined in Table 6.

Table 13: Geographical coordinates

	Coordinates	
Culvert	29°59'45.25"S; 30°51'2.93"E	
A637 Gravel Road	Start	29°59'53.40"S; 30°50'58.63"E
	Middle	29°59'31.79"S; 30°51'1.64"E
	End	29°59'15.66"S; 30°50'53.40"E

Isipingo is the nearest town and is located approximately 7 km to the east of the site (Figure 1). Access to the site is from the N2 onto the M35 and left onto the A637 gravel road.

The culvert is located on the A637 gravel road, which runs through a settlement area. The site is zoned roads and falls within the Mthombeni VD settlement area in Folweni. Zenzele Primary School is located <1km to the east of the A637 gravel road and a purification plant is approximately 970m to the north of the site. A locality map is provided in Figure 2.



ETHEKWINI MUNICIPALITY
PROPOSED CULVERT CONSTRUCTION & ROAD A637 UPGRADE

Legend
- Place Names
- Metropolitan Roads
- Proposed Road Upgrade
- Culvert Location

N

0 30 60 90 120 150
Metres

DATA SOURCE:
SOUTH AFRICAN DEPARTMENT OF RURAL DEVELOPMENT AND LAND REFORM- CHIEF DIRECTORATE: NATIONAL GEO-SPATIAL INFORMATION

PROJECTION: WGS 31 HARTEBEESHOEK 94

PROJECT TITLE:
PROPOSED CONSTRUCTION OF A637 ROAD, FOLWENI

PROJECT NO: 45465

SCALE: 1:7,000 AT A4 | DATE: 2017-02-07

DRAWN BY: SABELO DUBE | FIGURE NO:

REVIEWED BY: BATHABILE MSOMI

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Figure 2: Site Locality (WSP GIS, 2017)

4.2 PROPOSED ACTIVITY DESCRIPTION

The proposed project entails the upgrading of an existing culvert, construction of stormwater inlets, manholes and piping and upgrade of the A637 gravel road. The road alignment runs in between formal and semiformal houses and crosses one watercourse where the culvert is located. The A637 road is an existing gravel road utilised by the local taxis and pedestrians and will be upgraded to an asphalt surface. The existing road is in a poor condition and has been eroded due to lack of appropriate stormwater drainage. The proposed development is expected to be completed within a 3-month timeframe.

The proposed project includes the following:

- Upgrade of the existing concrete culvert;
- Road upgrade (construction of a 5.5m wide asphalt surface road with selected layerworks);
- Construction of a kerb and channel;
- Construction of stormwater inlets; and
- Manholes and piping.

4.2.1 CONSTRUCTION PHASE

PROPOSED CULVERT

The existing culvert is located within the A637 gravel road and crosses a non-perennial stream. The upgrade of the culvert will entail the following;

- Excavation and compaction of materials to required levels and standards;
- Construction of 50mm blinding for concrete works;
- Construction of culvert base as per design drawings and standards;
- Construction of the culvert walls and roof slab as per design drawings and standards;
- Backfilling and compaction of materials to required levels;
- Re-instate river environment to original condition.

ROAD UPGRADE

eThekwini have decided to improve the condition of the existing A637 during the upgrade of the existing culvert. The current road is a gravel top and is approximately 4.0m - 5.5m in width. The width varies at different sections of the road. The proposed road upgrade will involve the construction of a 5.5m wide asphalt surface road with selected layerworks.

Road construction will include the following process:

- Earthwork excavations and compaction to design level;
- Import of suitable materials as per the design report; and
- Stormwater installation.

The designs for both the culvert (Appendix C 1) and the road (Appendix C2) are in line with eThekwini design standards and are best suited for that particular area and terrain.

4.2.2 OPERATIONAL PHASE

The operational phase will commence immediately upon the completion of the construction phase. The road culvert will allow for improved access for vehicles (taxis) at the water crossing. The road surface upgrade will minimise the

risks of flooding of the adjacent households during high rainfall seasons as it includes stormwater management outlets and manholes.

4.2.3 DECOMMISSIONING PHASE

The proposed development and associated activities are likely to be in operation for the near future, and therefore the likely impacts of decommissioning cannot be accurately predicted at this stage. However, impacts during decommissioning are likely to be similar in nature to those identified for the construction phase and will be managed in cognisance of the applicable legislation.

4.3 PROJECT ALTERNATIVES

The identification of alternatives provides a basis for demonstrating the options considered by the project team and selection of feasible or preferred option available to the decision-making authority. This is a requirement of the 2014 EIA regulations (amended 2017). The alternatives considered and evaluated in the BA process are outlined below.

4.4 ACTIVITY ALTERNATIVES

The preferred activity is the upgrading of the existing culvert and formalising of the existing A637 gravel road. No other activity alternative exists that would meet the need and desirability of the application.

4.4.1 PREFFERED SITE ALTERNATIVES

The project proposes that the existing culvert and A637 gravel road be upgraded to improve their current condition. The site has been identified by the eThekwini as an area where existing infrastructure requires improvement to ensure access and erosion issues are addressed. As the proposed project is the upgrade of existing infrastructure it is not feasible to identify alternative sites.

4.4.2 DESIGN ALTERNATIVES

This project entails upgrading of the existing gravel road (A637) located in an area under the ownership of the Ingonyama Trust. The area is a peri-urban environment with existing residential dwellings located adjacent to the road. The inhabitants are holders of a 'Permission to Occupy' document, which allows for occupancy and de facto ownership. The terrain is rolling to steep and can be a constraint to vehicles utilising it. The preferred layout was selected based on consideration of these factors. The proposed road alignment has been enhanced where necessary to improve the road geometry and provide for traffic safety (i.e. sight distance, stopping distance and horizontal curvature).

CULVERT

A Box Culvert type has been selected as the most preferred culvert type. The Coastal, Stormwater and Catchment Management unit conducted an internal assessment to determine the most suitable culvert for the site. It was confirmed that a Box culvert would be most suitable, as it would not affect the stream flow.

ROAD UPGRADE

Three options were considered for the proposed road upgrade in respect of pavement materials. These options are outlined below:

- Gravel material upgrade – The steep terrain of the site makes this option less feasible because it would require high frequency of maintenance post construction.
- Bitumen stabilised base material with asphalt wearing course – This option provides a more durable wearing surface but has a lower load bearing capacity. This lower load capacity makes this pavement type less suitable as it would not provide the required serviceability for the 20 year design span.

- Granular base with asphalt wearing course (preferred) – This option incorporates a more durable asphalt wearing course with a higher strength pavement base layer. This ensures greater load capacity and higher serviceability thus ensuring lower maintenance needs during the required 20-year design lifespan. This option was considered the most appropriate and suitable.

STORMWATER MANAGEMENT

The options considered for stormwater management included earth drains, grass-lined drains, concrete drains and concrete subsurface pipes.

EThekwini proposes to use a combination of concrete drains and concrete subsurface pipes for stormwater management. This is due to the steep terrain resulting in higher velocities and thus greater risk of scouring and erosions. The use of the concrete drains also provides for greater life-span and lower maintenance needs.

4.4.3 NO-GO ALTERNATIVE

The no-go alternative refers to the option of not upgrading the culvert and A637 gravel road. The condition of the existing culvert and road will continue to be degraded with increased taxis utilising the road. The 'do-nothing' scenario will result in the continuation of the status quo, which could have the following implication:

- Increase road risks due to deteriorated road conditions;
- Increased sedimentation of watercourse from increased soil erosion;
- Increase risk of flooding of the houses adjacent to the road due to inefficient storm water management systems.

4.5 NEED AND DESIRABILITY

The Mthombeni VD settlement, located within Folweni is an area that lacks formalised internal road infrastructure. The A637 gravel road is an internal road that links the semi-rural settlements to A640 and Sbu Magwanyane Highway. The existing culvert and A637 gravel road are in a poor condition and have severely deteriorated. There are currently no formal stormwater drainages and the road becomes a channel for stormwater, which increases risk of flooding of along the road during the rainfall seasons. Access to this road is dangerous especially during rainy season due to the terrain and condition of the infrastructure.

The proposed upgrade will improve the local infrastructure and minimise flood risks for households adjacent to the site and at the water crossing area. It will also improve linkage between the settlement area and the main road allowing for improved transportation networks. The upgrade will include pavements, which will improve pedestrian safety especially that of the young school children walking to the nearby schools.

5 ENVIRONMENTAL BASELINE

5.1 CLIMATE

The Folweni area falls within the coastal climate zone with a mean annual rainfall range of 820 mm to 1,423 mm. The mean annual temperature of the areas ranges between 22.0°C and 18.5°C. Thus the climatic condition for the area can be classed as moderate as it is not too hot in summer and not too cold either in winter (EThekwini Municipality, 2013).

5.2 TOPOGRAPHY

The proposed site is characterized by a hilly terrain characterized by several undulating hills. The hilly nature of the site results in steep slopes and deep valleys. The existing culvert is located within the valley bottom whilst the A637 gravel channels on the steep hillside.

5.3 GEOLOGY AND SOILS

According to the 1:250 000 Geological Map, the culvert is underlain by the red brown coarse-grained arkosic to subarkosic sandstone; quartz arenite; micaceous sandstone; small pebble conglomerate; subordinate siltstone and mudstone of the Natal Group Natal Group. The A637 gravel road is underlain by this group formation as well as diamicite; subordinate thin sandstone of the Dwyka Formation (Figure 3).

5.4 HYDROLOGY

There are a number of drainage lines that traverse the Folweni area. The site falls within the western catchment of the Mbokodweni River, which runs along the eastern boundary of the proposed site. A small stream feeding into the Mbokodweni River crosses the A 637 road (Figure 5). During the site walk over a minimal flow of the stream was observed. It is assumed that the flows are seasonal with the watercourse being dry in the winter months. According to the National Freshwater Ecosystems Priority Areas (2012), no wetlands are present on or near the site (Figure 4).

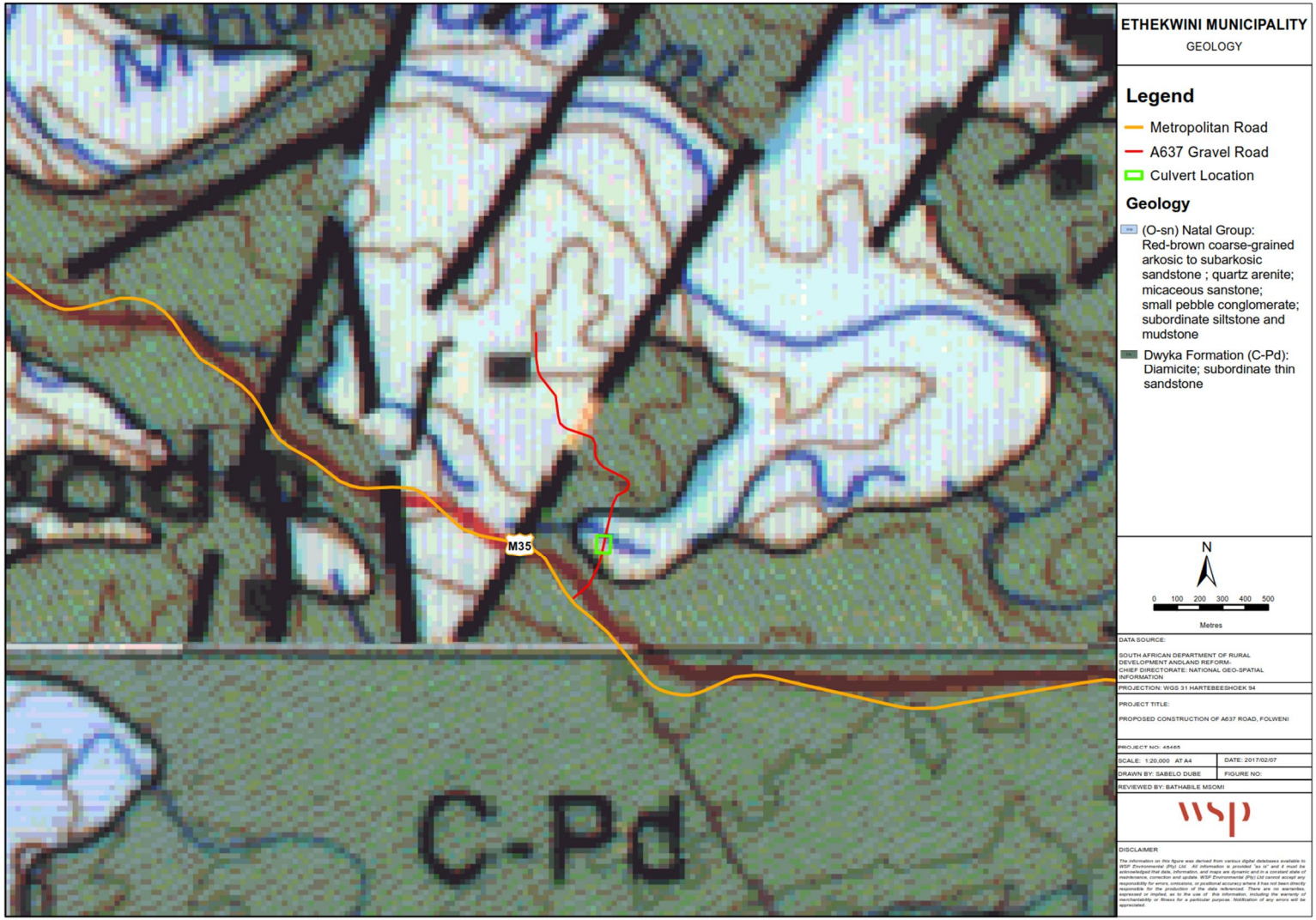

Figure 3: Geological Map (WSP GIS, 2017)

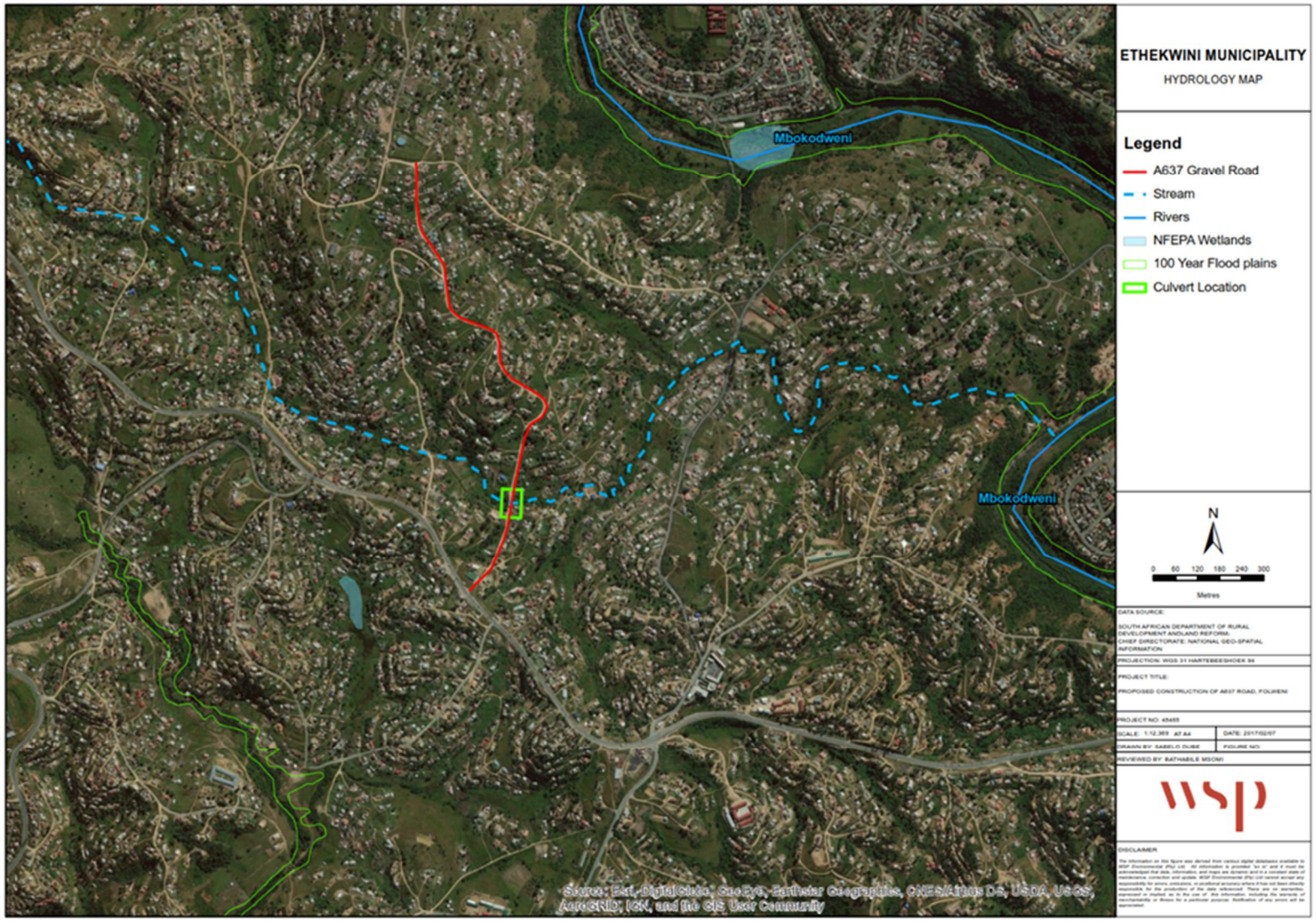

Figure 4: Hydrology Map (WSP GIS, 2017)

5.5 FAUNA AND FLORA

Minimal biodiversity of conservation significance was observed at the existing culvert location (Figure 5 - 8). The site falls under a vegetation type classified as the Kwazulu-Natal Coastal Belt (Figure 9). The vegetation consists of grass type vegetation and alien vegetation. The area where the culvert and road will be upgraded has undergone major alternation due to settlement encroachment hence the site having very little biodiversity of significant concern.

Figure 5: Vegetation near the stream

Figure 6: Vegetation around the existing culvert

Figure 7: Vegetation along the A637 gravel road.

Figure 8: Vegetation along the A637 gravel road.

Figure 9: Vegetation cover map (WSP GIS, 2017)

5.6 NOISE

The main sources of noise in the area and surrounds are associated with vehicular movements and human activities. The proposed sites fall within a residential area with the Sbu Magwanyane Highway in close proximity. Noise levels in the area can be classed as low.

5.7 AIR QUALITY

The proposed site is situated within a semi-rural residential area, which has a high-density settlement pattern. The nearest industrial area is located more than 10km away. The main source of air emissions are vehicular emissions and dust from the gravel road. The area is a semi-rural area and some houses may utilise energy sources such as paraffin, which may contribute to the air emissions.

5.8 LAND USE CAPABILITY

The proposed site is located in an area built up for residential settlement (Figure 10). There is a mix of formal and semi-formal dwellings. The site has a steep topography and there is minimal agricultural activities taking place near the site. Some households have water purification plant is located less than 1 km from the site.

5.9 SOCIAL

The eThekwini Metropolitan Municipality is located on the east coast of South Africa within the province of KwaZulu-Natal and is a Category A municipality. It covers an area of approximately 2 297km^2 and is home to approximately 3, 7 million people (Statistics SA, 2016). Its land area is comparatively larger than that of other South African cities and is topographically hilly, with many gorges and ravines and almost no true coastal plain.

Folweni falls within the eThekwini Municipality and has a population of approximately 30 402 people and population density of 8945 people/ km^2. The Black African group is dominant and isiZulu (94,4%) being the most spoken language. Females make up 52% of the population and 48% are males (Statistics South Africa, 2012). The service delivery in the area is relatively low with 53% of the dwellings having piped water inside dwellings and 41, 9% having toilets connected to the municipal sewer.

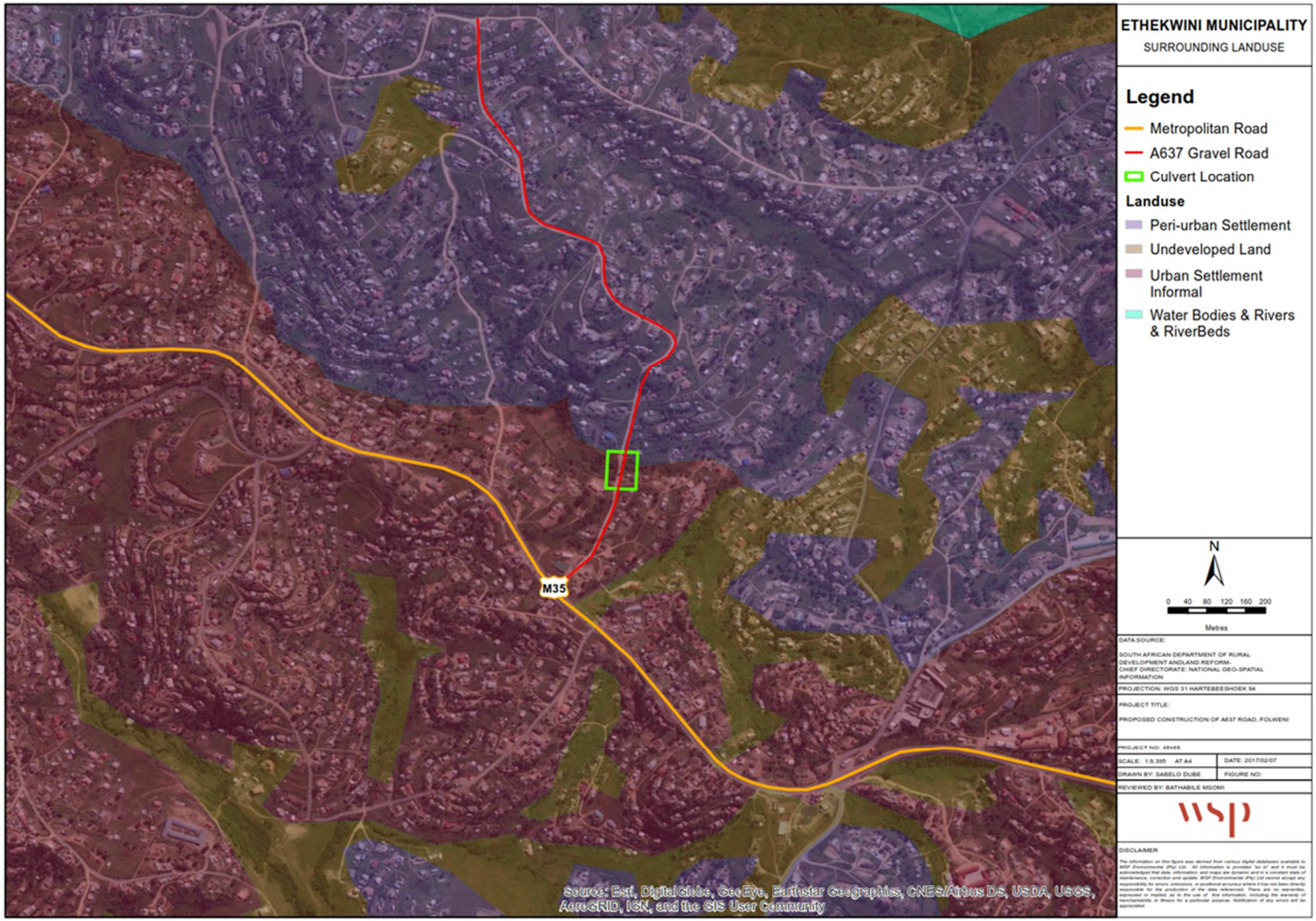

Figure 10: Land use Map (WSP GIS, 2017)

6 ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

6.1 CONSTRUCTION PHASE

6.1.1 LOCAL ECONOMY AND EMPLOYMENT OPPORTUNITIES

The construction activities will be undertaken by a contractor with an existing labour force. The project therefore will only have the potential to generate employment opportunities for the local community if additional labour is require. Use of local contractors is strongly encouraged, and the use of local community members should additional labour requirements should be written into the agreement signed by the contractor. The use of local contractors will ensure continued employment of existing staff and any local community employment will have a positive impact.

Indirect socio-economic benefits for local suppliers are anticipated during the construction phase, which will have positive impacts on the local economy.

6.1.2 TRAFFIC, ACCESS AND SAFETY

During the upgrading of the culvert and A637 gravel road, there is likely to be a disruption caused to road users and pedestrians in the vicinity. An increase in traffic associated with the construction phase activities (delivery of construction materials and equipment) is anticipated. An increased traffic volume has the potential to result in increased congestion on the road.

Construction vehicle movement may pose safety risks to road users and residents (young children walking to school) during the construction phase, as there are no formal pavements. Access to the road /site must be temporary restricted and the walkways for pedestrians moving past the site must be clearly delineated.

6.1.3 VISUAL DISTURBANCE

There may be visual impacts within the vicinity (residents adjacent to the site) of the proposed site. Factors contributing to this include the storage of construction material, presence of vehicles and workers. This impact will be applicable to the immediate site area, and will occur over a temporary (3 month) construction period.

6.1.4 CULTURAL HERITAGE

The construction activities have the potential to unearth cultural or historical resources. However, the site is highly transformed from the current road infrastructure and adjacent residences; it is highly unlikely that any culturally sensitive resources exist. A ‘chance find’ procedure has been included in the EMPr in the unlikely event that any resources are found.

6.1.5 DECREASE IN AMBIENT AIR QUALITY

During construction, localised air quality may be affected as particulate matter will potentially be released into the air because of the movement of construction vehicles, excavators and compactors on the gravel road. Dust emissions have the potential to deteriorate local air quality that may result in a nuisance factor to the local residents, particularly those near to the road. Potential impacts will be short term (i.e. limited to the construction period).

Emissions from vehicles transporting materials and labour may have an impact on local air quality potentially negatively affecting close receptors (houses and settlements near the road).

6.1.6 DECREASE IN NOISE QUALITY

Noise emissions are likely to be generated from typical construction sources, such as construction vehicles and labourers. Elevated noise levels have the potential to disrupt the local residents, however this will be short term and limited to the construction phase.

Acceptable levels are prescribed by SANS 10103:2008 (The Measurement and Rating of Environmental Noise with Respect to Annoyance and to Speech Communication). It is the most relevant code of practice for environmental noise impact assessment in South Africa. Typical rating levels for noise in different types of districts are presented in Table 14 below. Rating levels for suburban areas are applicable to this project. These values should be viewed as guidelines of typical noise levels that should not be exceeded outdoors in the various district levels. Construction activities will need to comply with noise guidelines and mitigation measures outlined in the draft EMPr (Appendix D). It is unlikely that significant noise will be generated during the construction phase as such the activities are unlikely to exceed the regulatory standards.

Table 14: Typical rating levels for noise in districts (adapted from SANS 10103:2008)

Type of District	1. Equivalent Continuous Rating Level for Noise ($L_{Req,T}$) (dBA) 2. Outdoors		
	Day-Night ($L_{R,dn}$)	Daytime ($L_{req,d}$)	Night-time ($L_{req,n}$)
a) Rural	45	45	35
b) Suburban (with little road traffic)	50	50	40
c) Urban	55	55	45
d) Urban (with one or more of the following: workshops; business premises; and main roads)	60	60	50
e) Central Business Districts	65	65	55
f) Industrial District	70	70	60

Table 15: Categories of community/ group response (adapted from SANS 10103:2008)

· Excess ($\Delta L_{Req,T}$)[a] dBA	· Estimated Community Group Response	
	Category	Description
0 – 10	Little	Sporadic Complaints
5 – 15	Medium	Widespread Complaints
10 – 20	Strong	Threats of community or group action
>15	Very Strong	Vigorous community or group action

6.1.7 HAZARDOUS SUBSTANCES AND WASTE MANAGEMENT

The construction phase has the potential to generate both general waste (building rubble, domestic waste etc.) and potentially small amounts of hazardous waste (oils, spent solvents etc.). The mixing of cement and improper handling of waste/wash water and negligent small-scale spills can lead to soil, surface and groundwater contamination and secondary impact to human health and ecosystems. The presence of labourers on site requires ablution facilities, which have the potential to increase soils and water pollution. Adherence to measures and spill management procedures

outlined within the draft EMPr (Appendix D) will ensure that the impacts associated with generation, storage, use and disposal of hazardous substances, and general and hazardous waste will be appropriately mitigated.

6.1.8 GEOLOGY AND SOILS

Construction activities, including excavation and stockpiling of materials, has the potential to increase localised soil erosion. The sloping nature of the site may have implication on storm water runoff rate. Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality of the water crossing. Soil compaction by heavy-duty vehicles and construction equipment may destabilize the soil and lead to soil erosion.

6.1.9 SURFACE AND GROUND WATER QUALITY

During the construction phase, the storage and handling of hazardous substances (such as fuel and oil) can result in accidental or negligent small-scale spills. There is also the potential for the spillage of concrete during the construction of the culvert which will lead to soils, surface and groundwater contamination. Accidental spillages will have direct impacts on the stream.

Excavation and movement of soil on the river banks of the watercourse will likely require an excavator. Operating the excavator within the project area will dislodge fine and medium sediments and increase erosion potential temporarily increasing the turbidity of the watercourse resulting in secondary impacts to the aquatic ecosystems functioning. High rainfall events could increase the probability and extent of the impact downstream of the construction site.

The watercourse is a drainage line and should have water during construction. Diversion of flow will occur in order to allow for the construction of the culvert. It is anticipated that construction activities will not result in any water quantity impacts such as reducing the amount of water that reaches downstream users.

An application for GA has been initiated in order to address the WUL requirements associated with the construction of a culvert over the water crossing, in compliance with the National Water Act (Act No.36 of 1998).

6.1.10 FAUNA AND FLORA

Direct impacts on terrestrial flora and fauna (e.g. habitat loss) associated with removal of vegetation during ground clearing and excavation is anticipated during the construction phase. Impacts on vegetation may be anticipated at the culvert location. However, these impacts are limited to the riverine vegetation and alien plants observed during the site visit. No wetlands have been identified near this watercourse and thus no impacts on wetlands are not anticipated. This was also confirmed during consultations held with the Department of Water and Sanitation (DWS) and the EThekwini Environmental Planning & Climate Protection Department on 15 February 2017. Disturbance of the site may lead to encroachment of alien plant species on site.

6.2 OPERATIONAL PHASE

6.2.1 TRAFFIC ACCESS AND SAFETY

Once upgraded the culvert will have an overall positive impact on the area by improving road safety for taxis and local community. The culvert upgrade will be parallel with the road upgrade, which will allow for the provision of pavements. Therefore improving pedestrian safety and vehicular access.

6.2.2 HOUSEHOLD RISK

The operational phase of the proposed culvert and associated infrastructure will control surface runoff, which will minimise flooding risks of households adjacent to road, which is a positive impact.

6.2.3 SURFACE AND GROUND WATER QUALITY

The potential exists for increased stormwater runoff particularly during high rainfall events. The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion if not properly managed. Increased erosion will increase turbidity and sedimentation of the watercourse, decreasing the water quality.

6.3 DECOMMISSIONING PHASE

The proposed development and associated activities are likely to be in operation for the foreseeable future, and therefore the likely impacts of decommissioning cannot be accurately predicted at this stage. However, impacts during decommissioning are likely to be similar in nature to those identified for the construction phase and will be managed in accordance with the applicable legislation.

6.4 NO-GO ALTERNATIVE

The no-go alternative refers to the continuation of the status quo which is the continued use of the existing culvert and gravel road (A637). Should the proposed development not occur, the condition of the existing culvert and road will continue to be degraded. The 'do-nothing' scenario will result in the continuation of the status quo, which could have the following implication:

- Increase road risks due to deteriorated road conditions;
- Increased sedimentation of watercourse from increased soil erosion;
- Increase risk of flooding of the houses adjacent to the road due to inefficient stormwater management systems.

6.5 IMPACT ASSESSMENT MATRIX

The risk assessment methodology (as described in Section 6.1) was used to assess the potential environmental impacts of the proposed culvert development on the receiving environment. The results are provided in Table 16 (construction phases), Table 17 (Operational phase), and Table 18 (No-go alternative).

Table 16: Construction Phase Impacts

	PRIOR TO MITIGATION									POST MITIGATION								
Aspect	Impact Description	Intensity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact	Mitigation Measures	Intensity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact
Social Environment																		
Local Economy and Employment Opportunities	Generation of employment opportunities	Low	Low	Low	Low	Low	High	Positive	Low	- Local contractors must be used - If additional labour is required this must be sourced from the local community (Folweni) to further maximise the local opportunities. - Tender processes must include the prioritisation of local businesses contractors and labour throughout the construction phase, where feasible.	Low	Low	Low	Low	Low	High	Positive	Low
Visual and Aesthetics	Visual disturbances to surrounding land users	Medium	Low	Low	Low	Medium	High	Negative	Medium	- Minimise clearing and grading where possible. - The contractor(s) should maintain good housekeeping on site to avoid litter and minimise waste. - Litter and rubble should be timeously removed from the construction site and disposed at a licenced landfill facility. - The construction site boundary must be demarcated.	Low	Low	Low	Low	Low	High	Negative	Low
Traffic	Increase in traffic flow and congestion due to increased vehicular movement (construction vehicles and delivery of materials)	Medium	Low	Low	Low	High	High	Negative	Medium	- Compliance with applicable road regulations and any permit issued in terms of the National Road Traffic Regulations (2000). - The movement of vehicles into and out of the site must be managed to ensure the impact on roads is minimised.	Low	Low	Low	Low	Low	Medium	Negative	Low
	Increase in vehicular traffic will increase community safety risks.	Medium	Low	Low	Low	High	High	Negative	Medium		Low	Low	Low	Low	Low	Medium	Negative	Low

										- Vehicle drivers must be aware of the local residents and schoolchildren using the existing road. - Signage must be placed at relevant points along the access road to caution pedestrians of the movement of construction vehicles and machinery into the site. - Project manager to notify surrounding landowners of project and associated increased vehicular activity.									
Cultural and Heritage Resources	Destruction or harm to unidentified cultural or heritage resources during earthworks	Low	Low	Low	Low	Low	High	Negative	Low	- Should any cultural or historical heritage resources or human graves be observed during construction, all work on-site should cease and Amafa must be contacted immediately.	Low	Low	Low	Low	Low	High	Negative	Low
Physical Environment																			
Air Quality	Generation of in dust (earthworks) and vehicles emissions which has the potential to deteriorate local air quality and result in a nuisance factor to sensitive receptors	Low	Low	Low	Low	Medium	High	Negative	Medium	- Dust suppression measures (e.g. water suppression or physical barriers) on active and stockpile, excavated, and cleared areas of the site as necessary. - Reduction of unnecessary traffic and vehicles travelling on unpaved roads; and strict adherence to speed limits to ensure minimal dust entrainment. - Cover trucks hauling any loose material that could generate dust when moving. - Store topsoil from construction area in stockpiles not more than 1.5 – 2m in height to avoid windblown dust.	Low	Low	Low	Low	Low	High	Negative	Low

Noise	Elevated noise levels have the potential to cause disruption to sensitive receptors (residents) where an increase in ambient noise is discernible	Low	Low	Low	Low	Medium	High	Negative	Medium	- Maintain vehicles and machinery in good working order. - Equipment with a lower noise output should be selected where practical. - No sound amplification equipment such as sirens, loud halers or hooters are to be used on site except in emergencies. - Undertake all noisy construction activities during normal working hours i.e. 08h00 – 17h00 during weekdays.	Low	Low	Low	Low	Low	High	Negative	Low
Hazardous Substances and Waste Management	Improper handling, storage and disposal of general (building rubble), domestic and hazardous waste (fuels grease and oils) leading to secondary impacts to downstream ecosystem and receptors”	Medium	Low	Low	Low	Medium	High	Negative	Medium	- Waste should be separated and stored in separate skips for appropriate re-use, recycle, or disposal options. Hazardous waste storage (including used oils and material containing oils, solvents etc.) should be within impermeable bunded, ventilated and covered storage areas, capable of containing 110% of total volume. All storage containers are to be labelled, sealed and stored in accordance with SDS requirements. - Waste receptacles should be located with consideration to stormwater management and covered to prevent windblown waste. - Working areas are to be cleared of litter on a daily basis. No litter / waste may be burnt on-site. - Building waste must be disposed of at a landfill site.	Low	Low	Low	Low	Low	High	Negative	Low

Hazardous Substances and Waste Management	Accidental spillage of hazardous substances and waste (outside of contained area and loss of primary containment) resulting in contamination of surface water, groundwater.	Low	Low	Low	Low	Medium	High	Negative	Medium	- Use drip trays on vehicles and machinery. - Contaminated soil removed as soon as possible and deposited in a designated area for disposal. - Spill and response equipment must be accessible on-site. - Method statements and contingency / emergency response plans should be prepared for management of hazardous materials on-site. - Adequate spill response training	Low	Low	Low	Low	Low	High	Negative	Low
Soils, Surface and Groundwater	Earth moving activities will increase the potential for localised soil erosion to occur. Potential indirect impacts relate to sediment laden surface water / stormwater contamination	Medium	Low	Low	Low	High	High	Negative	Medium	- Measures must be implemented to control soil erosion including limiting the extent of work areas, management of stormwater runoff, and sediment containment structures. - Excavated areas to be rehabilitated as much as possible. - Store topsoil from construction area in stockpiles not more than 2m in height to avoid compaction. - The working area should be clearly designated and demarcated to minimise the footprint of the activity - All habitats that occur outside of the working area (other instream habitats and riparian habitats) must be avoided. - Should heavy rainfall events start during construction, work must stop to avoid increased sedimentation.	Low	Low	Low	Low	Low	High	Negative	Low
Biotic Environment																			

Flora and Fauna	Excavations have the potential to impact on vegetation on site.	Low	Low	Low	Low	Low	High	Negative	Low	- Alien clearing must be undertaken within the entire development. - All water crossings should be carefully planned and the ECO must approve all method statements to ensure minimal impact on the water crossing.	Low	Low	Low	Low	Low	High	Negative	Low

Table 17: Operational Phase Impacts

	PRIOR TO MITIGATION									POST MITIGATION								
Aspect	Impact Description	Intensity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact	Mitigation Measures	Intensity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact
Social Environment																		
Traffic	Improved access for taxis to the A637 road and the Sbu Magwanyane Highway.	Medium	Low	Low	Low	High	High	Negative	Medium	- No mitigation measures are required.	Medium	Low	Low	Low	High	High	Negative	Medium
	Improved safety of pedestrians (including young school children walking to school)	Medium	Low	Low	Low	High	High	Negative	Medium		Medium	Low	Low	Low	High	High	Negative	Medium
Household Risk	Reduced surface runoff will minimise flooding risks of households adjacent to road.	Medium	Low	Low	Low	High	High	Positive	Medium	- No mitigation measures are required.	Medium	Low	Low	Low	High	High	Positive	Medium
Physical Environment																		

Soils	Additional hardened surfaces will increase the amount of stormwater runoff causing increasing erosion.	Medium	Low	Low	Low	Medium	High	Negative	Medium	- Measures must be implemented to control soil erosion including limiting the extent of work areas, management of stormwater runoff, and sediment containment structures. - Excavated areas to be rehabilitated as much as possible. - Store topsoil from construction area in stockpiles not more than 1.5 - 2m in height to avoid compaction.	Low	Low	Low	Low	Low	High	Negative	Low
Soils, Surface water quality	Reduced erosion has the potential to minimise turbidity in the watercourse.	Low	Low	Low	Low	Low	High	Positive	Low	- Maintenance of stormwater / surface water management measures throughout the lifetime of the development.	Low	Low	Low	Low	Low	High	Positive	Low
Biotic Environment																			
Flora and Fauna	Disturbed areas have the potential to result in propensity of alien invasive species	Low	Low	Low	Low	Low	High	Negative	Low	- Ongoing maintenance and the removal of alien invasive vegetation must be implemented.	Low	Low	Low	Low	Low	High	Negative	Low

Table 18: No-go Alternative

Aspect	Impact Description	Intensity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact
Traffic	Continued poor culvert conditions will increase community safety risks.	Medium	Medium	Medium	Medium	High	High	Negative	Medium
Household Risk	Reduced surface runoff will minimise flooding risks of households adjacent to culvert.	Medium	Low	Medium	Medium	High	High	Positive	Medium
Soils, Surface and groundwater quality	Increase surface runoff will increase the potential for localised soil erosion to occur. Potential indirect impacts relate to sediment laden surface water / stormwater contamination	Medium	Medium	Medium	Medium	High	High	Negative	Medium

6.6 ENVIRONMENTAL IMPACT ASSESSMENT STATEMENT

The construction phase will have positive and negative impacts on the biophysical and social environment. The majority of the potential environmental risks have been determine to be of low significant post mitigation.

The impacts associated with the proposed construction will have no significant, adverse, long-term environmental impact on the surrounding environment. Positive impacts associated with construction include:

- Provision of formal infrastructure in the form of roads;
- Safe transportation medium (vehicles); and
- Potential employment opportunities (limited) and support of local contractors and suppliers.

The operational phase is associated with positive social impacts of medium significance and negative biophysical impacts of low significance post mitigation.

The no-go option will result in a loss of generation of employment opportunities and hindrance of service delivery by the eThekwini. The lack of provision of culvert and road infrastructure will have negative impacts of a medium significance.

7 CONCLUSIONS

The overall objective of the BA process is to provide sufficient transparent and technically-robust information to enable informed decision-making by the authorities. This has been undertaken through consideration of the proposed project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures. The impacts assessed by the EAP have allowed for the development of the draft EMPr (Appendix D). The proposed culvert construction and road upgrade will have positive and negative impacts on the biophysical and social environment as the site. The identified negative impacts/environmental risks are mostly low post mitigation. All mitigation measures proposed in this report and the draft EMPr must be implemented during all phases of the proposed project. It is further noted that the draft EMPr must be viewed as a dynamic, working document that will be improved upon as and when required.

It is the opinion of WSP that the information contained in this document is sufficient for EDTEA to make an informed decision for the EA being applied for in respect of this project. It is further recommended that the EA should be issued in accordance with the current legal requirements under the NEMA and subject to adherence to mitigation measures outlined in this report and the accompanying draft EMPr (Appendix D).

APPENDIX

A CURRICULUM VITAE

APPENDIX

B MAPS

APPENDIX

C LAYOUTS

APPENDIX

D ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX

E STAKEHOLDER ENGAGEMENT REPORT