





# Draft Basic Assessment Report: Proposed Construction of the Collector Sewer, Sewage Pump Stations, Rising Main Ancillary Works at Gwala Farm, Kwa-Zulu Natal

04 May 2018

Prepared for: eThekweni Municipality – Water and Sanitation Unit,  
Wastewater Design Branch  
Contact: Sizwe Dlamini  
Email: [sizwe.dlamini@durban.gov.za](mailto:sizwe.dlamini@durban.gov.za)

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Prepared by	Manogrie Chetty Pr.Sci.Nat.	
Reviewed & Approved by	Leena Ackbar Pr.Sci.Nat.	

Report prepared by:



**ECA Consulting**  
**Specialists in:**  
Environmental Impact Assessments  
Environmental Management Programmes  
Carbon Footprints  
Water Use Licenses, etc.

**Address:** 645 Sunset Avenue,  
Unit 3 Logbro Centre, Woodhurst,  
Durban, 4092  
**Cell:** 079 494 5412  
**Fax:** 0866 199 945  
**Email:** [leena@ecaconsulting.co.za](mailto:leena@ecaconsulting.co.za)  
**Web:** [www.ecaconsulting.co.za](http://www.ecaconsulting.co.za)

**Disclaimer**

The information in this report is based on information supplied by the client, eThekweni Municipality – Water and Sanitation Unit, Wastewater Design Branch. 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.

**Details of EAP****Leena Ackbar**

Qualification:

Experience:

Registration:

Contact:

**MANAGING DIRECTOR & LEAD ENVIRONMENTAL CONSULTANT**

BSc (Hons) Biological Science MSc Environmental Science

10 years

Registered with SACNASP, Accredited Green Star SA Professional (GBCSA), Level 1 Carbon Footprint Analyst (GCX)

Cell: 079 494 5412; email: leena@ecaconsulting.co.za

**Manogrie Chetty**

Qualification:

Experience:

Registration:

Contact:

**OPERATIONS DIRECTOR & LEAD ENVIRONMENTAL CONSULTANT**

BSc (Hons) Biological Science MSc Environmental Science

10 years

Registered with SACNASP

Cell: 084 401 1512; email: manogrie@ecaconsulting.co.za

**Expertise of EAP**

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. The study was further extended throughout sub-Saharan Africa by COMPETE, which is an international research organisation funded by the European Union focussing on sustainable bioenergy crop expansion in sub-Saharan Africa. Leena is not only a qualified environmental scientist but is also suitably qualified environmental assessment practitioner. Manogrie Chetty also holds a Master of Science Degree in Environmental Sciences and has academically specialised in Environmental Impact Assessments in KZN.

In addition to holding a tertiary qualification in environmental sciences both our lead consultants are registered Professional Natural Scientists with SACNASP, Leena is also accredited with the Green Building Council of South Africa and the Global Carbon Exchange.

To date Leena and Manogrie have 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.

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.

Some of our notable contributions include presentation at the 2011 Mining Conference hosted by the International Institute Research of South Africa, which is now run from its head office, Informa Middle East, located in Dubai. We have also provided comment, as part of the environmental panel for the Durban Chamber of Commerce on the National Treasury Paper on Carbon Tax.

**DECLARATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)**

I, Manogrie Chetty declare that,

- I will comply with the requirements for EAPs as stipulated in Regulation 13(1) of the EIA Regulations, 2014, as amended;
- I act as the independent environmental practitioner in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014 (as amended), if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998)

**Disclosure of Vested Interest**

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014 (as amended).



Signature of the environmental assessment practitioner: **Manogrie Chetty**

Name of company: **Envirocarb Consulting T/A ECA Consulting**

Date: **04 May 2018**

**Acronyms**

BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EDTEA	KZN Department of Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GA	General Authorisation
GNR	Government Notice Regulation
HDuPVC	Heavy Duty Unplasticized Polyvinyl Chloride
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
kN	Kilonewton
m	Meter
mm	Millimeter
mPVC	Modified Polyvinyl Chloride
NEMA	National Environmental Management Act (Act 107 of 1998)
SACNASP	South African Council for Natural Scientific Professions
WUA	Water Use Authorisation
WUL	Water Use License
WWTW	Waste Water Treatment Works

**Symbol**

∅	Diameter
>	Greater Than



## EXECUTIVE SUMMARY

### Project Description

The applicant, eThekweni Municipality-Water and Sanitation Unit, Wastewater Design Branch, propose to construct a gravity fed collector sewer pipeline, two (2) sewage pump stations, and rising main pipeline that ties into the existing infrastructure in the Gwala Farm and Belvedere North area, Ward 61, Tongaat. A portion of the existing 450mmØ trunk main pipeline will be re-graded en-route to the Wastewater Treatment Works (WWTW).

Portions of the collector sewer pipeline, rising main pipeline and the re-graded trunk main pipeline will be constructed within the watercourse and will involve excavation / removal of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from the watercourse. As such the proposal will require Environmental Authorisation (EA) in terms of the EIA Regulations 2014 (amended in 2017) via a Basic Assessment process.

### Alternatives

Three alternatives have been identified and assessed in detailed in this BAR:

**Alternative S1 & A1 (Alternative Option):** *Construction of a non-gravity fed collector sewer pipeline, rising main pipeline, three (3) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.*

**Alternative S1 & A2 (Preferred Option):** *Construction of a gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.*

**No-go option:** *The site will remain in its current condition. The need for connection of the Gwala Farm low cost housing development to the waterborne sewerage system will not be addressed, these residents will continue to use pit latrines. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. There will be no crossing of any watercourses. The existing pipeline will not be re-graded. There will be no improvement in access to local services and infrastructure.*

### Legislation and Guidelines considered

The following legislation and guidelines were considered in preparing this BAR as discussed in Section 3.0 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)
- KwaZulu-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

- 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)
- eThekweni 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)
- DEAT Guideline 5: Assessment of Alternatives
- NEMA Public Participation Guideline
- National Environment Management Act: Environmental Impact Assessment (EIA) 2014 Regulations (as amended in 2017)

#### **EIA Process**

The current proposal is undergoing a Basic Assessment (BA) process as per requirements of GNR 326, NEMA 2014 EIA Regulations (as amended in 2017). The application is being assessed under the 2014 EIA Regulations (as amended 2017).

#### **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 2014 EIA Regulations (as amended in 2017). 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 draft BAR and provide comment. The comment period commences on the 07 May 2018 and ends on 07 June 2018. 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**

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The following specialist studies have been undertaken and reviewed as part of the Basic Assessment process:

- Heritage Impact Assessment
- Wetland and Riparian Ecological Review and Assessment
- Geotechnical Desktop Assessment

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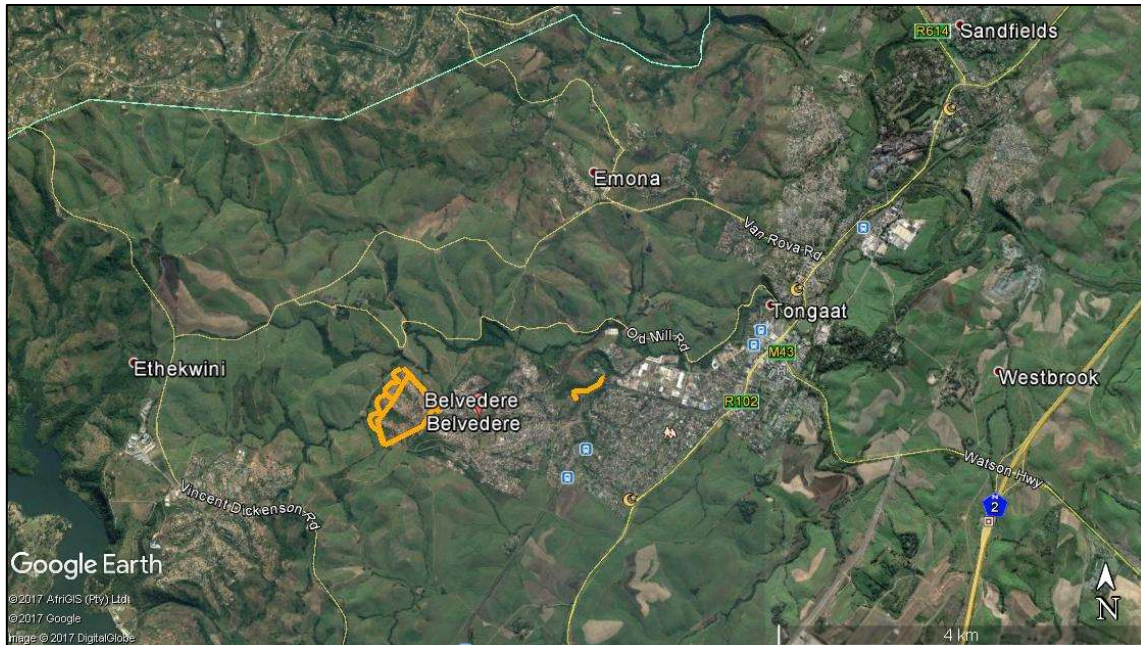
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## 1.0 Description of the Proposed Activity

### 1.1 Project Background

The applicant, eThekwin Municipality-Water and Sanitation Unit, Wastewater Design Branch, propose to construct a gravity fed collector sewer pipeline, two (2) sewage pump stations, and rising main pipeline that ties into the existing infrastructure in the Gwala Farm area and Belvedere North in Ward 61, Tongaat (Figure 1, Appendix 2). A portion of the existing 450mmØ trunk main pipeline will be re-graded en-route to the Wastewater Treatment Works (WWTW).



**Figure 1: Map showing the proposed location of the proposed activity in orange**

Portions of the proposed collector sewer pipeline, rising main pipeline and re-graded trunk main pipeline will be constructed within a watercourse and will involve excavation / removal of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from the watercourse. As such the proposal will require Environmental Authorisation (EA) in terms of the EIA Regulations 2014 (amended in 2017) via a Basic Assessment process. A pre-application meeting was held with the KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) on 22 May 2017. The pre-application meeting register has been attached as Appendix 3 as well as the meeting minutes. The applicant has been issued with a directive (Reference no.:16/2/7/GWALA FARM) from the Department of Water and Sanitation (DWS) for the proposed development activity (Refer to Appendix 4).

### 1.2 Project Description (Mahlambi, 2017)

The proposed development activity will consist of a gravity fed collector sewer pipeline, two (2) pump stations, rising main pipeline and re-grading of a portion of the existing trunk sewer pipeline. The re-grading of the trunk sewer pipeline will start at the cul de sac on Flamingo Road and run for approximately 500m following the road in a north westerly direction (MSJ, 2016) (Figure 2). Re-grading refers to the construction of a portion of the pipeline adjacent to the portion of the existing pipeline that will no longer be used. The new portion will tie into the existing pipelines at the existing manholes.



**Figure 2: Map showing the location of the proposed trunk pipeline (in orange) that will be re-graded on Flamingo Road**

The proposed rising main pipeline will run parallel to the northeast edge of the township, intersects an ephemeral channel and ties into the existing pipeline within the suburb of Belvedere, at the corner of Saunders Circle and Hercus Avenue (Figure 3) (MSJ, 2016). The proposed gravity fed collector sewer pipeline runs parallel to an ephemeral channel on its east side, and intersects a number of other ephemeral channels (MSJ, 2016; SDP,2017). The position of the proposed pump station one (1) is located at the lowest point and the pump station two is located on the rising main pipeline, near the ephemeral channel. The proposed rising main pipeline connects from proposed pump station one (1), through proposed pump station two (2) to the existing terminal manhole located on Hercus Avenue (MSJ, 2016).



**Figure 3: Aerial overview showing the proposed collector sewer pipeline (light blue), proposed pump stations (dark blue) and rising main pipeline (purple)**

It is important to note that not all aspects of the proposed development activity require Environmental Authorisation (EA) in terms of the 2014 EIA Regulations (as amended in 2017). The description of the

proposed activity has been discussed in its entirety in this section to provide a holistic approach to understanding the proposal. In terms of the 2014 EIA Regulations (as amended in 2017) the proposed development activity requires EA only for the excavation of more than 10 cubic metres of soil, sand stone from within the watercourse.

The following sections provide a detailed description of the project as provided for by the project manager, Mr Alex Mahlambi and Sizwe Dlamini (2017).

*The collector sewer pipeline<sup>1</sup> will consist of a 160mm Ø HDuPVC pipe line with 1000mmØ precast concrete ring manholes constructed at every change in grade leading to pump station one (1) downstream of the development. The sewage will then be pumped from pump station one (1) to pump station two (2) along the rising main pipeline through to a terminal manhole on the existing sewer at Belvedere North. This will require the extension of sewers along each of the three valleys from Gwala Farm to connect into the collector sewer.*

*The proposed pump stations will be a wet well/ dry well arrangement which will include a separate sumps and pump room. The pumps will be arranged in a duty/standby manner and the building that houses the pump station will be constructed out of reinforced concrete.*

*The proposed rising main pipeline<sup>2</sup> will be a 200mm Ø mPVC Class 16, 800m long, pipeline with air valve chambers and scour valve chambers positioned at the crests and troughs respectively. The rising main will end at the terminal manhole after which the rising main pipeline will join the existing gravity sewer system.*

*The existing 400mm Ø trunk sewer pipeline located along Flamingo Road will be re-graded to improve the flow characteristics of the pipeline as the existing pipeline is operating beyond capacity and the manholes overflow periodically.*

#### **Description of Pipelines**

Two different types of pipelines will be utilised for the proposed project based on the flow conditions:

- Low pressure for gravity flow (for the gravity fed collector sewer pipeline) and
- High pressure for pumped flow in the rising main pipeline.

*The HDuPVC pipe will be utilised for the low pressure gravity flow and the mPVC will be utilised for the high pressure rising main. Where there are pipe bridges, a cement mortar lined steel pipe will be utilised to sleeve the mPVC pipe.*

#### **Construction corridor and servitude**

*The construction corridor located outside of ecologically sensitive areas will be 10m in total, 5m on either side of the proposed pipeline route. The final pipeline servitude width required for maintenance purposes is 3m.*

*In ecologically sensitive areas, the construction corridor will be reduced to 6m in total, 3m on either side of the pipeline route. The final pipeline servitude width required for maintenance purposes is 3m.*

<sup>1</sup> The gravity fed collector sewer pipeline carries the sewage from the manhole into the rising main pipeline.

<sup>2</sup> The rising main pipeline is a pressurised pipeline that transport the sewage from the pump station through to the terminal manhole.

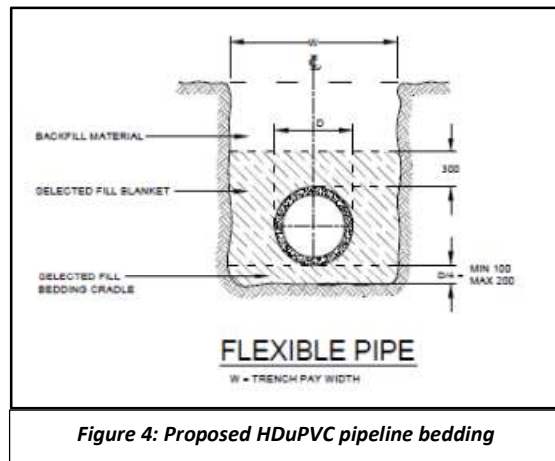
### **Methodology for laying pipelines**

#### **Below Ground Pipelines**

***This section is applicable to the collector sewer pipeline, rising main pipeline and regarded portion of trunk main pipeline.***

*Pipelines will be laid below ground by conventional open trench excavation except in the sensitive areas. The depth of the various trenches will vary according to location and topography of the existing ground level but generally an average depth of 1m above the top of the pipe will be adhered to. The trench widths will be in accordance with SANS 1200 - 300mm wider on either side of the pipeline. This will allow for compaction with a motorised rammer.*

*Before laying, pipes will be visually checked for scratches, puncture, ovality, correct marking. HDuPVC will be laid on flexible bedding (Figure 4). The selected cradle and blanket will be river sand. More river sand will then be placed on the sides of the pipe to 100mm above the crown of pipe (bedding cradle). This will then be hand stamped to secure the position of the pipe. Suitable material from the trench excavation or river sand, if the sand taken from the trench has too many large particles, it is then placed a further 200mm on top of the pipe (bedding blanket) and then compacted. The trench will then be backfilled with normal backfill material or the material excavated from the trench till the existing ground level. This backfill will be compacted in 300mm layers until the ground profile is reached.*



**Figure 4: Proposed HDuPVC pipeline bedding**

#### **Work within Stream/ River Crossings**

*Stream crossings will be constructed mainly via the dam and flume<sup>3</sup> method. In this method the stream will be temporarily dammed to prevent water flow in the area to be trenched. The trench will be excavated quickly whilst a pipe or flume is placed over the trench, conveying water downstream. The pipe will be encased in concrete (only where the concrete is founded on rock) and then backfilled up to streambed level. Silt and sediment accumulation will be removed from the streambed and the bed and banks of the stream will be restored to preconstruction conditions.*

#### **Channel Crossings**

*The pipeline will cross a number of ephemeral channels; all pipes which are laid in these areas will be excavated by hand. All pipes which will cross these areas will be laid at a minimum depth of 800mm below the river bed.*

#### **Rehabilitation**

Rehabilitation of the non-sensitive areas will be undertaken as per the recommendations of the client and sensitive areas will be rehabilitated in accordance with the Wetland, Aquatic and Ecological Assessment Report undertaken by SDP (2017), the EMPr and conditions of the Directive (Appendix 5). This will be further discussed in the EMPr.

<sup>3</sup> **Flumes** are specially shaped, engineered structures that are used to measure the flow of water in open channels (Accessed via: <https://www.openchannelflow.com/flumes> on 03/11/2017).

## 2.0 Description of the Need and Desirability of the Proposed Activity (Mahlambi, 2017)

The eThekweni Human Settlements department constructed low cost housing in Gwala Farm, Tongaat, North of Durban (Refer to housing units located within the Gwala Farm boundary – Figure 1). These housing units are not connected to a waterborne sewerage system. This housing project involved the construction of top structures without the proper bulk sanitation infrastructure in place, these units have subsequently been occupied by residents. Presently, these residents use traditional sewer systems - pit latrines - for sanitation purposes. This can lead to contamination of the below ground and above ground watercourses.

The proposed development activity is considered as crucial in connecting the Gwala farm housing units to the waterborne sewerage system.

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

The proposed project will cross the watercourses on the following properties:

- Collector Sewer and Rising Main (taking place within the site referred to as the **western** property)
  - Farm 17240 Msomi, NOFU0000000172400000; and
  - Farm 17239 Frosterly, NOFU0000000172390000 (Figure 5).



**Figure 5: Map showing the cadastral lines in white and the properties affected by the collector sewer and rising main line (in blue and purple)**

- Re-grading of Pipeline (taking place within the site referred to as the **eastern** property) will cross the watercourses on the following properties:
  - Erf 4961 of Farm 0335 Tongaat, NOFU03350000496100000(Referred to as 2 on Figure 6)
  - Parcel 8 of Portion 47 of Farm 1267 Buffels Kloof, NOFU00000000126700047(Referred to as 1 on Figure 6)



**Figure 6: Aerial Map showing the cadastral lines in yellow and the properties affected by the re-grading of the pipeline (shown with the red lines)**

#### **Western Property**

The property affected by the proposed collector sewer line, rising main and pump stations are dominated mostly with sugarcane (Figure 7) and is in close proximity to the Hlawe River.



**Figure 7: Photograph of sugarcane vegetation adjacent to the riparian system (SDP, 2017)**

The collector sewer crosses a few tributaries, most of which have been modified by the transformation of the surrounding land for sugarcane cultivation (SDP, 2017). The riparian habitats associated with these smaller, channels were limited in extent (Figure 8). In some cases where cultivation (or settlement) has occurred up to the channel edge, riparian habitat has been effectively removed (SDP, 2017).





**Figure 8: Photograph showing the riparian vegetation and alien vegetation within the riparian system (SDP, 2017)**

According to SDP (2017), the marginal zone has been disturbed by road crossings and a reduction in canopy cover. This disturbance has resulted in a change to the nature and characteristics of the marginal zone. Sections that would have been well shaded through canopy cover, are now generally open, supporting stands of reeds and secondary grasses (SDP, 2017). Exotic invasion, although less prevalent than in the eastern section of the study area, was present in low to moderate levels throughout the extent of the western riparian habitat (SDP, 2017). According to SDP (2017), no wetlands are located within the study area.

#### **Eastern Property**

According to SDP (2017), the lower section (eastern section) of the Hlawe River was highly invaded by a number of exotic species and have been impacted upon by a small, intensive farming operation with stream flow modification activities.

A portion of the Hlawe River and the associated riparian area was found to be in a degraded state, primarily as a result of anthropogenic disturbance and exotic invasion (SDP, 2017). More than 50 percent of the vegetation associated with the eastern riparian habitats were identified as exotic and a number of species such as *Pennisetum purpureum*, *Arundo donax*, *Coix lacryma-jobi* and *Melia azedarach* were significant invaders of the riparian habitat (SDP, 2017). These exotic species were also found to dominate the marginal zone (SDP, 2017) (Figure 9).



**Figure 9: Photograph showing the riparian habitat, *M azerdarach* is one of the species identified in the foreground (SDP, 2017)**

### 3.0 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), 2014 EIA Regulations (as amended in 2017), [GNR 326], the proposed development requires Environmental Authorisation via a Basic Assessment (BA) process, as per the following activity in terms of listing notice 1 (GNR 327):

**Activity 19 of GNR 327** – *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*

*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;*
- c. falls within the ambit of activity 21 in this Notice, in which case that activity applies;*
- d. occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or*
- e. where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*

Activities 12 of GNR 327 and 14(d)(vii) of GNR 324 were reviewed for the proposed project and were found to be not applicable as the site is located within an urban area and CBA areas within the province of Kwa-Zulu Natal have not yet been adopted by the competent authority.

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, as amended on the 07 April 2017.

#### 3.1 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 1: Legislation Applicable to Environmental Resource Protection and Management**

Applicable Legislation	Purpose and Applicability to Project
<b>National Environmental Management Act (Act 107 of 1998) (NEMA)</b>	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>The act further provides a framework for the protection and conservation of the environment.</p> <p><b><i>Applicability to project: A portion of the collector sewer pipeline, rising main (western portion) and re-grading of the pipeline (eastern portion) will be located within the tributary. Excavation of soil for the laying of the pipeline will also take place within the watercourse. The potential impacts will be assessed and mitigated against.</i></b></p>
<p><b>National Environmental Management : Biodiversity Act (Act 10 of 2004)</b></p>	<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><b><i>Applicability to Project: The sites contain mix of both indigenous and exotic vegetation. The potential impacts will be assessed and mitigated against.</i></b></p>
<p><b>National Environmental Management Protected Areas Act (Act 57 of 2003)</b></p>	<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><b><i>Applicability to Project: Millettia grandis was identified within the site and is protected in terms of the provincial legislation. The site is also located within a CBA area and portions of the site affected by the development must be rehabilitated immediately.</i></b></p>
<p><b>National Forest Act (Act 84 of 1998)</b></p>	<p>Purpose: “The purposes of this Act are to—</p> <ul style="list-style-type: none"> <li>(a) promote the sustainable management and development of forests for the benefit of all;</li> <li>(b) create the conditions necessary to restructure forestry in State forests;</li> <li>(c) provide special measures for the protection of certain forests and trees;</li> <li>(d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;</li> <li>(e) promote community forestry;</li> <li>(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.”</li> </ul>

	<p><b><i>Applicability to Project: A few indigenous plant species and a protected species were identified that is undergoing assessment. These must be preserved as part of the natural environment. Where this is unavoidable, a permit must be applied for.</i></b></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 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><b><i>Applicability to Project: The HIA undertaken found that no items of cultural or heritage significance were identified on site. However, should items of Heritage and / or cultural significance be unearthed during construction, construction activities must cease and AMAFA must be notified immediately.</i></b></p>
KwaZulu-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><b><i>Applicability to Project: As per previous.</i></b></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</p>

	<p>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><b><i>Applicability to Project: During both the construction and operational phase of this development provision has been made for the protection of watercourses and removal of declared weeds and alien invader plants.</i></b></p>
<b>Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998)</b>	<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><b><i>Applicability to Project: The development will use sustainable measures and resources where possible.</i></b></p>
<b>Paris Convention for the Protection of the World Cultural and Natural Heritage (1975)</b>	<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><b><i>Applicability to Project: As per the National Heritage Resources Act (25 of 1999).</i></b></p>
<b>Convention on the Conservation of Migratory Species of Wild Animals(CMS)</b>	<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>
<b>Bill of Rights (Chapter 2 (24) of the Constitution of the Republic of South Africa)</b>	<p>“Everyone has the right</p> <ol style="list-style-type: none"> <li>a. to an environment that is not harmful to their health or well-being, and</li> <li>b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that <ol style="list-style-type: none"> <li>i. prevent pollution and ecological degradation;</li> <li>ii. promote conservation, and</li> <li>iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</li> </ol> </li> </ol>

	<b><i>Applicability to Project: The aim of the project is to provide the residents of the Gwala Farm low cost housing project access to a waterborne sewerage system.</i></b>
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### 3.2 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 2: Legislation Applicable to Water Resource Protection**

Applicable Legislation	Purpose and Applicability to Project
<b>National Water Act (Act 36 of 1998)</b>	<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><b><i>Applicability to Project: The pipelines will be constructed within a watercourse and will require a WUL / GA application. A directive has been issued from the DWS in this regard (Appendix 4).</i></b></p>
<b>National Water Resource Strategy (2013)</b>	<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> <p><b><i>Applicability to Project: Water will not be abstracted from the watercourse for construction.</i></b></p>

### 3.3 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 3: Legislation Applicable to Waste Management**

Applicable Legislation	Purpose and Applicability to Project
<b>National Environmental Management: Waste Management Act (Act 59 of 2008)</b>	<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</p>

	<p>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><b>Applicability to Project: During the construction phase, the waste produced on site and will be transported to the closest registered landfill site.</b></p>
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### 3.4 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 4: Legislation Applicable to Noise Management**

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

### 3.5 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 5: Legislation Applicable to Occupational Health and Safety**

Applicable Legislation	Purpose and Applicability to Project
<b>Health and Safety Act (Act 85 of 1993)</b>	<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><b>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</b></p>
<b>Hazardous Chemical Substance regulations 1995</b>	<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>

	<b><i>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</i></b>
<b>Construction Regulations (2003)</b>	<p>Purpose: These Regulations apply to construction employees and provide guidelines for safe operation during construction.</p> <p><b><i>Applicability to Project: Applicable to construction activities. This will be managed by the EMPr.</i></b></p>

### 3.6 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 following is a list of legislation applicable to Air Quality Management:

**Table 6: Legislation Applicable to Air Quality Management**

<b>Applicable Legislation</b>	<b>Purpose and Applicability to Project</b>
<b>National Environmental Management: Air Quality Act (Act 39 of 2004)</b>	<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><b><i>Applicability to Project: Dust generated during construction that may be produced during construction will be investigated in this report.</i></b></p>

### 3.7 Guidelines

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

#### **NEMA Implementation Guidelines (GNR 603 of 2010)**

**Purpose:** The purpose 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.

#### **DEA Integrated Environmental Management Information Series (0 – 16) (2004)**

**Purpose:** To provide general information on techniques, tools and processes for environmental assessment and management.

#### **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.

**Western Cape DEA & DP (2010), Guideline on Need and Desirability**

**Purpose:** To provide guidance on understanding and establishing the need and desirability of a proposal.

**DEA Integrated Environmental Management Guideline on Need and Desirability (2017)**

**Purpose:** Provides a list of questions that should be addressed when considering the need and desirability of a proposal.

**3.7.1 Environmental Impact Assessment Regulations**

The NEMA 2014 EIA Regulations (as amended in 2017) 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 (as amended in 2017) (Government Notice (GNR) 326) was promulgated in terms of Section 24(5) of NEMA. The regulations are divided into 3 listing notices, GNR 324, GNR 325 and GNR 327.

GNR327 defines activities which will trigger a Basic Assessment (BA) process and GNR 325 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 324 defines certain geographically based listed activities per province for which a BA process must be undertaken.

Listed activities from these Regulations which will be triggered as part of the proposed project are provided in Table 7.

**Table 7: List of Applicable Activities as per the 2014 NEMA EIA Regulations (as amended in 2017)**

Listing Notice and Activity Number	Activity Description	Applicability to Project
<b>GNR 327; Activity 19</b>	<p><b>Activity 19 of GNR 327 –</b> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse;</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p> <p><i>a. will occur behind a development setback;</i></p>	The pipelines associated with the collector sewer, rising main and re-grading of the trunk pipeline will take place within the watercourse and will include the excavation of material from that watercourse.

	<p><i>b. is for maintenance purposes undertaken in accordance with a maintenance management plan;</i></p> <p><i>c. falls within the ambit of activity 21 in this Notice, in which case that activity applies;</i></p> <p><i>d. occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</i></p> <p><i>where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</i></p>	
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#### **4.0 Summary of Specialist Reports**

All specialist reports undertaken for this Basic Assessment Report have been attached as Appendix 5; a summary of each study is discussed in the subsections to follow.

##### **4.1 Heritage Impact Assessment (HIA) (Jean Beater, 2017)**

A HIA was undertaken by Jean Beater in July 2017 for the proposed project. The following is a summary of the HIA.

The proposed collector sewer and trunk main that is to be re-graded are longer than 300 m hence the project triggers subsection (a) of section 38 of the National Heritage Resources Act, 1999 (Act No 25 of 1999).

A site inspection was undertaken by Jean Beater on 06 June 2017. There were areas that were densely vegetated that could not be accessed but most areas of the two project components were inspected. The HIA report will be submitted to Amafa aKwaZulu-Natali (Amafa) via the SAHRIS database for their assessment and comment.

The fossil sensitivity map of South Africa indicates that the project area falls into a zone of moderate sensitivity. A moderate sensitivity requires that a desktop paleontological study be undertaken. Due to the highly disturbed nature of both components of the project, there is a low risk that intact and significant fossil finds will be found therefore it is recommended that no desktop assessment is required.

The two project areas are disturbed by farming activity, residential development and existing infrastructure including roads. No heritage sites were found during the inspection of both areas. Based on the findings of the site inspection, the development can proceed with the proviso that the implementation of the mitigation measures provided in the report must be taken into account and implemented where necessary.

##### **4.2 Wetland, Aquatic and Ecological Assessment (Sustainable Developments Projects (SDP), 2017)**

SDP was appointed by ECA Consulting to undertake a Wetland, Aquatic and Ecological assessment for the proposed sewer main and pump station located in Gwala Farm, Belvedere, Tongaat, KwaZulu-Natal. The following is a summary of the report as provided for by the specialist.

The site is located within the upper catchment of the Hlawe River. The surrounding area consists of formal and informal settlement, sugarcane cultivation, intensive agriculture and industry.

The study area consisted of two sections, the eastern section and western section. No wetlands were identified within each of the two sections; however significant riparian habitat was associated with the Hlawe River and some tributaries. The extent of the riparian habitat was reduced due to the encroachment of sugarcane and related activities (cane sidings and roads). The aquatic fauna of the Hlawe River was well represented in the western section; however the tributary within the eastern section revealed a depauperate<sup>4</sup> aquatic community as a result of habitat and catchment degradation. Water quality showed a similar trend with reduced water quality characteristic of the lower Hlawe River and eastern tributary. The terrestrial environment was significantly altered due to sugarcane cultivation and no sensitive terrestrial habitats were identified.

Two proposed alternatives were reviewed for the collector sewer as well as the status quo (no-go alternative). The preferred alternative (option 2) was recommended from an ecological perspective.

Direct and indirect impacts as a result of the proposed sanitation upgrade were found to be of medium to low significance before mitigation and of low significance after mitigation. Cumulative impacts as a result of improved services and the concomitant urban expansion resulting in habitat degradation was found to be the greatest threat to the Hlawe River and associated riparian habitat. The impact thereof could however be reduced through appropriate planning. In summary, the proposed sanitation upgrade is likely to be an improvement on the status quo and will not result in any significant ecological impacts.

**At the time of the specialist investigation by SDP, the applicant had proposed one pump station as the preferred option which was duly assessed. However since the completion of the specialist study, the applicant has advised that this is no longer feasible and the preferred option is the construction of two pump stations. In response to this, SDP have issued an addendum (Appendix 5) to their specialist report. SDP noted that the change in the preferred option from one to two pump stations does not raise any significant additional impacts and thus supports the preferred option of two pump stations on the gravity fed collector sewer pipeline.**

#### **4.3 Desktop Geotechnical Study (MSJ, 2016)**

MSJ Geotechnical Consulting Services (Pty) Ltd, hereafter referred to as “MSJ” was appointed by the eThekweni Municipality Water and Sanitation department to undertake a geotechnical investigation for the proposed construction of a gravity sewer pipeline, pump station and rising main at Gwala Farm, Tongaat, KwaZulu-Natal.

The site is underlain by a thick mantle of alluvial material and these soils are in turn underlain by residual soils and shale of the Pietermaritzburg Formation, Ecca Group or tillite bedrock of the Dwyka Formation, specifically:

- The site of the re-grading pipeline and the tie-in position of the rising main pipeline are underlain by Shales; and
- The majority of the site, made up of the proposed rising main and collector pipelines is underlain by Shales and Tillite of the Dwyka Formation, Karoo Supergroup (MSJ, 2016).

According to MSJ (2016), generally, the materials are of soft excavation to a depth of at least 2m below existing ground level.

There is a single residential road crossing and it is assumed that open cut trenches will be used to lay the pipe across these roads (MSJ, 2016).

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<sup>4</sup> In terms of biology, refers to (of a flora, fauna, or ecosystem) lacking in numbers or variety of species. Accessed via <https://en.oxforddictionaries.com/definition/depauperate> on 03 November 2017.

With particular reference to the stability of the sidewalls of trenches, it is important to ensure that the toe of the stockpile of soil removed from the trench is placed a distance from the edge of the trench equal to at least the depth of the trench (MSJ, 2016). It is generally required that trenches deeper than 1.5 metres below existing ground level must be adequately shored where there is a possibility of collapse and with pipeline trenches in particular there is a tendency to open the trench over significant lengths thereby increasing the risk of sidewall collapse (MSJ, 2016). According to MSJ (2016), there must be provision for safe access, or exit, not more than every 20m along the trench length.

The following key issues regarding the stability of trench sidewalls were identified as the following:-

- Soft wet soil conditions;
- Surcharge loading at edges of trenches whether by soil or equipment;
- Groundwater seepage; and
- Rainwater runoff.

According to MSJ (2016), surcharge loading and control of rainwater runoff can be managed. Surcharge in the form of stockpiling of backfill, or trenching machinery (pipe laying rigs), must be placed well away from the edge of the trench (MSJ, 2016). Other issues such as soft/loose soils and groundwater ingress must be audited daily by qualified professionals or shoring and lateral support measures must be introduced (MSJ, 2016). A drainage channel was encountered during the field investigation and it is anticipated that where slightly undulating terrain may occur the pipeline may be affected by the groundwater seepage during seasonal rainfall (MSJ, 2016).

According to MSJ (2016), it is necessary to place controls on the length of trench left open at any one time and in this instance consideration will need to be given to pipe lengths. Trench lengths should be agreed on prior to the start of the contract especially where depths exceed 1.5 m and the acceptance of trench lengths must go hand in hand with regular audits on site of trench stability by Geotechnical specialists (MSJ, 2016).

Construction of the pipelines at stream crossings will depend on whether water is flowing in the stream, the tendency for trench sidewalls to collapse and the strength of groundwater inflow and the following alternatives could be considered:

- Cofferdam construction to stop water flow in the stream bed while trenching and pipeline construction is carried out;
- Construct trench batters to 1V:3H to allow for safe working, provided there is sufficient space to accommodate these wide batters (dewatering may be required); and
- Use of trench sheetpiles to support sidewalls of excavation (Dewatering most likely will be required).

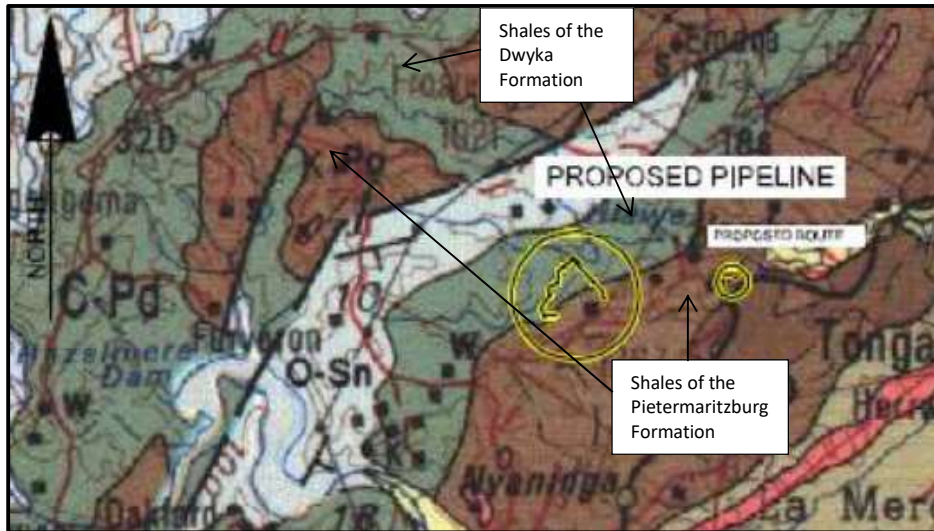
The information provided in the geotechnical report relates specifically to the positions of the field tests and as such there is a possibility that conditions of variance with those discussed above can be encountered elsewhere (MSJ, 2016). These variations must be taken into consideration during construction and it has been recommended that periodic inspections of the earthworks be undertaken by the geotechnical specialist to ensure that the recommendations are adhered to (MSJ, 2016). Any changes from the anticipated ground conditions could then be taken into account to avoid unnecessary expense (MSJ, 2016). In this regard it is important that the construction phase of the project be treated as an augmentation of the geotechnical investigation and costs allocated for the additional geotechnical inspections are included in the construction costs (MSJ, 2016).

**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**

**5.1.1 Geology**

The site of the re-grading pipeline and the tie-in position of the rising main pipeline are underlain by Shales of the Pietermaritzburg Formation, Ecca Group (Figure 8). The majority of the site, made up of the proposed rising main and collector pipelines is underlain by Shales and Tillite of the Dwyka Formation, Karoo Supergroup.



**Figure 10: Image showing the geology of the site area**

Groundwater seepage was encountered only in AH5 at a depth of 0.93mbegl, however, groundwater seepage may be anticipated at the boundary between residual soils and underlying bedrock during periods of prolonged rainfall in the wet summer months (MSJ, 2016).

The following key issues regarding the stability of trench sidewalls were identified as the following:-

- Soft wet soil conditions;
- Surcharge loading at edges of trenches whether by soil or equipment;
- Groundwater seepage; and
- Rainwater runoff.

**Potential Environmental Impact:** *Potential instability of the trench.*

**5.1.2 Biological Environment - Wetland, Riparian, Aquatic and Vegetation**

The regional context of the proposed development site is best described by the information provided in table 8:

**Table 8: Table describing the site environment (SDP, 2017)**

	Site Description
<b>Ecoregion</b>	North Eastern Coastal Belt
<b>Quaternary catchment</b>	U30B and U30D
<b>Vegetation type</b>	Kwazulu-Natal Coastal Belt (CB 3)
<b>NFEPA Wetlands</b>	Yes. A single NFEPA wetland is situated within 500 m of the proposed sewer pipeline and pump station
<b>CBA</b>	Yes, CBA 1

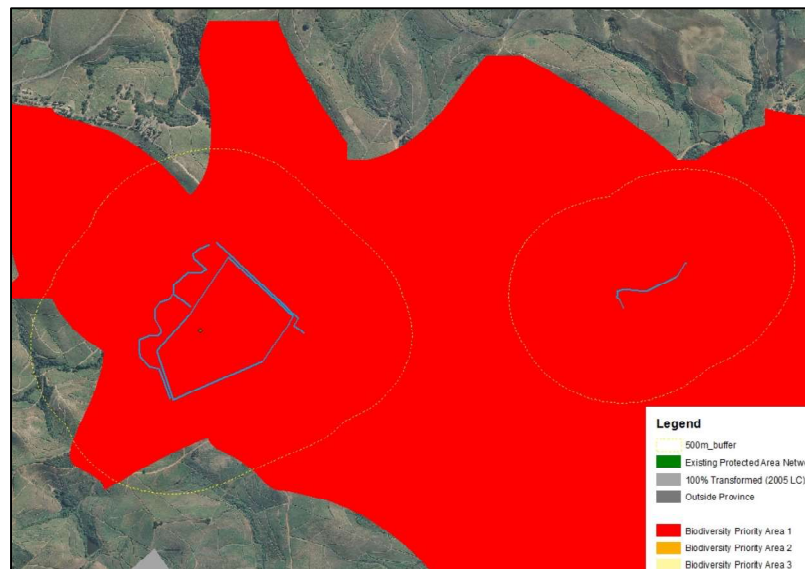
The NFEPA data indicates the presence of a wetland system in the south western extent of the study area (Figure 11) (SDP, 2017). However, this site has been recently subject to transformation for residential development purposes and a canalised drainage line is now present (SDP, 2017). As such the area in question now constitutes a watercourse and no wetland environment has been identified on the site or within 500m of the site (SDP, 2017).



**Figure 11: Location of NFEPA wetlands around the study area**

#### **Critical Biodiversity Area (CBA)**

The project area falls within a CBA 1 (mandatory) zone and according to the CBA data (Figure 12), the area was identified as comprising of North Coast Grassland habitat, as well as potentially (and historically) supporting a number of significant floral and faunal species from a conservation perspective (SDP, 2017).



**Figure 12: Map showing the location of the proposed activity within the CBA area**

According to SDP (2017), with the exception of the riparian habitat, no other terrestrial habitats were identified on site and although not entirely transformed, the project area has either been affected by development,

agriculture or exotic invasion or a combination of these factors. The extent of disturbance and the lack of intact terrestrial habitat suggest that the potential conservation value of the area is overstated (SDP, 2017).

#### **Watercourses, Riparian and Ecological Vegetation**

The site lies in the upper catchment of the Hlawe River and consists of two sections, the eastern section and western section (SDP, 2017). The riparian habitat of the Hlawe River is dominated by large trees and woody shrubs, with grasses and reeds appearing as secondary vegetation, where a loss of woody cover and shaded canopy has occurred (SDP, 2017).

According to SDP (2017), the Hlawe River is a perennial system (Type C channel,) and contains basal flow during dry periods. The majority of the tributaries were ephemeral channels (Type A channels) that have been modified by the transformation of the surrounding land for sugarcane cultivation (SDP, 2017). The riparian habitats associated with these smaller, ephemeral and seasonal channels was limited in extent and in some cases where cultivation (or settlement) has occurred up to the channel edge, the riparian habitat has been effectively removed (SDP, 2017).

The lower section (eastern section) of the Hlawe River was noted to be highly invaded by a number of exotic species and had been impacted upon by a small, intensive farming operation with stream flow modification activities (SDP, 2017). A number of indigenous and exotic species were identified as being associated with the riparian habitat at Gwala Farm, these are listed in section 5.1 of the wetland, aquatic and ecological specialist report attached as Appendix 5. *Millettia grandis* was the only indigenous species that is protected under the provincial legislation that was identified on site (SDP, 2017).

The riparian area associated with the tributary to the Hlawe River and the portion of the Hlawe River in the eastern portion of the site (Figure 13), although showing dense vegetation in places, was found to be in a degraded state, primarily due to anthropogenic disturbance and exotic invasion (SDP, 2017). More than 50 percent of the species associated with the eastern riparian habitats were identified as exotic. A number of species such as *Pennisetum purpureum*, *Arundo donax*, *Coix lacryma-jobi* and *Melia azedarach* were significant invaders of riparian habitat and in this area often dominated the marginal zone (SDP, 2017).



**Figure 13: Map of the eastern area showing the riparian area (green), Hlawe River (blue) and portion of pipeline undergoing re-grading (yellow) (SDP, 2017)**

According to the VEGRAI model, the riparian habitat has been altered significantly, relative to the reference state and this riparian habitat is considered to have a PES of “E” or “greatly modified” (SDP, 2017).

The upper portion of the Hlawe River and its associated western tributaries has been subjected to encroachment and modification by extensive sugarcane cultivation and despite this (Figure 14), communities of relic riparian vegetation remain, albeit in isolated areas along the stretch of the river (SDP, 2017). The extent of the riparian habitat has been significantly reduced, particularly that area formerly dominated by the non-marginal zone, when compared to the reference state (extensive riverine and moist coastal forest) (SDP, 2017). This area now consists mainly of sugarcane or it has been infilled for farming. The marginal zone has been disturbed by road crossings and a reduction in canopy cover and this has resulted in limited habitat loss, but has nevertheless changed the nature and characteristics of the marginal zone (SDP, 2017). Exotic invasion, although less prevalent than in the eastern section of the study area, was present in low to moderate levels throughout the extent of the western riparian habitat (SDP, 2017). The impact of sugarcane cultivation and the invasion of the area by exotic plant species has resulted in the PES of the remaining riparian habitat being classified as “largely modified” or EC: “D” (SDP, 2017).



**Figure 14: Map showing the riparian area (green), tributaries (light blue) and Hlawe River (dark blue) in relation to proposed site**

The invertebrate community within the eastern portion of the Hlawe River was of low diversity. An evaluation of the instream habitat indicated suboptimal habitat, with detractors such as algae cover, excessive disturbance, solid waste deposition such as rubble and anthropogenic disturbances being responsible for the poor invertebrate community as well poor water quality and a disturbed riparian habitat (SDP, 2017).

The invertebrate community of the upper Hlawe River according to SDP (2017), appeared healthier than past data and the recent sample from the eastern portion of the Hlawe River. A total of 21 taxa were recorded from



this site with a SASS score of 118 which is indicative of a “largely natural” (EC: “B”) system within the North Eastern Coastal Belt ecoregion (SDP, 2017). Noteworthy taxa included Platycnemidae (Odonata), Leptophlebiidae (Ephemeroptera), Philopotamidae (Trichoptera) and Ancylidae (Gastropoda) (SDP, 2017). The available habitat was considered to be “good”, even though the vegetation biotope was under represented (SDP, 2017). It is important to note that flow was low at the time of sampling (winter period) and it is expected that under normal flow conditions, the invertebrate community is more diverse with more fast water taxa, potentially present (SDP, 2017).

### **Aquatic**

A portion of the line that will be re-graded in the eastern site crosses the Hlawe River. In terms of water quality of the Hlawe River, the Nitrate levels presented indicate that the system is eutrophic which is likely to result in algal blooms and excessive plant growth within and adjacent to the channel (SDP, 2017). The Iron and Manganese concentrations exceed the General Limits, the presence of these elements may not necessarily be toxic as they are naturally occurring elements within the prevailing geology, but both can be an indicator of effluent release (or pollution) from industrial type activities – most likely to be informal activities in this instance (SDP, 2017). According to SDP (2017), the high coliform count and specifically E. coli levels indicate contamination from sanitation systems, either from periodic leaks from infrastructure, or informal systems such as septic tanks or unlined pit latrines.

The water quality of the upper Hlawe appears slightly better than the tributary situated in the eastern portion of the site with lower concentrations of E. coli, Potassium, total dissolved solids and conductivity.

The following Ecological Categories (EC) as shown in table 9, were assigned to various aspects of the ecosystems:

**Table 9: Table showing the scoring for the Ecological Categories (EC) (SDP, 2017)**

	Tributary (East):	Hlawe River (West):
Riparian habitat	– EC: “E”	– EC: “D”
Invertebrates	– EC: “E/F”	– EC: “B”
Ichthyofauna	– Not assessed	– EC: “C”
Water quality	– EC: “D”	– EC: “C”
Overall	– EC: “D”	– EC: “B”

The overall PES for the Hlawe River and the eastern tributary is “largely natural”, or EC: “B” and “largely modified” or EC: “D”.

The EIS rating for the affected section of the Hlawe River was presented as “high” with the presence of intolerant taxa (particularly invertebrates), a relatively high diversity of aquatic fauna and favourable habitat were significant characteristics contributing to the EIS rating (SDP, 2017). The EIS rating for the affected section of the eastern tributary was presented as “low” with the presence of “robust”, (capable of enduring highly modified or poor habitat conditions) taxa (particularly invertebrates), a low diversity of aquatic invertebrates and poor instream and marginal habitat were significant characteristics contributing to the poor EIS rating (SDP, 2017).

**Potential Environmental Impact:** *Potential loss of riparian area and terrestrial habitat; potential contamination of the watercourse (from sewage spills or construction activities); potential damage to the watercourse; potential hydrological and geomorphological changes; potential impact on the water quality; proliferation of alien vegetation; loss of indigenous vegetation.*

## 5.2 Surrounding Land Use

The western portion of the study area is flanked by sugarcane farms and formal and informal residential development. The eastern portion of the study area is surrounded mostly by sugarcane farms and formal and informal residential housing, with a commercial / industrial area located to the east of the study area. Within a 5km area is the King Shaka International Airport (KSIA) to the south east, the Hazelmere dam to the south west, informal settlements to the north and north west (Figure 15).

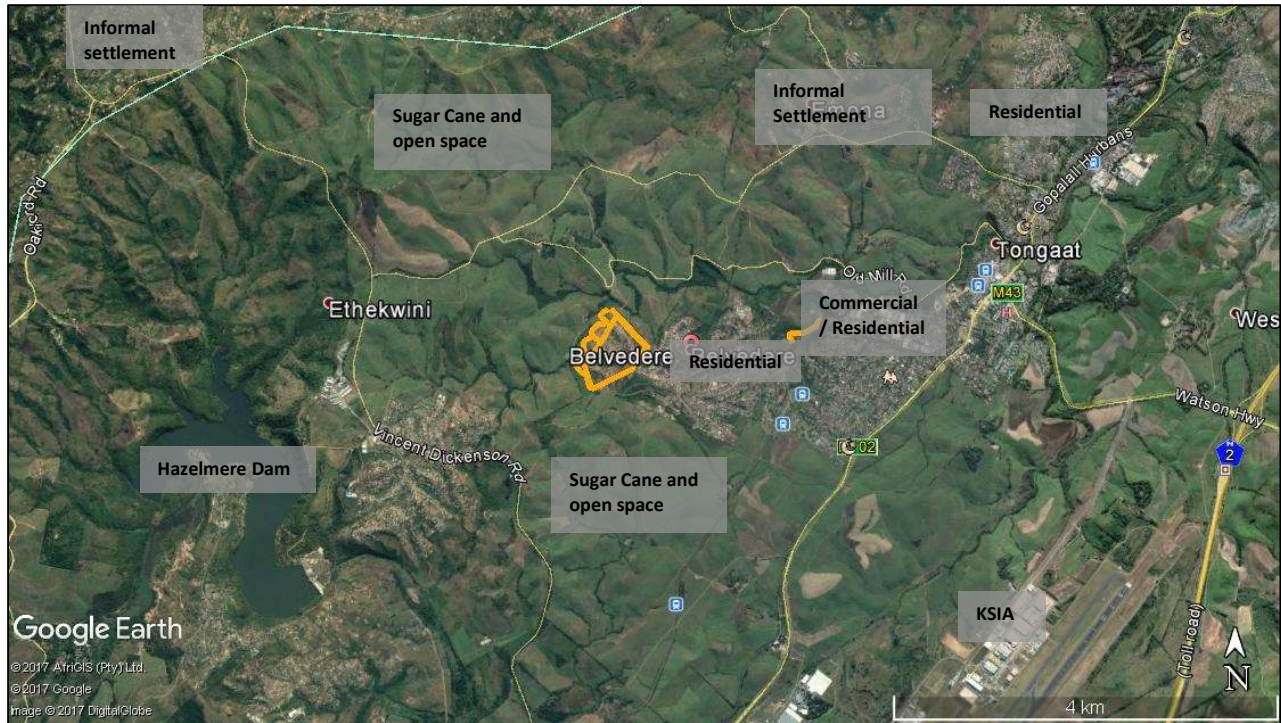


Figure 15: Map showing the surrounding land use

**Potential Environmental Impact:** *Potential job creation during construction phase. Potential negative health and safety impacts on surrounding community members due to construction activities. Potential increase in traffic during construction, potential improvement with the connection to the waterborne sewerage system.*

## 5.3 Infrastructure and Services

The project aims to connect residents located within the Gwala Farm low cost housing development to the waterborne sewerage system as the sewage is currently disposed off via pit latrines. A portion of the rising main is anticipated to cross Saunders Circle to tie into the manhole located on Hercus Avenue. No other infrastructure or services will be affected by this proposal.

**Potential Environmental Impact:** *Positive impact – Connection to waterborne sewerage system.*

## 5.4 Social and Economic

Formal and informal housing units are adjacent to the study area. The proposed project will allow for the existing low cost housing units to connect to the waterborne sewerage system instead of being connected to pit latines.

**Potential Environmental Impact:** *Connection of low cost housing units to the waterborne sewerage system (Positive Impact); increased noise during construction; potential economic benefit related to job creation.*

### 5.5 Heritage

The alignment of the proposed collector sewer passes through this area as well as through the Gwala Farm settlement. Gwala Farm is largely made up of formal housing with a number of traditional and informal structures interspersed between the formal housing and it is a highly disturbed area and no heritage sites were noted during the site inspection (Beater, 2017). Sections of the collector sewer that cross undeveloped areas were walked and no heritage sites were found (Beater, 2017).

The section of the trunk main to be re-graded is situated along an open area adjacent to a tar road on one side and a watercourse on the other side (Beater, 2017). The southern end of the trunk main passes through very dense vegetation which could not be accessed due to the thickness of the vegetation and no heritage resources were found during the site inspection (Beater, 2017).

According to Beater, (2017), the fossil sensitivity map of South Africa indicates that the project area falls into a zone of moderate sensitivity (Figure 16). A moderate sensitivity requires that a desktop paleaontological study be undertaken, however, due to the highly disturbed nature of both components of the project, there is a low risk that intact and significant fossil finds will be found therefore it is recommended that no desktop assessment is required (Beater, 2017).

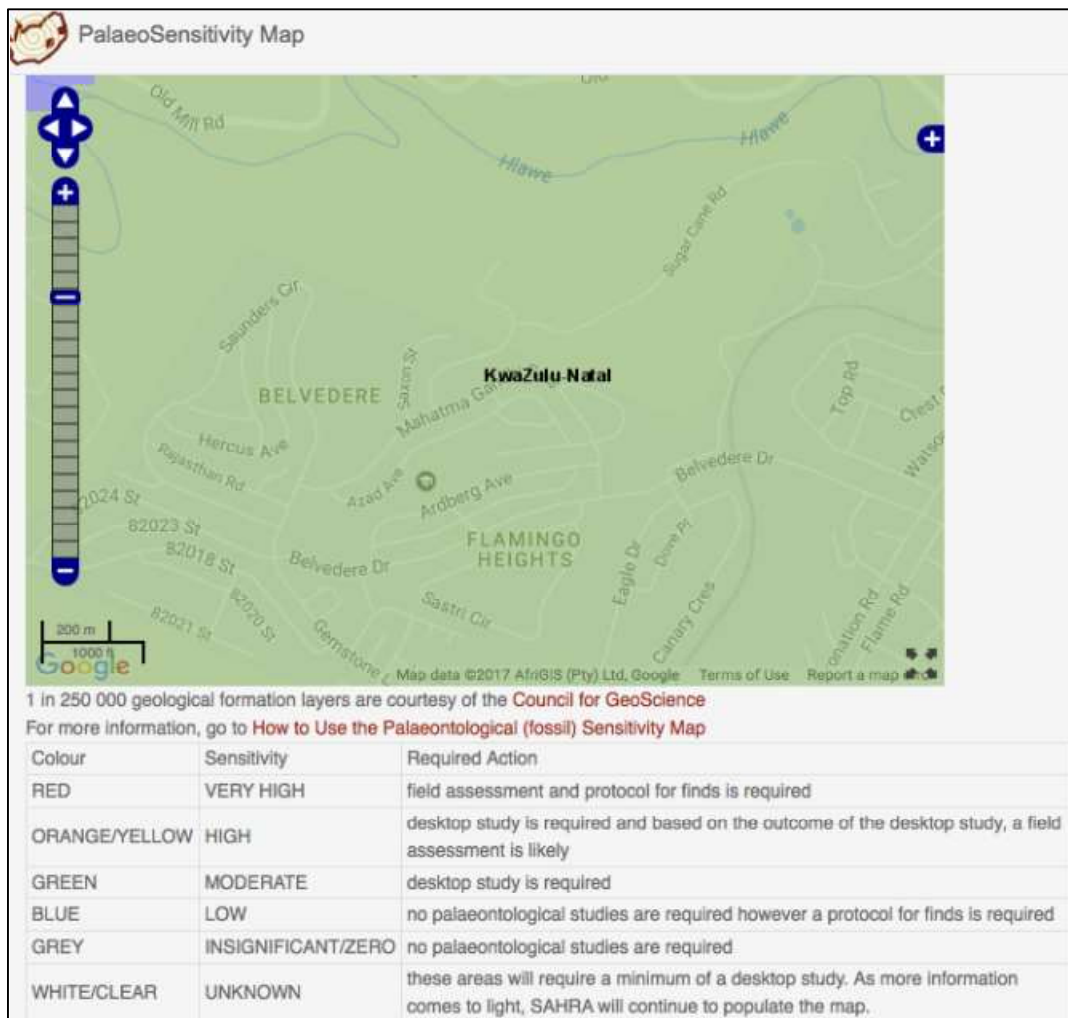


Figure 16: Fossil sensitivity map showing the site in red and yellow circles

No heritage sites were found during the inspection of both areas, however, should items of Heritage and / or cultural significance be unearthed during construction, construction activities must cease and AMAFA must be notified immediately.

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

### 5.6 Air Quality

The proposed project will not contribute directly to emissions released into the atmosphere except possible short-term dust emissions during construction.

**Potential Environmental Impact:** *Potential negative air quality impacts from construction activities i.e. excessive dust.*

## 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?
- 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 discuss the process of selecting the alternatives that have been considered for assessment.

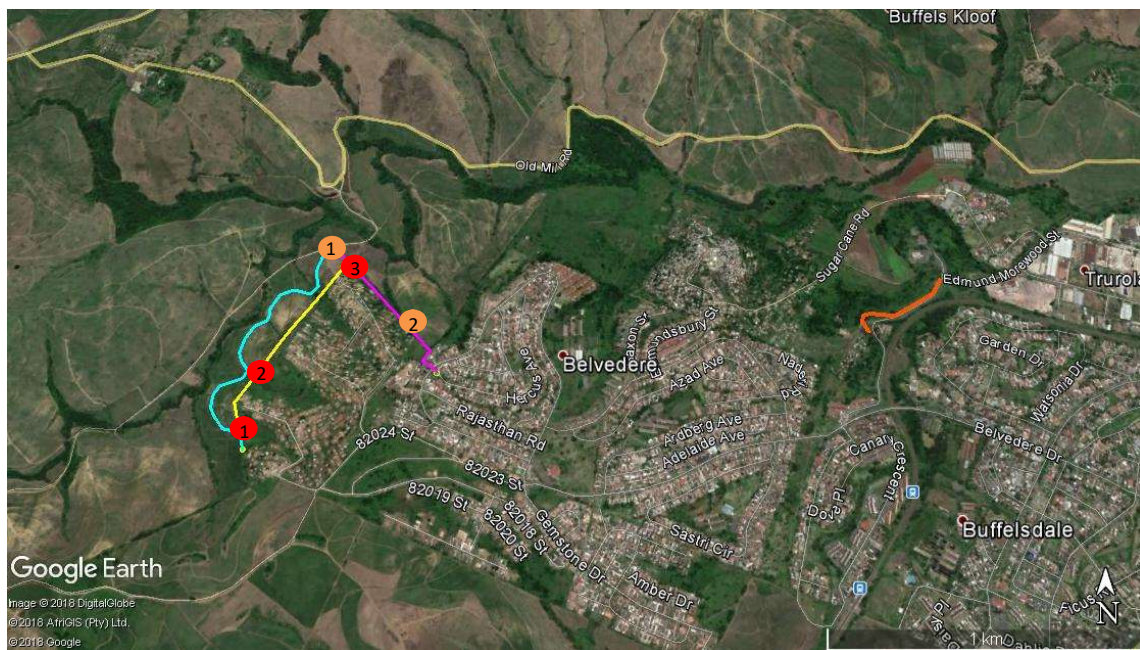
### 6.1 Site Alternatives

The proposed non-gravity collector sewer pipeline, rising main pipeline and two (2) pump stations cannot be relocated to an alternative site as the system is required to service the Gwala Farm low-cost housing development situated adjacent to the study area in the western area. The existing portion of the pipeline will be re-graded in the eastern portion of the study and as such this activity cannot be relocated to an alternate site.

**Alternative S1:** *Construction of a gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.*

### 6.2 Layout Alternatives

Two alternatives have been investigated for the collection of sewer pipeline (Figure 17). The following is a description of alternative route options considered for the collector sewer pipeline as provided for by the project manager.



**Figure 17: Map showing the two options for the collector sewer pipeline route as well as rising main pipeline, pump stations and re-graded trunk sewer pipeline**

#### Key to Map

- Alternative A1: Non-gravity collector sewer pipeline in yellow with three pump stations shown in red, rising main in purple and re-graded portion of trunk pipeline in orange.
- Alternative A2: Gravity collector sewer pipeline in blue, rising main pipeline in purple, two pump stations shown in orange and re-graded portion of the trunk sewer in orange.

**Alternative A1:** Alternative 1 is to lay the collector sewer 160mm Ø HDuPVC pipe line with 1000mmØ precast concrete ring manholes constructed at every change in grade and direction within Gwala Farm parallel to the boundary at the following co-ordinates: Start Point: 31°04'23.02" E, 29°34'49.67" S End Point: 31°04'32.81" E, 29°34'24.49" S. As this line crosses three valleys the sewer will need to be pumped over into the next catchment, requiring three pump stations in total. This option will prove to have a high capital and maintenance cost as a result of the pump stations. The sewage will be pumped from the third pump station into the rising main pipeline and into the terminal manhole. This alternative will include the re-grading of the trunk sewer pipeline.

**Alternative A2 (Preferred):** Alternative 2 is to grade the collector sewer 160mm Ø HDuPVC pipe line with 1000mmØ precast concrete ring manholes constructed at every change in grade and direction by following the topography in and out of the valleys 40m away from the stream to avoid being within the floodplain and grade all to a single pump station. This option will occur at the following co-ordinates: Start point: 31°04'22.89" E, 29°34'50.54" S End point: 31°04'31.31" E, 29°34'27.23" S. The sewage will be pumped to a second pump station and then to the terminal manhole on the existing sewer at Belvedere North. Although this option requires a longer length of collector sewer and chasing of grades, it is cheaper than option 1 in terms of both capital costs and maintenance cost. This will require the extension of sewers along each of the three valleys from Gwala Farm to connect into the collector sewer. This collector sewer falls outside the boundary of Gwala Farm and will require servitude across private land. The positioning of the collector sewer along the valleys will open for further development of possible 2000 sites which will be included in the design. This alternative will include the re-grading of the trunk sewer pipeline.

**Alternative S1 & A1 (Alternative Option):** Construction of a non-gravity fed collector sewer pipeline, rising main pipeline, three (3) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.

**Alternative S1 & A2 (Preferred Option):** Construction of a gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.

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

**Table 10: Consideration of Layout Alternatives**

<b>Activity Alternatives: Alternative A1 and Alternative A2</b>	
Is the alternative feasible and reasonable?	<b>Yes, the preferred alternative option will include the construction and operation of a gravity fed collector sewer pipeline (including two (2) pump stations) instead of a non-gravity fed collector sewer pipeline (including three (3) pump stations).</b>
Does the alternative suit the general purpose of the proposed activity?	<b>Yes, purpose of the proposed activity is to provide a sewer system for the Gwala farm residents.</b>
Does the alternative align with the need and desirability considerations of the proposed activity?	<b>Yes, the proposed activity will allow for the connection of the Gwala farm residents to the waterborne sewerage system.</b>
Is the alternative designed to prevent and minimise negative impacts and to maximise benefits?	<b>Yes. The preferred alternative is anticipated to result in the least environmental impact.</b>
Does the alternative compromise the integrity of the proposal?	<b>No</b>

Does the alternative comply with policy and legal requirements?	<b>Yes. The alternatives comply with the relevant municipal standards.</b>
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### 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 option:** The site will remain in its current condition. The need for connection of the Gwala Farm low cost housing development to the waterborne sewerage system will not be addressed, these residents will continue to use pit latrines. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. There will be no crossing of any watercourses. The existing pipeline will not be re-graded. There will be no improvement in access to local services and infrastructure.

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

**Alternative S1 & A1 (Alternative Option):** *Construction of a non-gravity fed collector sewer pipeline, rising main pipeline, three (3) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.*

**Alternative S1 & A2 (Preferred Option):** *Construction of a gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations and re-grading of the trunk main pipeline in Gwala Farm, Tongaat.*

**No-go option:** *The site will remain in its current condition. The need for connection of the Gwala Farm low cost housing development to the waterborne sewerage system will not be addressed, these residents will continue to use pit latrines. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. There will be no*

### 7.0 Details of the Public Participation Process Conducted in Terms of Regulation 27 (a) (in terms of Regulation 28 (g) of the NEMA EIA Regulations 2014 (as amended in 2017)

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) guideline<sup>5</sup> on public participation, the EAP has followed the public participation process as detailed in Figure 13. Proof of the public participation undertaken has been attached as Appendix 6.

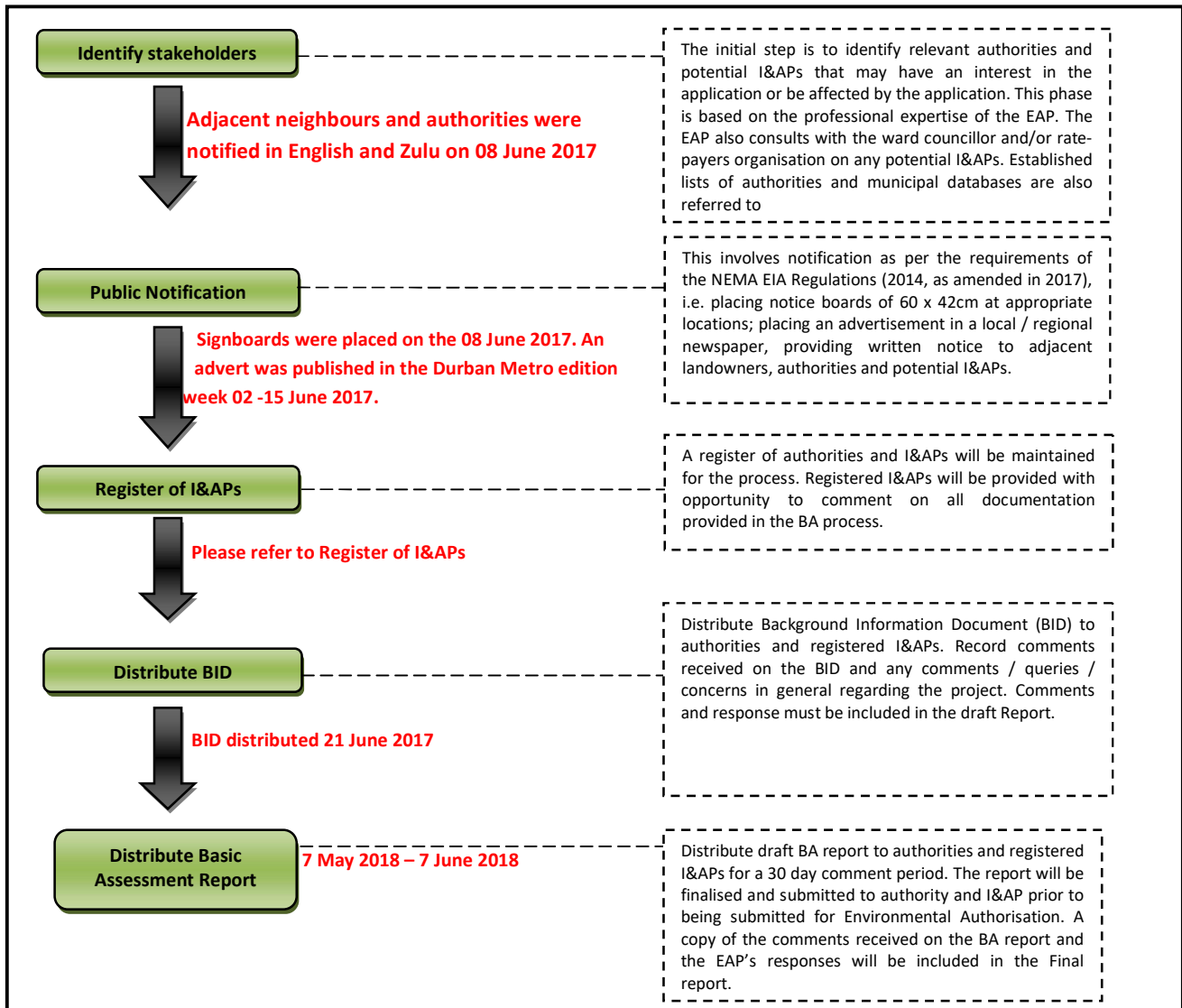


Figure 18: Summary of public participation process

According to Chapter 6 of the 2014 EIA Regulations (as amended in 2017)(GNR 326), 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

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



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 6 to this report. Authorities were notified of the application via email on 09 June 2017. Proof of notification is attached Appendix 6 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

Site notification and placement of signboards were conducted on 08 June 2017. Three signboards (i.e. two English and one Zulu signboard) were placed at the site. Photographic proof of signboard placement is also attached as Appendix 6 to this report.

A Zulu and English advert (Appendix 6) was published in the local newspaper (The Metro Ezasegasini), on the edition of week 02 June 2017 – 15 June 2017.

### 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 have been included as a registered I & AP as well as any member of public that responded to the advert or notices that were distributed. A list of registered I&APs is attached as Appendix 6 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 Appendix 7. The original comments are also attached in Appendix 7. Below is a summary of comments / issues to date.

**Table 11: Comments and Response Table**

Comment	Details of I & AP and Date Received	Response
We would like to know the full extent of the servitude area which will be lost to farming on the above property as this is not very clear from the documents we have received in this regard.	Tina Hattingh – Tongaat Hulett Sugar Date Received: 26/06/2017	The construction corridor where construction vehicles are permitted and outside of ecologically sensitive areas is to be 10m in total, 5m on either side of the proposed pipeline route. The final pipeline servitude width required for maintenance purposes is 3m.  In ecologically sensitive areas, the construction corridor will be 6m in total, 3m on either side of the pipeline route. The final pipeline servitude width required for maintenance purposes is 3m.
<b>STRUCTURES AND SERVICES</b> In order for the Department to ensure operational efficiency of the Provincial Road	Michele Schmid – KZN Department of Transport	Noted.

Comment	Details of I & AP and Date Received	Response
<p>Network so as to ensure Road Safety is not compromised the Department maintains a level of control over Structures and Services, both within the declared or expropriated road reserve and in that portion of land immediately adjacent to the road reserve, known as the building restriction area, as defined in Section 13 (1) (a) &amp; (b) of the Kwazulu-Natal Roads Act No. 4 of 2001.</p>	<p>Date Received: 28/06/2017</p>	
<p>No buildings or any structures whatsoever, other than a fence, hedge or a wall which does not rise higher than 2,1 meters above or below the surface of the land on which it stands, shall be erected on the land within a distance of 15 meters measured from the road reserve boundary of a Blacktop surfaced Main or District Road, or within a distance of 30 meters measured from the center line of a Gravel surfaced Main Road; or within a distance of 25 meters measured from the center line of a Gravel surfaced District Road.</p>	<p>Michele Schmid – KZN Department of Transport Date Received: 28/06/2017</p>	<p>Noted.</p>
<p>The road reserve boundary shall be determined in consultation with this Departments Road Information Services, (Tel: 033–355 8600).</p>	<p>Michele Schmid – KZN Department of Transport Date Received: 28/06/2017</p>	<p>Noted</p>
<p>On Main Roads, no single pole power transmission line, telecommunication line, cable, or pipeline with a diameter of less than 100mm diameter should be placed within a distance of 13 metres of the Road centreline. Nor, in addition, should they be more than 2 metres <u>inside</u> the road reserve boundary.</p> <p>Except at approved crossings of the road reserve, the closest point a pipeline exceeding 100mm in diameter should be at least 17 metres from the centreline of a Main Road, carriageway or ramp. In addition, the closest point a pipeline should be located is at least 2 metres <u>outside</u> of the road reserve boundary.</p>	<p>Michele Schmid – KZN Department of Transport Date Received: 28/06/2017</p>	<p>Noted. These measures will be adhered to where applicable.</p>

Comment	Details of I & AP and Date Received	Response
<p>On District Roads and Local Roads, no single pole power transmission line, telecommunication line, cable, or pipeline with a diameter of less than 100mm diameter should be placed within a distance of 8 metres of the Road centreline. Nor, in addition, should be more than 2 metres <u>inside</u> the road reserve boundary.</p> <p>Except at approved crossings of the road reserve, the closest point a pipeline exceeding 100mm in diameter should be at least 12 metres from the centreline of a District Road or Local Road. In addition, the closest point a pipeline should be located is at least 2 metres <u>outside</u> of the road reserve boundary.</p>	<p>Michele Schmid – KZN Department of Transport Date Received: 28/06/2017</p>	<p>Noted. These measures will be adhered to where applicable.</p>
<p>All Structures and Services are to be approved and placed in consultation with and to the satisfaction of the relevant Cost Centre Manager.</p>	<p>Michele Schmid – KZN Department of Transport Date Received: 28/06/2017</p>	<p>Noted. The relevant approvals will be acquired where necessary.</p>
<p><b>ETHEKWINI TRANSPORT AUTHORITY</b> No Objection in Principle, subject to the following:- A Traffic management plan must be submitted To ETA for approval if any road closures / deviations Etc. are being proposed.</p>	<p>Kuben Samie – Environmental Planning and Climate Protection Department eThekwini Municipality Date Received: 01/08/2017</p>	<p>Noted. The relevant plan will be submitted if required.</p>
<p><b>ETHEKWINI ELECTRICITY</b> Please note that HV Operations has no objections to the proposal, however a separate approval must be obtained from MV/LV Operations Branch to receive a complete clearance from the Electricity Unit.</p>	<p>Kuben Samie – Environmental Planning and Climate Protection Department eThekwini Municipality Date Received: 01/08/2017</p>	<p>Noted. The relevant approvals will be sought by the applicant.</p>
<p><b>GEOTECHNICAL ENGINEERING</b> No geotechnical objections. Suggest a geotechnical route investigation before Construction. Site 1 is primarily in Dwyka Formation tillite on the Mid-slope so should be relatively straight forward But they may encounter shallow water in the Trenches in sections of Site 2 where underlain by alluvial sediments.</p>		<p>Noted. The route investigation will be undertaken prior to construction with the relevant geotechnical specialist.</p>
<p><b>With respect to site A, please note the following:</b> a. The <b>Gwala’s Farm Housing Project</b> (which</p>		<p>Please note that this proposed activity for the construction of the collection sewer line, pump stations</p>

Comment	Details of I & AP and Date Received	Response
<p>the proposed infrastructure aims to service) commenced without environmental authorization and this is thus a <b>prima facie unlawful development</b>.</p> <p>b. In April 2015, the Municipality was requested to provide further information on the housing project. This information was never produced.</p> <p>c. The houses were therefore built prior to 2015 and were settled by the current occupants without the provision of adequate and necessary infrastructure in the form of sewer.</p> <p>d. No environmental assessment were ever conducted to ascertain the extent of environmental damage as a result of the unlawful commencement.</p> <p>e. In terms of s24G of the National Environmental Management Act 107 of 1998 an unlawful activity can only be rectified by following the process as outlined in s24G.</p> <p>f. The provision of services to site A is thus a continuation of the unlawful activity, and therefore needs to be conducted in terms of s24G.</p> <p>g. This Department would not be in a position to comment on the proposal, until the following is compiled with:</p> <p>i. The provincial environmental department in engaged with, with a view to resolving this matter in terms of s24G of NEMA.</p> <p>ii. Where required, a s24G application is submitted to the provincial environmental department for the housing and the proposed sewer for site A.</p> <p>iii. The assessment of environmental damage as a result of the unlawful commencement of the housing project is conducted, and remediation and rehabilitation where recommended is implemented which may or may not involve the redesign of the housing</p>	<p>Kuben Samie – Environmental Planning and Climate Protection Department eThekwini Municipality Date Received: 01/08/2017</p>	<p>and rising main is not a S24G application. This has been confirmed by the EDTEA who has stated the following: “... the W&amp;S project is not S24G. What should happen is the housing component needs to lodge the S24G application to legalise the development and the then W&amp;S project should be lodged. The reasoning behind this is we as a Dpt cannot authorise services for a project which is unlawful. If the S24G process requests Human Settlements to demolish some houses this would be fruitless expenditure. At the same time we cannot subject W&amp;S to a fine for something that they did not do. I think we need to call a meeting with both sections.”</p> <p>The applicant has stated that a meeting will be held with the EDTEA and eThekwini Municipality; however this development activity is a separate activity to the housing development and as such does not constitute a S24G.</p>

Comment	Details of I & AP and Date Received	Response
<p>layout and/or the sewer route/design.</p> <p>h. Please note that the Municipality has a legal duty in terms of s28 of NEMA with respect to the duty of care and recommendation of environmental damage.</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 2014 EIA Regulations (as amended in 2017), 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
<b>Reversibility</b>		
	Can the impact be prevented?	1
	Can the impact be reversed?	2
	Can the impact be managed?	3
<b>Will irreplaceable resources be lost?</b>		
	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.
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	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.

#### 8.1.1 Construction Phase

The following are potential impacts that may occur during the construction phase of the collector sewer line, rising main and re-grading of the trunk main across the ephemeral channels and tributaries.

The impacts have been identified and assessed for the listed activity only. All impacts are applicable to both alternatives. Impacts that are specific to each alternative have been listed separately.

CONSTRUCTION IMPACT		Scores where applicable
Aspect	<i>Soil (A1 and A2)</i>	n/a
Nature of Impact	<b><i>(Direct) Contamination of soil and/or the affected channel / tributary during concrete mixing.</i></b>	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.</i>	1
Probability of impact occurring before mitigation	<i>Medium-High</i>	n/a
Mitigation Measure	<i>Cement mixing will not be permitted to occur where run off can enter the watercourse and stormwater drains. Cement mixing must take place on a hard surfaced area or cement mixing trays must be used. Cement mixing must be done in a controlled manner; cement bags must not be left open indefinitely to warrant run-off into the stream in the event of a stormwater event. No dumping of excess cement, cement bags or equipment contaminated with cement are permitted to enter the watercourse at any time. Cement mixing must take place further than 50m away from the watercourse.</i>	n/a
Probability of impact occurring after mitigation	<i>Low</i>	1

Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>5</b>
<b>CONSTRUCTION IMPACT</b>		<b>Scores where applicable</b>
Aspect	Soil (A1 and A2)	n/a
Nature of Impact	<b>(Direct) The destabilisation of soils and subsequent erosion, sedimentation of watercourse (SDP, 2017).</b>	n/a
Extent of Impact	Site	1
Duration of Impact	Very Short-term (During construction)	1
Can impact be prevented/reversed or managed?	Yes, can be prevented.	1
Probability of impact occurring before mitigation	Medium-High	n/a
Mitigation Measure	<p><i>The implementation of temporary stormwater management and erosion control measures such as silt fences, sand bags, berms and cut off drains. These will collate sediments and control runoff, potentially reducing erosion within the construction area and ultimately the amount of sediment entering the adjacent riparian systems.</i></p> <p><i>In order to minimise soil erosion, care must be taken at the design stage that the correct placement of water directing techniques within the construction area be designed and specified in a manner that will best mitigate the effects of stormwater runoff.</i></p> <ul style="list-style-type: none"> <li>• <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;</i></li> <li>• <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. The entire construction area must not be stripped of vegetation prior to commencing construction activities;</i></li> <li>• <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></li> <li>• <i>There must be no mining of soil/sand required for construction purposes from the banks of the river. Soil must be brought in, if needed for construction purposes. This must also be stockpiled away from the channels edge.</i></li> <li>• <i>No stockpiling of any materials may take place adjacent to the channel or within 30m from the riparian area.</i></li> <li>• <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></li> </ul>	n/a
Probability of impact	Low	1

occurring after mitigation		
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>5</b>
CONSTRUCTION IMPACT		
Aspect	<i>Soil &amp; Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Risk of oil / fuel spills from refuelling of and use of construction equipment contaminating soil, and / or the affected channel / tributary.</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Site</i>	<b>1</b>
Duration of Impact	<i>Very Short-term (During construction)</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes can be prevented / managed</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>High</i>	<b><i>n/a</i></b>
Mitigation Measure	<i>A drip tray must be placed under any construction equipment that could leak oil. All equipment must be regularly serviced offsite 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 river system. Mobile refuelling units can be used, but must be accompanied by a drip tray to capture any spillage (SDP, 2017).  <i>Refuelling and hazardous storage and handling must be in undertaken in accordance with the site-specific EMPr (Appendix 8).</i></i>	<b><i>n/a</i></b>
Probability of impact occurring after mitigation	<i>Medium</i>	<b>2</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	
	<b>Significance rating</b>	<b>5</b>
CONSTRUCTION IMPACT		
Aspect	<i>Soil &amp; Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Risk of spills during storage of hazardous materials (cement, oils etc.) during construction contaminating soil and / or the affected channel / tributary.</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Site</i>	<b>1</b>
Duration of Impact	<i>Very short-term (during construction)</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<b><i>n/a</i></b>
Mitigation Measure	<i>No hazardous substances / materials to be stored within 50m of the tributary and where run-off can enter into the tributary. All</i>	<b><i>n/a</i></b>

	<p><i>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 50m 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 contaminated soil must be removed, stored in a sealed container and disposed of at a licensed facility.</i></p> <p><i>Storage of hazardous substances / materials must be in undertaken in accordance with the site-specific EMPr.</i></p>	
Probability of impact occurring after mitigation	Medium	2
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>6</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	Waste & Watercourse (A1 and A2)	n/a
Nature of Impact	<b>Improper disposal of general waste or rubble i.e.: burying or neglecting building rubble; Disposal of general waste, building rubble and other construction waste into the watercourse.</b>	<b>n/a</b>
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>Disposal or dumping waste into the stream is strictly prohibited. Separate skips / appropriate storage containment must be provided for the different streams of general waste (e.g. plastic, glass, paper, etc.) as well as for rubble. Waste skips which can only be stored on site temporarily. All excess rubble and building material must be removed from the site. Disposal skips 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>Disposal of general waste must be done in accordance with the site-specific EMPr.</i></p>	

	<i>Contractors must be given environmental training during which staff must be made aware of the importance of the riparian system and watercourses (channels, tributary and the Hlawe River). Construction activities will be managed by a site specific EMPr and will be monitored by an ECO who will ensure compliance with the construction EMPr.</i>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>5</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Ablution facilities (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Improper management of ablution facilities causing a health and safety hazard; ablution facilities causing potential pollution to the watercourse.</i></b>	<b><i>n/a</i></b>
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>Chemical ablution facilities during the construction phase must be located at least 50m away from the watercourse. It must be regularly cleaned and serviced so as to not pose a health and safety risk to construction staff and/or the public. The chemical ablution facility must be removed from site when construction is complete. One portable toilet must be provided for every seven (7) staff members on site.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
<b>+</b>	<b>Significance rating</b>	<b>5</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Cultural/ Heritage (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Unearthing and damage to items of cultural or historical significance.</i></b>	<b><i>n/a</i></b>
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>	<b>1</b>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<b>n/a</b>
Mitigation Measure	<i>The Heritage Impact Assessment undertaken by JLB Consulting (2017) notes that no items of cultural or heritage significance were noted on site. However, should any item of cultural or heritage significance be encountered during construction, construction activities must cease immediately and the relevant authority be notified. Construction must then cease until further notice.</i>	<b>n/a</b>
Probability of impact occurring after mitigation	<i>Low</i>	<b>1</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>Yes, only if items of cultural or heritage significance are unearthed and destroyed.</i>	<b>1</b>
	<b>Significance rating</b>	<b>9</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Flooding during construction activities (A1 and A2)</i>	<b>n/a</b>
Nature of Impact	<b><i>Risk of flooding on site during construction activities.</i></b>	<b>n/a</b>
Extent of Impact	<i>Site and downstream of river</i>	<b>2</b>
Duration of Impact	<i>Very short-term [during construction only]</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium-high</i>	<b>n/a</b>
Mitigation Measure	<p><i>Work must take place in the river bed during months when the least amount of rain is expected. During periods of heavy rain events, the contractor must ensure that sandbags are securely placed and monitored. The water pump must be used to pump out water from the dry part of the river to prevent damage to structures in place.</i></p> <p><i>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. The designated responsible person on site, usually the contractor, must ensure that no construction work takes place before the stormwater control measures are in place.</i></p> <p><i>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</i></p>	<b>n/a</b>

	<i>must be removed or protected from washing away during a flood event. It is the responsibility of the contractor to ensure site 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	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No, provided that mitigation measures are implemented.	0
	<b>Significance rating</b>	<b>6</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Sustainability (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><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></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Potential regional impact if unsustainable practices occurs</i>	<b>4</b>
Duration of Impact	<i>Very short-term (during construction)</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium-high</i>	<b><i>n/a</i></b>
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 allowed amount for abstraction must be confirmed with the Department of Water and Sanitation.</i>  <i>No mining of sand or other material is permitted from the watercourse banks unless authorised by the Department of Mineral and Resources.</i>	<b><i>n/a</i></b>
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>8</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Potential alteration in hydrology, water quality and flow as water flow in the required area of the watercourse is diverted for excavation and installation of pipes.</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Site – local</i>	<b>2</b>

Duration of Impact	<i>Short to long term</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be mitigated and managed</i>	<b>2</b>
Probability of impact occurring before mitigation	<i>High</i>	<b>n/a</b>
Mitigation Measure	<p><i>The flow will be diverted such that work will take place in the dry portion of the stream / watercourse bed. This will be temporary, until such time that construction is complete. Work must take place within the dry months so as to minimise the potential impact on the hydrology of the stream.</i></p> <p><i>All chemicals or hazardous substances must be stored at least 50m away from the watercourse or riparian area. Drip trays must be placed beneath any equipment that could leak oil.</i></p> <p><i>The dumping of waste / waste water into the watercourse is not permitted. No littering is allowed on site.</i></p>	<b>n/a</b>
Probability of impact occurring after mitigation	<i>Medium</i>	<b>2</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>8</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Watercourse(A1 and A2)</i>	<b>n/a</b>
Nature of Impact	<b><i>Hydrological and geomorphological changes (SDP, 2017)</i></b>	<b>n/a</b>
Extent of Impact	<i>Site – local</i>	<b>2</b>
Duration of Impact	<i>Short-term</i>	<b>2</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<b>n/a</b>
Mitigation Measure	<p><i>SDP (2017) has stated the following:</i></p> <p><i>Western area: During the construction period some level of flow retardation is likely to occur, however this will be dependent upon the presence of flow within the ephemeral drainage lines affected by the proposed pipeline. There is however potential for erosion to arise on account of the destabilisation of river channel areas during the construction phase. Indirect sedimentation may also arise within the Hlawe River. Sedimentation and erosion mitigation measures suggested previously are applicable.</i></p> <p><i>Eastern area: Bank destabilisation, flow retardation and erosion are a likely consequence of the construction of the pipeline in this area due to the proximity of the sewer line to the main channel. The system is however, highly degraded and the significance of any impacts is likely to be minimal. Significant hydrological and</i></p>	<b>n/a</b>



	<i>geomorphological impacts are therefore only likely to be present during the construction phase. Sedimentation and erosion mitigation measures suggested previously are applicable.</i>	
Probability of impact occurring after mitigation	<i>Low</i>	<i>1</i>
Magnitude	<i>Medium</i>	<i>2</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	<b>Significance rating</b>	<b>8</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Access roads (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<i>Vehicular movement and associated impacts on the surrounding environment (SDP, 2017).</i>	<i>n/a</i>
Extent of Impact	<i>Site – local</i>	<i>2</i>
Duration of Impact	<i>Short-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>Designated access roads need to be provided to prevent plant arbitrarily traversing watercourses in order to access work areas (SDP, 2017). No access roads are allowed across the watercourse r riparian areas.</i></p> <p><i>In addition,</i></p> <ul style="list-style-type: none"> <li><i>• Access routes must be demarcated and adhered to.</i></li> <li><i>• Routes for maintenance access and haul roads must be existing paths and routes. All contractors and maintenance staff, vehicles and materials movement must be confined to these paths and roads.</i></li> <li><i>• The disturbance footprint must be kept to a minimum, including the areas traversed by trucks and machinery and limited to a specific operational area.</i></li> <li><i>• The relevant speed limits must be adhered to and signage must be implemented.</i></li> <li><i>• Suitable erosion protective measures to be implemented for access roads where these occur on existing dirt roads.</i></li> <li><i>• Any damage to the existing access roads as a result of construction activities must be repaired.</i></li> </ul>	<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>
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Vegetation (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Spread / proliferation of alien invasive species</i></b>	<b><i>n/a</i></b>

Extent of Impact	<i>Site – local</i>	<i>2</i>
Duration of Impact	<i>Short-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>An alien invasive control plan / programme must be incorporated into the EMPr.</i></p> <p><i>Ongoing alien plant control must be undertaken on site and up to a radius of 10m; 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> <p><i>Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.</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>
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Habitat (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Loss of indigenous vegetation.</i></b>	<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>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>The ecological assessment undertaken by SDP (2017) notes that the riparian areas are dominated by indigenous vegetation. Prior to construction, indigenous vegetation must be clearly marked and construction staff must be made aware of their location. 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.</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>	<i>n/a</i>
Probability of impact occurring after	<i>Low</i>	<i>1</i>

mitigation		
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Habitat (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Loss of habitat</i></b>	<b><i>n/a</i></b>
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	<i>The ecological assessment undertaken by SDP (2017) notes that no ecologically “sensitive” terrestrial habitats will be disturbed during the establishment of the sewer line. Cultivated sugarcane fields, secondary and exotic vegetation and other transformed areas are the primary terrestrial habitats affected by the development.</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>
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Riparian Areas (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Disturbance of riparian areas (SDP, 2017)</i></b>	<b><i>n/a</i></b>
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>Medium-High</i>	<i>n/a</i>
Mitigation Measure	<i>The construction servitude must be demarcated to avoid construction teams straying outside of the working area. The construction area must be enclosed by a shade cloth fence where riparian habitat lies adjacent to the line route.</i>  <i>SDP (2017) have stated that with reference to construction of the collector sewer and rising main (west), the majority of the sewer line proposed within the western portion of the site affects minor drainage lines that have been degraded by sugarcane cultivation and settlement. Very limited riparian habitat is present in association with these systems. The riparian habitat of the main</i>	<i>n/a</i>

	<p><i>Hlawe River will however, be unaffected by the proposed sewer line. The affected terrestrial habitats include sugarcane, secondary and exotic vegetation and transformed areas. These areas are of limited ecological value and the resultant impact will be low.</i></p> <p><i>With regards to the eastern portion of the site, a portion of the proposed sewer line that is to be upgraded, is situated within the riparian habitat associated with the main tributary to the Hlawe River. Disturbance will arise as a consequence of the construction process, however, once construction is complete, no further disturbance is expected with the exception of periodic repairs and maintenance requirements. The riparian habitat in this area is largely degraded with a high density of exotic species present.</i></p> <p><i>The remainder of the line falls within an area of secondary and exotic vegetation between the riparian edge and Edmund Morewood Road. This area is cleared regularly and maintained as part of the road reserve/sewer servitude. Disturbance of this area is of limited ecological concern.</i></p> <p><i>Work must be limited to the construction footprint, especially within the sensitive areas.</i></p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Fauna (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Disturbance or loss of fauna</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Site – local</i>	<b>2</b>
Duration of Impact	<i>Short-term – long-term</i>	<b>2</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<b><i>n/a</i></b>
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, fishing 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</i></p>	<b><i>n/a</i></b>

	<p><i>be removed to a safe location by the 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>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	Noise (A1 and A2)	n/a
Nature of Impact	<b>Noise generated by construction workers, machinery and construction vehicles disturbing surrounding residents.</b>	<b>n/a</b>
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>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 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> <p><i>An Environmental Management Programme (EMPr) has been designed to manage construction activities.</i></p>	n/a
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	1
	<b>Significance rating</b>	<b>6</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	Dust pollution (A1 and A2)	n/a
Nature of Impact	<b>Construction activities resulting in excessive dust production.</b>	<b>n/a</b>
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>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<b>n/a</b>
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.  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>	<b>n/a</b>
Probability of impact occurring after mitigation	<i>Low</i>	<b>1</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>5</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Air pollution (A1 and A2)</i>	<b>n/a</b>
Nature of Impact	<b><i>CO<sub>2</sub> Emissions generated from construction vehicles.</i></b>	<b>n/a</b>
Extent of Impact	<i>Local (between 2km – 5km)</i>	<b>2</b>
Duration of Impact	<i>Very short-term (during construction)</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be managed</i>	<b>3</b>
Probability of impact occurring before mitigation	<i>Low-medium</i>	<b>n/a</b>
Mitigation Measure	<i>During construction, it is anticipated that tailpipe emissions from construction vehicles are the only air emissions. These emissions will be minimal and is not expected to significantly affect surrounding residents and businesses.</i>	<b>n/a</b>
Probability of impact occurring after mitigation	<i>Low</i>	<b>1</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>8</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Traffic (A1 and A2)</i>	<b>n/a</b>
Nature of Impact	<b><i>Potential increase in traffic disruptions on surrounding access roads.</i></b>	<b>n/a</b>
Extent of Impact	<i>Local (&gt;2km)</i>	<b>1.5</b>
Duration of Impact	<i>Very short-term (during construction)</i>	<b>1</b>

Can impact be prevented/reversed or managed?	<i>Yes impact can be managed</i>	<b>3</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<b>n/a</b>
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 development. 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 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.</i></p>	<b>n/a</b>
Probability of impact occurring after mitigation	<i>Low</i>	<b>1</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>7.5</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Bulk services (A1 and A2)</i>	<b>n/a</b>
Nature of Impact	<b><i>Potential damage to existing services (water pipes, etc.)</i></b>	<b>n/a</b>
Extent of Impact	<i>Local (between 2km-5km)</i>	<b>2</b>
Duration of Impact	<i>Very short-term (during construction)</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<b>n/a</b>
Mitigation Measure	<i>All services must be identified prior to construction. Should it be anticipated that a service may be disrupted during construction,</i>	<b>n/a</b>

	<p><i>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 / applicant's responsibility to repair a service line, pipe or pole that is damaged by the construction activities.</i></p>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>6</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Geotechnical (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Potential instability of the site</b>	<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	<p><i>The geotechnical investigation (Appendix 5) notes the following in terms of trench stability:</i></p> <p><i>With particular reference to the stability of the sidewalls of trenches, it is important to ensure that the toe of the stockpile of soil removed from the trench is placed a distance from the edge of the trench equal to at least the depth of the trench. It is generally required that trenches deeper than 1.5 metres below existing ground level must be correctly shored where there is a possibility of collapse. With pipeline trenches in particular there is a tendency to open the trench over significant lengths thereby increasing the risk of sidewall collapse. In any event there must be provision for safe access, or exit, not more than every 20m along the trench length.</i></p> <p><i>Key issues regarding the stability of trench sidewalls are:-</i></p> <ul style="list-style-type: none"> <li><i>• Soft wet soil conditions</i></li> <li><i>• Surcharge loading at edges of trenches whether by soil or equipment</i></li> <li><i>• Groundwater seepage</i></li> <li><i>• Rainwater runoff</i></li> </ul> <p><i>Of these both surcharge loading and control of rainwater runoff can be managed. Surcharge in the form of stockpiling of backfill, or trenching machinery (pipe laying rigs), must be placed well away from the edge of the trench. The other issues such as soft/loose soils and groundwater ingress must fall under daily</i></p>	<i>n/a</i>



	<p><i>audits by professionals well experienced in these matters, otherwise shoring and lateral support measures must be introduced. Although a drainage channel was encountered during the field investigation, where slightly undulating terrain may occur the pipeline may be affected by the groundwater seepage during seasonal rainfall.</i></p> <p><i>It is necessary to place controls on the length of trench left open at any one time and in this instance consideration will need to be given to pipe lengths. Trench lengths must be agreed on prior to the start of the contract especially where depths exceed 1.5 m. The acceptance of trench lengths must go hand in hand with regular audits on site of trench stability by Geotechnical specialists.</i></p> <p><i>The study further states the following for stream crossings: Construction of the pipelines at stream crossings will depend on whether water is flowing in the stream, the tendency for trench sidewalls to collapse and the strength of groundwater inflow. The following alternatives could be considered:</i></p> <ul style="list-style-type: none"> <li>• <i>Coffer dam construction to stop water flow in the stream bed while trenching and pipeline construction is carried out,</i></li> <li>• <i>Construct trench batters to 1V:3H to allow for safe working, provided there is sufficient space to accommodate these wide batters. Dewatering may be required,</i></li> <li>• <i>Use of trench sheeters to support sidewalls of excavation. Dewatering most likely will be required.</i></li> </ul>	
Probability of impact occurring after mitigation	<i>Low-medium</i>	<i>1.5</i>
Magnitude	<i>Moderate</i>	<i>2</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	<b>Significance rating</b>	<b>8.5</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Positive Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Improvement of water quality of adjacent watercourses (SDP, 2017)</i></b>	<b><i>n/a</i></b>
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>SDP (2017) states the following: “The upgrade and improvement to sanitation infrastructure within the Gwala Farm area is likely to have both a positive impact through the formalisation of sanitation and the potential to improve the water quality of the adjacent watercourses. However, these infrastructural improvements may</i>	<i>n/a</i>

	<i>inadvertently promote development within the area further facilitating transformation and degradation of riparian habitat. This long term, cumulative impact is likely to have a greater influence on the riparian and aquatic habitat at Gwala Farm than the proposed sewer upgrades and may negate any improvements afforded by the sanitation project. This situation can only be addressed through appropriate town and infrastructure planning.”</i>	
Probability of impact occurring after mitigation	High	3
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Positive Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Potential for job creation during construction period.</b>	<b>n/a</b>
Extent of Impact	<i>Local (between 2km-50km)</i>	<b>2</b>
Duration of Impact	<i>Very short-term [during construction]</i>	<b>1</b>
Can impact be prevented/reversed or managed?	<i>Not required</i>	<b>0</b>
Probability of impact occurring before mitigation	<i>n/a – no mitigation deemed necessary as this is a positive impact.</i>	<b>n/a</b>
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>	<b>n/a</b>
Probability of impact occurring after mitigation	High	3
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>7</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Indirect Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Potential for waste to be disposed of at incorrect landfill resulting in contamination at the landfill site.</b>	<b>n/a</b>
Extent of Impact	<i>Local at landfill site; potential to become regional if impact leads to groundwater contamination</i>	<b>3</b>
Duration of Impact	<i>short (2-5 years) / Potential long-term</i>	<b>2</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented/managed</i>	<b>1</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<b>n/a</b>
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</i>	<b>n/a</b>

	<i>landfill site and safe disposal certificates must be obtained.</i>	
Probability of impact occurring after mitigation	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>8</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Cumulative Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Increase in waste being sent to landfill.</b>	<b>n/a</b>
Extent of Impact	<i>Local – at landfill site</i>	2
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	Medium	<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	Low	1
Magnitude	Low	1
Will irreplaceable resources be lost?	No	0
	<b>Significance rating</b>	<b>6</b>
<b>CONSTRUCTION IMPACT</b>		
Aspect	<i>Soil &amp; Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Risk of spill of sewage during tying in of the regraded trunk main pipeline into the existing manholes and existing line.</b>	<b>n/a</b>
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	Medium	<i>n/a</i>
Mitigation Measure	<i>The existing trunk main pipeline will be closed before the regraded portion of the trunk pipeline ties into it. The contractor must ensure that proper containment and collection is in place and that an approved method statement is in place before this can be undertaken.</i>  <i>In the event of soil contamination during construction, the contaminated soil must be removed, stored in a sealed container</i>	<i>n/a</i>

	<i>and disposed of at a licensed facility.</i>	
	<i>Storage of hazardous substances / materials must be in undertaken in accordance with the site-specific EMPr.</i>	
Probability of impact occurring after mitigation	<i>Medium</i>	<i>2</i>
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	<b>Significance rating</b>	<b>6</b>

### 8.1.2 Operation Phase

The following are potential impacts that may occur during the operational phase of the proposal and are applicable to both alternatives unless otherwise stated:

OPERATIONAL IMPACTS		
Aspect	<i>Positive Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Improvement of water quality of adjacent watercourses (SDP, 2017)</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Local (between 2km-50km)</i>	<i>2</i>
Duration of Impact	<i>Medium-term</i>	<i>3</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>SDP (2017) states the following: “The upgrade and improvement to sanitation infrastructure within the Gwala Farm area is likely to have both a positive impact through the formalisation of sanitation and the potential to improve the water quality of the adjacent watercourses. However, these infrastructural improvements may inadvertently promote development within the area further facilitating transformation and degradation of riparian habitat. This long term, cumulative impact is likely to have a greater influence on the riparian and aquatic habitat at Gwala Farm than the proposed sewer upgrades and may negate any improvements afforded by the sanitation project. This situation can only be addressed through appropriate town and infrastructure planning.”</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>
	<b>Significance rating</b>	<b>9</b>
OPERATIONAL IMPACT		
Aspect	<i>Watercourse (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b><i>Potential impact on water quality as a result of sewer leaks.</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Surrounding area within 2km</i>	<i>2</i>
Duration of Impact	<i>Short-term (for the duration of the contamination event until leak has been cleaned / rehabilitated)</i>	<i>2</i>

Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented and managed</i>	<b>3</b>
Probability of impact occurring before mitigation	<i>High</i>	<i>n/a</i>
Mitigation Measure	<p><i>Any blockages or leakages from the sewer line will result in contamination of the watercourses both within and downstream of the study area. Water quality is presently deemed to be poor within the eastern section of the project area and the upgrade of the existing line may contribute towards the improvement of water quality in the long term. The risk of contamination from new and existing infrastructure is however still possible. During the construction phase, the likelihood of periodic fluctuations in water quality are likely to arise, these being primarily associated with changes in turbidity.</i></p> <p><i>The applicant must ensure that long-term sewage containment and treatment facilities implemented for the development are sufficient and regularly inspected and maintained such that spillages of sewage to the environment are unlikely.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Medium</i>	<b>2</b>
Magnitude	<i>Moderate</i>	<b>2</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>11</b>
<b>OPERATIONAL IMPACT ASSOCIATED WITH ALTERNATIVE A1 ONLY</b>		
Aspect	<i>Watercourse (A1)</i>	<i>n/a</i>
Nature of Impact	<b><i>Potential contamination of the watercourse as a result of sewer leaks from any of the three (3) (pump stations (SDP, 2017).</i></b>	<b><i>n/a</i></b>
Extent of Impact	<i>Site – surrounding area within 2km from project area</i>	<b>2</b>
Duration of Impact	<i>Short-term (for the duration of the contamination event until leak has been cleaned / rehabilitated)</i>	<b>2</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<b>3</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<i>The potential direct and indirect impacts that would arise as a result of the operation of the proposed sewer infrastructure and upgrades, were found to be low provided that all three (3) pumps and pressurised lines are maintained regularly. The applicant has stated that due to the increased number of pump stations on this alternative, this option is more expensive in terms of maintenance.</i>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Medium-High</i>	<b>3</b>
Magnitude	<i>Low</i>	<b>2</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>

	<b>Significance rating</b>	<b>12</b>
<b>OPERATIONAL IMPACT ASSOCIATED WITH ALTERNATIVE A2 ONLY</b>		
Aspect	<i>Watercourse (A2)</i>	<i>n/a</i>
Nature of Impact	<b>Potential contamination of the watercourse as a result of sewer leaks from any of the two (2) pump stations (SDP, 2017).</b>	<b>n/a</b>
Extent of Impact	<i>Site – surrounding area within 2km from project area</i>	<b>2</b>
Duration of Impact	<i>Short-term (for the duration of the contamination event until leak has been cleaned / rehabilitated)</i>	<b>2</b>
Can impact be prevented/reversed or managed?	<i>Yes impact can be prevented / managed</i>	<b>2</b>
Probability of impact occurring before mitigation	<i>Medium</i>	<i>n/a</i>
Mitigation Measure	<p><i>SDP (2017) states the following regarding alternative A2:</i></p> <p><i>“The risk of blockages and manhole leakages is considered equal for both alternatives; however the lack of additional pressure points (pump stations) for the preferred alternative is an advantage, despite being slightly closer to the Hlawe River. The risk of contamination, if maintained properly, is likely to be lower for the preferred alternative, due to its simpler design and reliance on gravity.”</i></p> <p><i>The potential direct and indirect impacts that would arise as a result of the operation of the proposed sewer infrastructure and upgrades, were found to be low provided that the pumps and lines are maintained regularly. The applicant has stated that this is a cheaper option in terms of capital costs and maintenance.</i></p>	<i>n/a</i>
Probability of impact occurring after mitigation	<i>Low-medium</i>	<b>1.5</b>
Magnitude	<i>Low</i>	<b>1</b>
Will irreplaceable resources be lost?	<i>No</i>	<b>0</b>
	<b>Significance rating</b>	<b>8.5</b>
<b>OPERATIONAL IMPACTS</b>		
Aspect	<i>Positive Impacts (A1 and A2)</i>	<i>n/a</i>
Nature of Impact	<b>Connection of low cost housing development to the waterborne sewerage system</b>	<b>n/a</b>
Extent of Impact	<i>Local (between 2km-50km)</i>	<b>2</b>
Duration of Impact	<i>During Operation</i>	<b>3</b>
Can impact be prevented/reversed or managed?	<i>Not required</i>	<b>0</b>
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	<i>High</i>	<b>3</b>

mitigation		
Magnitude	<i>Low</i>	<i>1</i>
Will irreplaceable resources be lost?	<i>No</i>	<i>0</i>
	<b>Significance rating</b>	<b>9</b>

### 8.1.3 No-Go Option

SDP (2017) states the following in terms of impacts of the no-go option. The no go alternative is the status quo, or current sanitation infrastructure, which consist of pit latrines. Pit latrines are a basic sanitation technology often used when communities are situated outside of the ambit of existing waterborne infrastructure. The main concern with regard to pit latrines from an ecological perspective (wetland and aquatic environmental in particular) is the risk of contamination via subsurface seepage and through groundwater recharge systems. The Gwala Farm settlement is situated on a slope above the Hlawe River. Water quality results from the two recent sample points (Gwala Farm 1 and 2) indicated *E. coli* contamination at both points, with levels at Gwala Farm 2 higher than Gwala Farm 1, which was situated slightly downstream of the Gwala Farm settlement. This evidence suggests that the current sanitation systems employed in the Gwala Farm settlement may be contributing to *E. coli* contamination of the adjacent Hlawe River.

It is unknown whether the existing systems are formal lined systems or informal, but it is suspected that a mixture exists based on the existence of informal and formal structures within the area. It is more probable that informal pits are likely to be the primary cause of contamination, however poor maintenance of formal pits cannot be ruled out.

The site will remain in its existing condition and the need for connection of the Gwala Farm low cost housing development to the waterborne sewage system will not be addressed. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. The channels, tributaries and riparian areas will not be impacted upon by the construction related activities and will remain in its existing condition.

### 8.1.4 Decommissioning

No decommissioning will be undertaken. Separate approvals and a decommissioning EMPr will be required prior to decommissioning as part of the proposed development activity.

A detailed decommissioning plan must be submitted to EDTEA for approval at least 30 days prior to the decommissioning of the associated infrastructure. The plan must address the following:

- Air quality
- Soil erosion
- Waste management
- Waste water management
- Stormwater management
- Worker conduct
- Dust
- Landscaping, re-vegetation, stabilization and rehabilitation
- Land contamination
- Removal of structures
- Complaints register
- Emergency Response

The following must also be included in the decommissioning plan:

- Prior to decommissioning the surrounding community must notified.
- Decommissioning must take place only during working hours.
- All solid waste and rubble must be disposed of at an approved landfill site.
- No waste is allowed to contaminate the open space or any sensitive areas.
- Any wash water must be treated as contaminated and is not permitted to enter stormwater drains and run-off into the receiving environment.
- Rehabilitation measures must be put into place. All structures, foundations, concrete and tarred areas are demolished.
- Rubble must be removed by an approved contractor and taken to a licensed landfill site. Waste recycling must be encouraged.
- A long-term monitoring system must be in place to ensure total rehabilitation of the site following decommissioning.
- An assessment of the end land use to determine which infrastructure will be removed or retained must be undertaken. Equipment, structures, and building material that can be reused will be identified prior to the commencement of rehabilitation activities.
- Scrap metal and equipment will be sold as scrap or disposed of at a suitably licensed facility.
- The pipelines, pump stations and rising main must be emptied out and all aboveground pipelines and infrastructure must be removed.

## 8.2 Comparative Assessment of Alternatives

	Environmental / Ecological	Surrounding Business / Communities	Economic feasibility
<b>Alternative A1 / S1</b>  <b>(Alternative Option):</b>	<p>The proposed development will allow for residents to connect to the waterborne sewage system. This will have a positive impact on the water quality.</p> <p>There is a potential risk of leaks associated with the pipeline, three (3) pump stations and rising main, however this can be prevented with regular maintenance. This risk will be increased due to the increased number of pumps.</p> <p>The potential for contamination from the pump stations in the event of mechanical failure is considered to be high (SDP, 2017). The risk of contamination is considered to be greater for the alternative due to the increased number of pump stations and the use of a non-gravity fed collector sewer pipeline.</p>	<p>This option will allow for Gwala Farm low cost housing development to connect to a waterborne sewerage system instead of using pit latrines.</p>	<p>This option is more expensive due to the increased number of pumps in terms of capital cost and maintenance.</p>
<b>Alternative A2 / S1 (Preferred Option)</b>	<p>The proposed development will allow for residents to connect to the waterborne sewage system. This will have a positive impact on</p>	<p>This option will allow for Gwala Farm low cost housing development to connect to a waterborne sewerage</p>	<p>Although this option requires a longer length of collector sewer and chasing of grades, it is cheaper in terms of both</p>



	Environmental / Ecological	Surrounding Business / Communities	Economic feasibility
	<p>the water quality.</p> <p>There is a potential risk of leaks associated with the pipeline, two (2) pump stations and rising main, however this can be prevented with regular maintenance.</p> <p>The lack of additional pressure points for the preferred alternative is an advantage, despite being slightly closer to the Hlawe River (SDP, 2017). The risk of contamination, if maintained properly, is likely to be lower for the preferred alternative, due to its simpler design and reliance on gravity (SDP, 2017).</p>	<p>system instead of using pit latrines.</p>	<p>capital costs and maintenance cost.</p>
<b>No-go option</b>	<p>The site will remain in its current condition. The need for connection of the Gwala Farm low cost housing development to the waterborne sewerage system will not be addressed. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. There will be no improvement in access to local services and infrastructure.</p> <p>SDP (2017) states the following in terms of impacts of the no-go option. The no go alternative is the status quo, or current sanitation infrastructure, which consist of pit latrines. Pit latrines are a basic sanitation technology often used when communities are situated outside of the ambit of existing waterborne infrastructure. The main concern with regard to pit latrines from an ecological perspective (wetland and aquatic environmental in particular) is the risk of contamination via subsurface seepage and through groundwater recharge systems. The Gwala Farm settlement is situated on a slope above the Hlawe River. Water</p>	<p>This option will not benefit the community or the environment.</p>	<p>There will be no cost associated with construction activities.</p>

	Environmental / Ecological	Surrounding Communities	Business /	Economic feasibility
	<p>quality results from the two recent sample points (Gwala Farm 1 and 2) indicated <i>E. coli</i> contamination at both points, with levels at Gwala Farm 2 higher than Gwala Farm 1, which was situated slightly downstream of the Gwala Farm settlement. This evidence suggests that the current sanitation systems employed in the Gwala Farm settlement may be contributing to <i>E. coli</i> contamination of the adjacent Hlawe River.</p> <p>It is unknown whether the existing systems are formal lined systems or informal, but it is suspected that a mixture exists based on the existence of informal and formal structures within the area. It is more probable that informal pits are likely to be the primary cause of contamination, however poor maintenance of formal pits cannot be ruled out.</p>			

#### 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), KZN Department of Transport (DoT), Ward Councillor will be provided with all documentation and reports for review and comment. The Provincial Department of Economic Development, Tourism and Environmental Affairs (EDTEA) are the competent authority on this application; final reports will be submitted to this department for acceptance and authorisation.

**Table 12: EIA Timeframes**

Tasks	Timeframe
Notification of I&APs/	08 June 2017
Placement of signboards	08 June 2017
Notification of Authorities	09 June 2017
Placement of adverts	Week 02-15 June 2017
Distribution of BID to I&APs and Authorities	21 June 2017
Submission of Application form to EDTEA	04 May 2018
Acknowledgment of receipt by EDTEA	18 May 2018
Distribution of draft BAR to I&APs and Authorities (30 day comment period)	07 May 2018 – 07 June 2018
Distribution of final BAR to I&APs and Authorities (14 day comment period)	TBC
Submission of final BAR to EDTEA for authorisation	TBC

#### 10.0 Assumptions, Uncertainties, Limitations and Gaps in Information

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, identified impacts and mitigation will be monitored and / or audit in terms of the following:

**Alternative S1 (preferred site)****Construction phase:**

Compliance monitoring must 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 gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations, regraded portion of the trunk main pipeline and associated infrastructure to ensure that the watercourse is not affected / damaged in any way and the systems are effectively functioning.

**Alternative A1****Construction phase:**

Compliance monitoring must 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 non-gravity fed collector sewer pipeline, rising main pipeline, three (3) pump stations, regraded portion of trunk main pipeline and associated infrastructure to ensure that the watercourse is not affected / damaged in any way and the systems are effectively functioning.

**Alternative A2 (preferred activity alternative)****Construction phase:**

Compliance monitoring must 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 gravity fed collector sewer pipeline, rising main pipeline, two (2) pump stations, regraded portion of trunk main and associated infrastructure to ensure that the watercourse is not affected / damaged in any way and the systems are effectively functioning.

**12.0 Environmental impact statement**

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

**A1/S1 (Alternative)**

The applicant, eThekweni Municipality-Water and Sanitation Unit, Wastewater Design Branch, propose to construct a non-gravity fed collector sewer pipeline, three (3) sewage pump stations, and rising main pipeline that ties into the existing infrastructure in the Gwala Farm area and Belvedere North in Ward 61. A portion of the existing 450mmØ trunk main pipeline is to be regarded en-route to the Wastewater Treatment Works (WWTW). A portion of the collector sewer line and re-grading of the trunk main will be constructed within the watercourse and will involve excavation / removal of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from the watercourse. As such the proposal will require Environmental Authorisation (EA) in terms of the EIA Regulations 2014 (amended in 2017) via a Basic Assessment process.

The re-grading of the trunk main pipeline will start at the cul de sac of Flamingo Road and run for approximately 500m following the road in a north westerly direction (MSJ, 2016) (referred to as the eastern portion of the site). The re-grading of the pipeline will take place within a riparian area and will cross the Hlawe River (Figure 19, Appendix 5 (Specialist Report)). The existing 400mm Ø trunk main pipeline will be re-graded

to improve the flow characteristics of the pipeline as the existing pipeline is operating beyond capacity and the manholes overflow periodically.



**Figure 19: Aerial Map showing the proposed portion of the pipeline to be re-graded, buffers and sensitive areas (SDP, 2017)**

The rising main pipeline will run parallel to the northeast edge of the township, intersects one major stream crossing and ties into the existing pipeline within the suburb of Belvedere, at the corner of Saunders Circle and Hercus Avenue (MSJ, 2016). The proposed collector pipeline runs parallel to the stream on its east side, and intersects four major stream crossings (MSJ, 2016) (Figure 20).



**Figure 20: Aerial map showing the proposed development with the alternate collector sewer pipeline route (yellow), rising main pipeline (purple), pump stations (white circle), working area (red line), sensitive riparian area (green), drainage lines (blue) and buffers (yellow dotted line) (SDP, 2017)**

The non-gravity fed collector sewer pipeline will consist of a 160mm Ø HDuPVC pipe line with 1000mmØ precast concrete ring manholes constructed at every change in grade and direction within Gwala Farm parallel to the boundary (Figure 20). As this line crosses three valleys the sewer will need to be pumped over into the next catchment, requiring three (3) pump stations in total (Figure 20). This option will prove to have a high capital and maintenance cost as a result of the pump stations. The sewage will be pumped from the collector sewer pipeline into the rising main. From the rising main, the sewage will enter the existing terminal manhole on the existing sewer at Belvedere North. This will require the extension of sewers along each of the three valleys from Gwala Farm to connect into the collector sewer.

The proposed pump stations will be a wet well/ dry well arrangement which will include a separate sumps and pump room. The pumps will be arranged in a duty/standby manner and the building that houses the pump station will be constructed out of reinforced concrete. The proposed rising main from the pump station will be a 200mm Ø mPVC Class 16, 800m long, pipeline with air valve chambers and scour valve chambers positioned at the crests and troughs respectively. The rising main will end at the terminal manhole after which the pipeline will join the existing sewer system.

The most significant construction impacts (as identified and assessed in section 8 of this report) relate to the potential damage to the watercourse including damage to / contamination of the watercourse and riparian habitat, potential risk of spillages of sewage from the tying in of the regarded portion of the trunk main pipeline into the existing trunk main pipeline. The potential loss of riparian habitat including potential damage to indigenous and / or protected vegetation and fauna, hydrological and geomorphological changes to the watercourse, impact on water quality and hydrology was also identified as a significant impact. For both alternatives assessed in this report, the development activity is anticipated to have a positive impact in terms of creating opportunities for local employment.

Provided that the mitigation measures suggested by the EAP are adhered to, it is anticipated that construction impacts posed by this option will be minimal and of low significance.

During the operation phase, although this alternative will assist in improving water quality of the Hlawe River; the use of a pressurised (non-gravity fed) collector sewer pipeline poses a greater risk of contamination due to the additional pump stations. The potential risk of contamination of the watercourse as result of the potential mechanical failure of the three (3) pump stations is considered to be higher for this alternative option due to the additional pump station and the non-gravity fed line.

**Provided the mitigation measures, specialist recommendations and EMPr are followed, the EAP is of the opinion that the construction impacts raised and assessed can be mitigated against. The EAP however does not recommend this option as the operational impacts posed by this option is considered higher. Specifically, the risk of contamination and mechanical failure is considered to be higher as this design is dependent on a mechanical and highly pressured system in comparison to the preferred alternative. The success of the system is largely dependent on ongoing maintenance by the applicant to ensure the continued integrity of the pump stations and pressurised collector sewer. The applicant has further advised that maintenance on this system is more expensive due to the increased number of pump stations.**

#### **A2/S1 (Preferred)**

The applicant, eThekweni Municipality-Water and Sanitation Unit, Wastewater Design Branch, propose to construct a gravity fed collector sewer pipeline, two (2) sewage pump stations, and rising main pipeline that ties into the existing infrastructure in the Gwala Farm area and Belvedere North in Ward 61. A portion of the existing 450mmØ trunk main pipeline is to be regarded en-route to the Wastewater Treatment Works (WWTW). A portion of the collector sewer pipeline and re-grading of the trunk main pipeline will be

constructed within the watercourse and will involve excavation / removal of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from the watercourse. As such the proposal will require Environmental Authorisation (EA) in terms of the EIA Regulations 2014 (amended in 2017) via a Basic Assessment process.

The re-grading of the trunk main pipeline will start at the cul de sac of Flamingo Road and run for approximately 500m following the road in a north westerly direction (MSJ, 2016) (referred to as the eastern portion of the site). The re-grading of the trunk main pipeline will take place within a riparian area and will cross the Hlawe River (Figure 22).



**Figure 21: Aerial map showing the proposed portion of the pipeline to be re-graded, buffers and sensitive areas (SDP, 2017)**

The rising main pipeline will run parallel to the northeast edge of the township, intersects one major stream crossing and ties into the existing pipeline within the suburb of Belvedere, at the corner of Saunders Circle and Hercus Avenue (MSJ, 2016). The proposed gravity fed collector sewer pipeline runs parallel to an ephemeral channel on its east side, and intersects a number of other ephemeral channels (MSJ,2016; SDP,2017). The position of the proposed pump station one (1) is located at the lowest point and the pump station two is located on the rising main pipeline, near the ephemeral channel. The proposed rising main pipeline connects from proposed pump station one (1), through proposed pump station two (2) to the existing terminal manhole located on Hercus Avenue (MSJ, 2016).



**Figure 22: Aerial map showing the proposed development with the preferred collector sewer line (light blue) rising main (purple), two pump stations (blue circle) terminal manhole (yellow circle), head of line (orange) and sensitive areas and buffers (blue lines and blue and green shaded areas) (SDP, 2017)**

The collector sewer pipeline will consist of a 160mm  $\varnothing$  HDuPVC pipe line with 1000mm $\varnothing$  precast concrete ring manholes constructed at every change in grade leading to pump station one (1) downstream of the development. The sewage will then be pumped from pump station one (1) to pump station two (2) along the rising main pipeline through to a terminal manhole on the existing sewer at Belvedere North. This will require the extension of sewers along each of the three valleys from Gwala Farm to connect into the collector sewer.

The proposed pump stations will be a wet well/ dry well arrangement which will include a separate sumps and pump room. The pumps will be arranged in a duty/standby manner and the building that houses the pump station will be constructed out of reinforced concrete. The proposed rising main from the eastern pump station will be a 200mm  $\varnothing$  mPVC Class 16, 800m long, pipeline with air valve chambers and scour valve chambers positioned at the crests and troughs respectively. The rising main will end at the terminal manhole after which the pipeline will join the existing sewer system. The existing 400mm  $\varnothing$  pipeline will be re-graded to improve the flow characteristics of the pipeline as the existing pipeline is operating beyond capacity and the manholes overflow periodically.

The most significant construction impacts (as identified and assessed in section 8 of this report) relate to the potential damage to the watercourse including damage to / contamination of the watercourse and riparian habitat, potential risk of spillages of sewage from the tying in of the regarded portion of the trunk main pipeline into the existing trunk main pipeline. The potential loss of riparian habitat including potential damage to indigenous and / or protected vegetation and fauna, hydrological and geomorphological changes to the watercourse, impact on water quality and hydrology was also identified as a significant impact. For both alternatives assessed in this report, the development activity is anticipated to have a positive impact in terms of creating opportunities for local employment.

Provided that the mitigation measures suggested by the EAP are adhered to, it is anticipated that construction impacts posed by this option will be minimal and of low significance.

During the operation phase, it is anticipated there will be an improvement in water quality of the Hlawe River. This is a positive impact and will benefit the supporting ecosystem. The lack of additional pressure points (pump stations) for the preferred alternative is an advantage, despite being slightly closer to the Hlawe River (SDP, 2017). The risk of contamination, if this system is maintained properly, is likely to be lower for the preferred alternative, due to its simpler design and reliance on gravity (SDP, 2017). The applicant has advised that although this option requires a longer length of collector sewer and chasing of grades, it is a cheaper option in terms of capital costs and maintenance.

**Provided the mitigation measures, specialist recommendations and EMPr are followed, the EAP is of the opinion that the impacts raised and assessed for this alternative can be mitigated against or managed.**

**No Go-Alternative**

The site will remain in its current condition. The need for connection of the Gwala Farm low cost housing development to the waterborne sewerage system will not be addressed. The water quality of the Hlawe River will continue to be negatively impacted upon as a direct result of the sanitation system or lack thereof. There will be no improvement in access to local services and infrastructure.

SDP (2017) states the following in terms of impacts of the no-go option. The no go alternative is the status quo, or current sanitation infrastructure, which consist of pit latrines. Pit latrines are a basic sanitation technology often used when communities are situated outside of the ambit of existing waterborne infrastructure. The main concern with regard to pit latrines form an ecological perspective (wetland and aquatic environmental in particular) is the risk of contamination via subsurface seepage and through groundwater recharge systems. The Gwala Farm settlement is situated on a slope above the Hlawe River. Water quality results from the two recent sample points (Gwala Farm 1 and 2) indicated *E. coli* contamination at both points, with levels at Gwala Farm 2 higher than Gwala Farm 2, which was situated slightly downstream of the Gwala Farm settlement. This evidence suggests that the current sanitation systems employed in the Gwala Farm settlement may be contributing to *E. coli* contamination of the adjacent Hlawe River.

It is unknown whether the existing systems are formal lined systems or informal, but it is suspected that a mixture exists based on the existence of informal and formal structures within the area. It is more probable that informal pits are likely to be the primary cause of contamination, however poor maintenance of formal pits cannot be ruled out.

**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?

YES	NO
X	

The EAP recommends the following 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 A2 and S1** be accepted as the preferred alternative from an ecological perspective.
2. The applicant must ensure that mitigation measures and controls specified in the Basic Assessment Report and EMPr are adhered to. The construction phase of the proposed development activity must be monitored by an independent ECO who should ensure compliance with the construction EMPr (Appendix 8). Please see the EMPr for further details on management of the site during construction. It is recommended that the site be monitored at minimum monthly and that monthly reports be submitted to EDTEA enforcement and compliance.



3. Mitigation measures and recommendations provided by the specialists in the respective reports (attached as Appendix 5) must be adhered to where relevant.
4. The proposed development activity will take place within the watercourse and will require a Water Use Authorisation (WUA). The applicant has been issued with a Directive from the DWS (Appendix 4), all conditions must be adhered to.
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 structures or infrastructure must be immediately repaired. A post construction audit must be undertaken prior to the contractors leaving the site.
7. Environmental Authorisation is required for the construction phase of this project and should be valid for the next five years.

#### **14.0 References**

- Jean Beater (2017). Proposed Gwala Farm Sewerage Infrastructure Project, Tongaat, KwaZulu-Natal. Phase 1 Heritage Impact Assessment
- DEA (2010). National Environmental Management Act (Act 107 of 1998) Implementation Guidelines. GNR 654 of 2010.
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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.
- Mahlambi, A. (2017). The Construction of the Collector Sewer, Sewage Pump Station, Rising Main and Ancillary Works at Gwala Farm.
- MSJ (2016), Report to eThekweni Municipality Water and Sanitation Division on a Geotechnical Investigation for the Construction of a Gravity Sewer Pipeline, Pump Station and Rising Main at Gwala Farm, Tongaat, KwaZulu-Natal
- SDP (2017) Wetland, Aquatic and Ecological Assessment Report – Proposed Sewer Main and Pumpstation Gwala Farm, Tongaat, eThekweni Municipality
- 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](http://www.westerncape.gov.za/other/2010/8/dea&dp_eia_guideline_on_alternatives_aug2010.pdf)

**Appendix 1: CVs of EAP**

**Appendix 2: Layout Maps**

**Appendix 3: EDTEA Pre-application Meeting Minute and Register**

**Appendix 4: DWS Directive**

**Appendix 5: Specialist Reports**

**Appendix 6: Proof of Public Participation**

**Appendix 7: Comments & Response Table and Actual Comment Received**



**Appendix 8: Environmental Management Programme (EMPr)**