



Muny Consultants

**Basic Assessment Report for the
proposed Upgrading of the
Tembisa Extension 25 Bulk
Outfall Sewer, Gauteng**

BASIC ASSESSMENT REPORT

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TSG 0708

Prepared for:

Tangos Consultants (Pty) Ltd

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Abbreviations and Acronyms

BAR	Basic Assessment Report
Bgl	Below Ground Level
BID	Background Information Document
CEC	Cation Exchange Capacity
CoE	City of Ekurhuleni
C Plan	Conservation Plan
CRR	Comments and Response Report
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation (previously Department of Water Affairs)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
FEL	Front End Loader
GDARD	Gauteng Department of Agriculture and Rural Development
GN R.	Government Notice Regulation
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IBA	Important Bird Area
IDP	Integrated Development Plan
IWUL	Integrated Water Use Licence
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
LDV	Light Duty Vehicle
LED	Local Economic Development
LHD	Load-Haul-Dump
MAE	Mean Annual Evaporation
mamsl	Metres above mean sea level
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act, Act No. 107 of 1998

NEMBA	National Environmental Management: Biodiversity Act, Act No. 10 of 2004
NEMWA	National Environmental Management: Waste Act, Act No. 59 of 2008
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Governmental Organisation
NID	Notice of Intent to Develop
NWA	National Water Act, Act No. 36 of 1998
PES	Present Ecological Status
PHRA-G	Provincial Heritage Resources Agency - Gauteng
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SSC	Species of Special Concern
TOR	Terms of Reference
WML	Waste Management Licence
WUL	Water Use Licence
WULA	Water Use Licence Application

Units of Measure

$\mu\text{g}/\text{m}^3$	Micro grams per cubic meter
dBA	Decibels
Ha	Hectare
kV	Kilovolt
km	Kilometres
m	metres
m^2	Square metres
m^3	Cubic metres
mS/m	Millisiemens per Metre
mg/l	Milligrams per litre
mm	Millimetres
mm/a	Millimetres per annum
PPB	Parts Per Billion
PPM	Parts Per Million
Tph	Tonnes Per Hour
Tpm	Tonnes Per Month

Executive Summary

Introduction

An area was identified by the CoE Human Settlement Department and zoned for residential and recreational development, named Tembisa X25. The development township is situated approximately 15km from the Kempton Park City Centre, south of Clayville Industrial Area and the Olifantsfontein Road (R562) and north of the Tembisa Hospital. Tangos Consultants was appointed by the CoE to investigate the existing sewage infrastructure (Tembisa East Outfall Sewer) with the view of draining sewer flows from the proposed Tembisa X25 development. A total of 125 houses were expected to be commissioned by December 2018 as part of phase 1 of the development. The Tembisa X25 development would have a grand total of 3510 Residential 2 (Phase 2) households (middle income housing).

Tembisa East Outfall Sewer is currently draining the north eastern area of Tembisa, the south-western area of Olifantsfontein and parts of Clayville east. There is evidence of sewage overflow at certain manholes. The flow loggings conducted on the Tembisa X25 outflow sewer have confirmed that the overflows are due to insufficient capacity of the sewer. The drainage system challenges are compounded by the aging infrastructure, high sedimentation of sand and solids, as well as vandalism of the existing outfalls.

The proposed upgrade of the sewer outfall requires an Environmental Authorisation (hereafter EA) and a Water Use Licence (hereafter WUL) prior to commencement of construction activities. The EA application was undertaken in line with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) and the supporting Water Use Licence Application (WULA) in line with the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Project Applicant

The details of the applicant are detailed in the table below.

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Environmental Consultants

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Purpose of this report

The overarching objectives of this Basic Assessment Report (BAR) were to:

- Identify and assess potential environmental impacts associated with the proposed Project; and
- Recommend mitigation and management measures to ensure that the development was undertaken in such a way as to minimise negative impacts.

This report also provides the status quo of the biophysical and socio-economic environment of the project area through specialist studies undertaken. Furthermore, an Environmental Management Programme (EMP) was developed to mitigate and manage environmental impacts associated with each project activity.

Project Overview

An area was identified by the CoE Human Settlement Department and zoned for residential and recreational development, named Tembisa X25. Tembisa X25 township is situated approximately 15km north of Kempton Park city centre, south of Clayville industrial area and the Olifantsfontein road (R562), east of Winnie Mandela Park and north of the Tembisa Hospital. It is approximately 2km west of the R21 Highway which links Pretoria and OR Tambo International Airport. The site bisects Reverend RTJ Namane Road on the east and shares a boundary with Tembisa Hospital.

Tangos Consultants were appointed by the CoE to investigate the existing sewer infrastructure (Tembisa east outfall sewer) with view of draining sewer flows from the proposed Tembisa X25 development. The Outfall Sewer drains sewage from sewer lateral pipes branching from the eastern side of Tembisa, Clayville industrial, Clayville east and several Clayville extensions on the northern side of Clayville.

A new township development – Tembisa X25 – is currently under construction; the sewer lateral pipes from Tembisa X25 are to be connected to the Outfall Sewer.

The proposed development would drain sewerage into the existing outfall sewer which starts upstream of RTJ Namane Road within the Moriting sub-township of Tembisa and traverses through the development site for the proposed township, through Clayville industrial and across several ERF stands in the northern part of Clayville all the way into the Olifantsfontein Waste Water Treatment Works (WWTW). The scope of work considered in this PDR only starts downstream of RTJ Namane Road (next to Moriting Primary school) and ends across S-view road (before the pipe bridge)

Approach to Public Participation Process

The Public Participation Process (PPP) was developed to ensure compliance with environmental regulatory requirements and to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate the project. During this process stakeholders were able to provide inputs and receive feedback from the environmental specialists and/or proponent.

Consultation with I&APs during the basic assessment process was undertaken as follows:

- **Background Information Letter (BIL):** a BIL which included a project description, information about the relevant legislation, the competent authorities and details of the appointed EAP was prepared and distributed on the 7th of November 2019. The BIL was also accompanied by a Registration and Comment Form for stakeholders to use for formal registration as I&APs or to submit comments. Information regarding the availability of the Draft BAR was also provided, and I&APs were asked to comment.
- **Newspaper advertisement:** a newspaper advertisement was placed in the Ekurhuleni News, on the 7th of November 2019, The advert was published in English and included a brief project description, information about the relevant legislation, the competent authorities, details of the appointed EAP, registration process for I&APs, and information regarding the availability of the Draft BAR for public comment.
- **Site notices:** Site notices were put up at various places in and around the proposed pipeline route from the 8th of November 2019. The site notices contained a brief project description, information about the relevant legislation, the competent authorities and details of the EAP, registration process for I&APs and information regarding the availability of the Draft BAR for public comment.

The Draft BAR was made available for a public comment period of 30 days from the 7th of November to the 9th of December 2019 at the Olifantsfontein Library, Winnie Mandela Library, Moses Molelekwa Community Centre and on the Muny Consultants website: www.munyconsult.com (under Published Documents). Comments received from I&APs regarding the project during this period have been incorporated into the Final BAR.

Summary of the Impact Assessment

A summary of all the environmental impacts identified during each phase of the proposed project and the significance of the impacts associated with the biophysical environment, pre-mitigation and post-mitigation, is summarised in the table below

Summary of the Key Potential Impacts

Project Phase	Receiving Environment	Impact Description	Pre-Mitigation	Post-Mitigation
Construction	Biodiversity	<ul style="list-style-type: none"> ▪ Removal of the natural vegetation ▪ Disturbance to animals on site 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Increased soil erosion, increase in silt loads and sedimentation ▪ Establishment and spread of declared weeds 	Moderate (-ve)	Negligible (-ve)
Construction and Operational		<ul style="list-style-type: none"> ▪ Pollution due to oil and fuel spills, erosion, and ablution facilities. 	Moderate (-ve)	Negligible (-ve)
	<ul style="list-style-type: none"> ▪ Pollution due to construction waste 	Minor (-ve)	Negligible (-ve)	
Construction	Soil and land capability	<ul style="list-style-type: none"> ▪ Soil compaction caused by vehicles and heavy machineries onsite 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Increased soil erosion 	Minor (-ve)	Negligible (-ve)
Construction	Water resources	<ul style="list-style-type: none"> ▪ Loss of wetland Features Habitat and Ecological Structure 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Changes to Ecological and Socio-Cultural Services Provision 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Loss of hydrological function and sediment balance 	Moderate (-ve)	Negligible (-ve)
Operational	Water resources	<ul style="list-style-type: none"> ▪ Loss of wetland Features Habitat and Ecological Structure 	Negligible (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Changes to Ecological and Socio-Cultural Services Provision 	Negligible (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> ▪ Loss of hydrological function and sediment balance 	Negligible (-ve)	Negligible (-ve)
Construction	Social	<ul style="list-style-type: none"> ▪ Creation of employment opportunities during the construction of the pipeline ▪ Enhancement of the local economy 	Negligible (+ve)	Minor (+ve)
Operational		<ul style="list-style-type: none"> ▪ Continuation of jobs during the operational phase of the pipeline through maintenance of the pipeline 	Negligible (+ve)	Minor (+ve)

Conclusion and Recommendation

The impacts identified were confined to the specific site and the significance of such impacts was greatly reduced through the implementation of mitigation and management measures. The key mitigation and management measures included:

- Only clear vegetation and removed topsoil when and where necessary;
- Berms were constructed around the periphery of the excavated area and stockpiles to divert storm water runoff;
- Site clearing and excavation activities took place during dry winter season
- Undertook an alien invasive monitoring programme. Alien invasive species were removed as they are identified;

- Prevented any hydrocarbon spills from occurring through ensuring that machines and vehicles were checked daily for oil leaks as well as making use of drip trays where leaks are identified;
- If a spill occurred it was to be cleaned up (Drizit spill kit, Oil or Chemical spill kit) immediately and reported to the appropriate authorities; and

It was noted that no significant impacts or risks associated with the proposed project were identified and with mitigation measures these impacts were considered manageable. It is therefore recommended that authorisation for the construction and operation of the proposed pipelines be granted.

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SECTION A: ACTIVITY INFORMATION

1 Proposal or Development Description

1.1 Project title (must be the same name as per application form)

Basic Assessment Report for the proposed Upgrading of the Tembisa Extension 25 Bulk Outfall Sewer, Gauteng

1.2 Project Description

An area was identified by the CoE Human Settlement Department and zoned for residential and recreational development, named Tembisa X25. The development township is situated approximately 15km from the Kempton Park City Centre, south of Clayville Industrial Area and the Olifantsfontein Road (R562) and north of the Tembisa Hospital. Tangos Consultants was appointed by the CoE to investigate the existing sewage infrastructure (Tembisa East Outfall Sewer) with the view of draining sewer flows from the proposed Tembisa X25 development. A total of 125 houses were expected to be commissioned by December 2018 as part of phase 1 of the development. The Tembisa X25 development would have a grand total of 3510 Residential 2 (Phase 2) households (middle income housing).

Tembisa East Outfall Sewer is currently draining the north eastern area of Tembisa, the south-western area of Olifantsfontein and parts of Clayville east. There is evidence of sewage overflow at certain manholes. The flow loggings conducted on the Tembisa X25 outflow sewer have confirmed that the overflows are due to insufficient capacity of the sewer. The drainage system challenges are compounded by the aging infrastructure, high sedimentation of sand and solids, as well as vandalism of the existing outfalls.

Tangos Consultants were appointed by the CoE to investigate the existing sewer infrastructure (Tembisa east outfall sewer) with view of draining sewer flows from the proposed Tembisa X25 development. The Outfall Sewer drains sewage from sewer lateral pipes branching from the eastern side of Tembisa, Clayville industrial, Clayville east and several Clayville extensions on the northern side of Clayville.

The recommended scope of works includes the construction and testing of a 6.5km Concrete Bulk Outfall Sewer Pipeline ranging between 525mm and 1200mm in diameter. The works will also include the construction of concrete pipe support columns, across streams, construction of junction boxes, installation of manholes, road crossings and river/stream crossings.

The proposed upgrade of the sewer outfall requires an Environmental Authorisation (hereafter EA) and a Water Use Licence (hereafter WUL) prior to commencement of



construction activities. The EA application was undertaken in line with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) and the supporting Water Use Licence Application (WULA) in line with the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Select the appropriate box

The application is for an upgrade of an existing development	<input type="checkbox"/>	The application was for a new development	<input checked="" type="checkbox"/>	Other, specify	<input type="checkbox"/>
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Does the activity also require any authorisation other than NEMA EIA authorisation?

YES

If yes, describe the legislation and the Competent Authority administering such legislation

A Water Use Licence has been also applied for in line with the prescripts promulgated in Section 21 of the National Water Act (Act 36 of 1998) or General Notice 509. This application has been lodged to the Department of Water and Sanitation (hereafter DWS).

If yes, have you applied for the authorization(s)?

YES

If yes, have you received approval(s)? (attach in appropriate appendix)

NO

2 Applicable legislation, policies and/or guidelines

List all legislation, policies and/or guidelines of any sphere of government that were applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
Constitution of the Republic of South Africa, (Act No. 108 of 1996)	National	18 December 1996
National Environmental Management Act, (Act No. 107 of 1998).	National & Provincial	27 November 1998
National Environmental Management: Waste Act, (Act No. 59 of 2008)	National & Provincial	06 March 2008
National Environmental Management: Air Quality Act, (Act No. 39 of 2004)	National & Provincial	19 February 2005
National Environmental Management: Protected Areas Act, (Act No. 39 of 2004)	National & Provincial	11 February 2004
National Environmental Management: Biodiversity Act, (Act No. 10 of 2004)	National & Provincial	7 June 2004

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Water Act, (Act No. 36 of 1998)	National & Provincial	26 August 1998
Occupational Health and Safety Act, (Act No. 85 of 1993)	National & Provincial	23 June 1993
National Heritage Resources Act, (Act No. 25 of 1999)	National & Provincial	28 April 1999
Hazardous Substances Act, (Act No. 15 of 1973)	National & Provincial	4 April 1973
National Road Traffic Act, (Act No. 93 of 1996)	National & Provincial	22 November 1996
Employment Equity Act, (Act No. 55 of 1998)	National & Provincial	12 October 1998
Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997)	National & Provincial	26 November 1997
Skills Development Act, (Act No. 97 of 1998)	National & Provincial	20 October 1998
Deeds Registries Act, (Act No. 47 of 1937)	National & Provincial	19 May 1937
EIA Regulations	National & Provincial	4 December 2014
Gauteng Provincial Environmental Management Framework	Provincial	22 May 2015
Red List Plant Species Guidelines	Provincial	26 June 2006
GDARD Draft Ridges Policy	Provincial	19 April 2001
Gauteng Noise Control Regulations	Provincial	20 August 1999
Gauteng Urban Edge Policy	Provincial	June 2003
Ekurhuleni Metropolitan Spatial Development Framework	Regional	2015

Description of compliance with the relevant legislation, policy or guideline:	
Legislation, policy of guideline	Description of compliance
Constitution of the Republic of South Africa, (Act No. 108 of 1996)	<p>The Tembisa x25 sewer project has been implemented in a manner that upholds environmental management objectives and principles that are socially and environmentally sustainable, thus aiding in the protection of ecologically sensitive areas, prevention of any future pollution events and help promote justifiable economic and social development. The implementation of the mitigation and management measures to minimise and prevent negative impacts associated with the project, are in line with Section 24 of the Bill of Rights which states that Everyone has the right:</p> <ol style="list-style-type: none"> a. to an environment that is not harmful to their health or well-being; and 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"> i. prevents pollution and ecological degradation; ii. promote conservation; and iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. <p>The proposed project also aimed to satisfy Section 27 (1) (b) of the Bill of Rights which states that everyone has the right to have access to sufficient food and water. The proposed project assisted in the realisation of the right to sufficient water, taking cognizant of the shortfall in sanitation requirements that was forecasted for the Tembisa area.</p>
National Environmental Management Act, (Act No. 107 of 1998).	The National Environmental Management Act (Act No. 107 of 1998) (NEMA) was the overarching framework for environmental legislation as well as the Regulations for Environmental Impact Assessment. It set out the principles that served as a general framework for environmental planning, as guidelines by reference to which organs of state must exercise their functions and guide other laws concerned with the protection or management of the environment. The application took into account the environmental and socio-economic conditions in compliance with the NEMA principles
National Environmental Management: Waste Act, (Act No. 59 of 2008)	<p>No listed waste activities were triggered by the proposed development, as such, a waste license was not required.</p> <p>General construction waste that was generated by construction activities were expected to be limited and was disposed of by the construction contractor at a licensed general waste landfill site.</p> <p>Waste management mitigation measures were identified and were implemented to ensure no negative impact to the environment occurred. All waste, both general and hazardous, were managed in accordance with the NEM:WA and relevant waste regulations</p>
National Environmental Management: Air Quality Act, (Act No. 39 of 2004)	During the construction phase of the proposed development, generation of dust became a factor to surrounding residents. However, Air Quality mitigation measures were identified and implemented in line with the NEM: AQA to ensure no negative impact to the environment occurred..
National Environmental Management: Biodiversity Act, (Act No. 10 of 2004)	<p>As part of this project, a Biodiversity Impact Assessment was undertaken to determine the status of the environment and to determine any potential ecological sensitivity to be avoided and/or mitigated.</p> <p>No applications were submitted in terms of NEM: BA for the project as no protected species were identified along the pipeline route.</p> <p>The Biodiversity Impact Assessment detailed the pipeline area and determined the ecological importance of the area. The findings of the biodiversity assessment, in the form of the impacts and the proposed mitigation measures for the project were included herein.</p>
National Water Act, (Act No. 36 of 1998)	The Construction of infrastructure within 100 meters of a River or within 500 meters of a wetland required authorisation under Section 40 of the NWA. The pipeline was constructed within 500m of seven (7) wetland areas and cross one (1) wetland area therefore a WUL/GA was applied for in terms of Section 21 (c) and (i) in accordance with the NWA.
Occupational Health and Safety Act, (Act No. 85 of 1993)	Considering the proposed development occurred within an urban environment next to other residential developments, the Act not only applied to the persons who would be responsible for construction, but also to the safety of members of the public. An EMPr has been drafted with this report to highlight measure put in place in order to ensure compliance to this Act.
National Heritage Resources Act, (Act No. 25 of 1999)	<p>Section 38. (1) of the Act states that;</p> <p>Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—</p> <p>the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;</p> <p>must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.</p> <p>A Heritage Impact Assessment Report (HIA) was commissioned as part of the proposed project to determine the presence of artefacts that may have been of cultural or historical importance. The study area is located within a residential area and is adjacent Ramona Road, therefore, nothing of archaeological importance was found. Mitigation measures have been put in place in order to ensure the integrity of any chance finds and the South African Heritage Resources Agency (SAHRA) has been contacted in such an instance. Further to this, a paleontological sensitivity analysis was undertaken as part of the HIA as the entirety of the project was underlined by an area deemed highly paleontologically sensitive.</p>

Description of compliance with the relevant legislation, policy or guideline:	
Legislation, policy of guideline	Description of compliance
Hazardous Substances Act, (Act No. 15 of 1973)	The proposed project has entailed the handling and storage of fuels and other hazardous materials to and from the project site and the measures which needed to be put in place to avoid or mitigate any significant risks
National Road Traffic Act, (Act No. 93 of 1996)	The Act deals with the transportation of materials and products from the project site and ensuring safe transportation through adherence to traffic rules (i.e. speed limits, weight and height restrictions, access arrangements to the project site etc.). M63, M45 and R51 will be the main access roads to the proposed development site, as such, mitigation measures have been taken into account so as to avoid negative impacts on traffic.
Employment Equity Act, (Act No. 55 of 1998)	This act aims to achieve equity in the workplace by promoting equal opportunity and fair treatment in employment through elimination of unfair discrimination and implementing affirmative action measures to redress the disadvantages in employment experienced by designated groups, in order to ensure equitable representation in all occupational categories and levels in the workforce. This act requires that an equal, fair and transparent recruitment process be undertaken when affording members of the public an opportunity to be involved in the proposed development with respect to employment.
Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997)	This Act gives effect to the right to fair labour practices referred to in section 23(1) of the Constitution by establishing and making provision for the regulation of basic conditions of employment; and thereby to comply with the obligations of the Republic as a member state of the International Labour Organisation. In relation to the proposed project development, the Act upholds the principles of fair compensation and working hours/conditions.
Skills Development Act, (Act No. 97 of 1998)	This Act aims to improve the skills of workers by promoting education and training in the workplace. During the construction and operational phases of the proposed project, unskilled and semi-skilled labour must be afforded opportunities to permanently acquire skills from being involved in the proposed project.
Deeds Registries Act, (Act No. 47 of 1937)	The act was created to consolidate and amend the laws in force in the Republic relating to the registration of deeds. The act caters for the registration of servitudes. The proposed pipeline route servitude will need to be registered as such.
EIA Regulations	Environmental authorisation for the proposed project is required for listed activities in terms of the EIA Regulations (2014) (as amended) of the NEMA. The listed activities are listed in Table 1 below. No activities identified in Listing Notice 2 apply to the proposed project, and therefore a BA Process is being followed in applying for authorisation. This BA report has been compiled in accordance with the requirements of the NEMA EIA Regulations, 2014 (as amended), with the environmental management objective to protect ecologically sensitive areas.
Gauteng Provincial Environmental Management Framework	According to the GPEMF, the proposed development occurs within Zone 1 – urban development activities, Zone 3 – high control zone and Zone 4 – normal control zone. The proposed development will therefore be in line with the requirements of the GPEMF.
Red List Plant Species Guidelines	The GDARD has a ranking scheme for prioritising Red List Plant Species in Gauteng from the most important to the least important. This ranking scheme was revised as a basis to develop the required Red List Plant Species Policy. A Biodiversity Impact Study was commissioned for the proposed project. The study looked at the identification of red faunal and floral data species. None were identified within the project area.
Gauteng Conservation Plan (C-Plan)	The proposed development comprises of Ecological Support Area and Important area in terms of the Gauteng Conservation Plan. No Irreplaceable areas are situated on the study area.
GDARD Draft Ridges Policy	No ridges occur on, or in the direct vicinity of the study site. The development site has an undulating plain topography on a relatively flat geographical section
Gauteng Noise Control Regulations	During the construction phase of the proposed development, noise generation could become a factor to surrounding residents. However, noise mitigation measures have been identified and will be implemented in line with the noise regulations to ensure no negative impact to the surrounding environment

Table 1: Listed Activities that have been applied for

Listing Notice and Activity	Listed Activity and trigger as per the project description	Aerial extent
GNR 327 (Listing Notice 1): <u>Activity 10</u>	The development and operation of infrastructure exceeding 1000 metres in length for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes will need an Environmental Impact Assessment. i.e. (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak flow of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or (b) where such development will occur within an urban area.	The proposed pipelines will be 6 500 m in length and will have a diameter ranging between 525mm and 1200mm (0.525m – 1.2 m)
GNR 327 (Listing Notice 1): <u>Activity 12</u>	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs: (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	The proposed pipelines will be 6 500 m in length and will have a diameter ranging between 525mm and 1200mm (0.525m – 1.2 m). At its narrowest point, the pipeline will have a surface area of 3 412.5m ²
GNR 327 (Listing Notice 1): <u>Activity 19</u>	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse; 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.	The pipeline upgrade will involve the removal of more than 10m ³ of soil from a watercourse
GNR 324 (Listing Notice 3): <u>Activity 12</u>	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <u>c. Gauteng</u> i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans; or	The proposed pipelines will be 6 500 m in length and will have a diameter ranging between 525mm and 1200mm (0.525m – 1.2 m). At its narrowest point, the pipeline will have a surface area of 3 412.5m ² .
GNR 324 (Listing Notice 3): <u>Activity 14</u>	The development of—(xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; and (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; <u>c. Gauteng</u> iii. Gauteng Protected Area Expansion Priority Areas; iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans	The proposed sewer outfall upgrade will be more than 10m ² and will occur within 32 m of a water and within sites identified as ESAs in the Gauteng Conservation Plan and a Gauteng Protected Area Expansion Priority Areas



3 Alternatives

Describe the proposal and alternatives that were considered in this application. Alternatives included a consideration of all possible means by which the purpose and need of the proposed activity was accomplished. The determination of whether the site or activity (including different processes etc.) or both were appropriate needs to be informed by the specific circumstances of the activity and its environment.

The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. **Do not include the no go option into the alternative table below.**

Note: After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Please describe the process followed to reach (decide on) the list of alternatives below

The proposed project entails the upgrading of the existing Tembisa x25 sewer outfall. As such, route alternatives were not considered.
An assessment was done to determine which pipeline material would best suit the proposed upgrade taking cognizant of pipeline depth, pipeline loads, durability, cos and corrosivity over time and space. Concrete was found to be the material for the upgrade as shown below.

One of the governing issues during the design stage of the gravity sewer outfall pipelines was the selection of the most appropriate pipe material for the specific operational and field conditions as it is important that the correct pipe materials are selected to ensure a maximised service life for the proposed infrastructure. The proposed pipelines will be laid in an urban area with a lot of services around (including roads crossings). Due to the fact that most of the sewer infrastructure is already existing; the depth of the pipeline will be constrained by the invert levels of the existing sewer laterals particularly at the beginning and at the connection point downstream. In some sections the pipeline will be buried at depths deeper than 6m; the pipe material used in this case will have to be able to take the soil loads at such depths.

The proposed pipeline routes will transverse along the servitude of the existing sewer outfall pipelines from Tembisa through Clayville, all the way to the Olifantsfontein WWTW. The types of pipe materials which were considered for construction of the proposed pipelines are un-plasticised Poly Vinyl Chloride (uPVC), High density polyethylene (HDPE), Ductile Iron (DI), Steel and Concrete pipes. When selecting a sewer material, it should be considered that the presence of biofilm in sewer creates residual material build-up which inevitably reduces the internal diameter.

The most suitable material for this application is Concrete pipes. Concrete pipe is less susceptible to damage during construction, and maintains its shape, by not deflecting as does



flexible pipe. Precast concrete pipes are used in sewer applications. Precast concrete pipe is the strongest pipe available. It can be designed and plant tested to resist any load required.

Concrete sewer is corroded by acids produced in the sewer from chemical and microbial processes. Microbial induced corrosion is responsible for most corrosion that takes place.

Types of concrete pipe joints include O-ring Gaskets, profile gasket and mortar or mastic joints. O Ring gaskets are used on all sanitary sewers where leak-resistant joints are required. Profile gaskets are used on stormwater culverts and storm reinforced concrete pipe and sanitary sewers. Mortar or mastic joints are used for storm sewers, culverts, and horizontal elliptical reinforced concrete pipe.

Concrete pipes in sewer applications are weakened by corrosion. Various linings have been explored in an effort to protect concrete from internal corrosion. HDPE lining is one of the best linings for concrete pipes. The HDPE lining is embedded into the concrete; it provides an inert protection layer against corrosion. Thus, HDPE lined concrete pipes have all the qualities of a concrete pipe plus they are inert to internal corrosion.

■ Design Stress and Pipeline Lifetime

Strength of material can be quantified using the Young's modulus. Young's modulus (also known as the modulus of elasticity) is the ratio of stress to strain on a particular material. This the material's ability to withstand stresses without failure or permanent deformation. Materials with a higher modulus of elasticity can withstand more stress than those with a lower modulus of elasticity. It should be noted that the external loads shall also be considered when determining operation stresses. Concrete pipelines are known to be durable. The life expectancy of concrete pipes can last up to and over 100 years.

■ Corrosion

Corrosion is very important to address in pipe systems. Corrosion inhibitors are employed in systems which are likely to have corrosion problems. Nitrites and molybdates are the most common corrosion inhibitors. Nitrites are referred for heating-water systems; this is due to the fact that nitrates can be food for microorganisms.

Concrete sewer is corroded by acids produced in the sewer from chemical and microbial processes, microbial induced corrosion is responsible for most corrosion that takes place in concrete sewers

■ Thermal Expansion of Pipe Materials

Thermal expansion of sewer lines has to be considered in the design. Expansion of the sewer material has to be allowed for in the design of sewer. Thermal is especially important in above ground applications where pipe would be exposed to temperature variations. **Figure 1** below shows the

Concrete pipes have the least expansion rate, which means they will not result in thermal expansion problems, particularly in above ground applications.

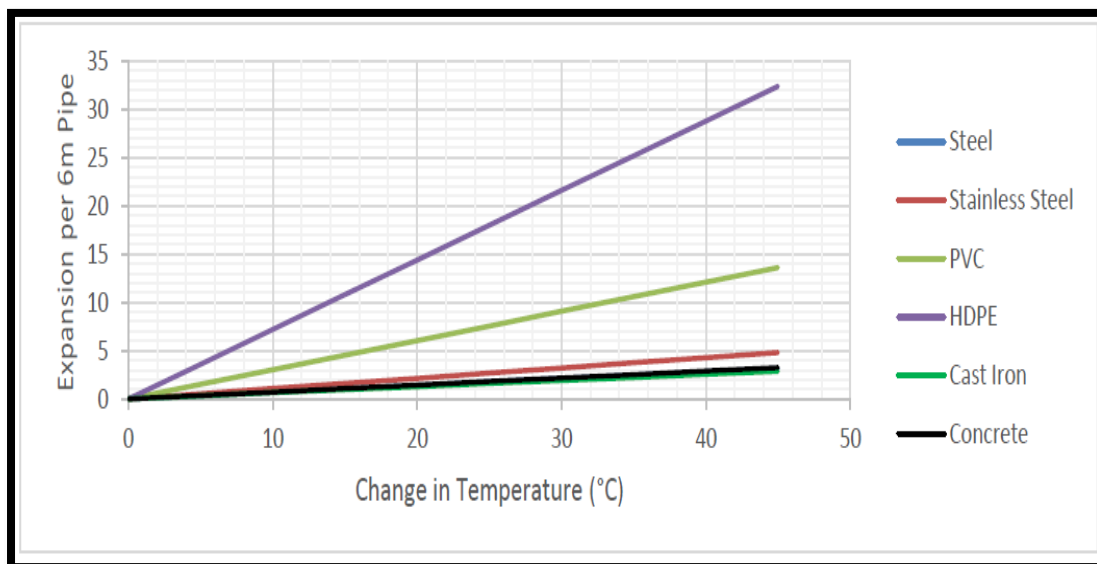


Figure 1: Thermal Expansion Rates per 6m Length of Pipe

■ **Cost Analysis of Material**

A cost analysis exercise showed that Ductile Iron is the most expensive of all the pipe materials under consideration. uPVC and HDPE are within the same price range for small diameter pipes. Steel is the second most expensive pipe material for small diameter pipes. However, HDPE pipes become more expensive than steel for diameters larger than 560mm. Concrete pipe material is the least costly. Thus, the most financially viable pipe material.

■ **Conclusion and Recommendation for Pipe Material Selection**

Selections of the appropriate material is based on the material's ability to withstand adverse site conditions that are likely to occur on the project. Table 15 below gives a summary of the impacts of these adverse conditions on each material.

Table 2: Adverse Site Conditions Likely to Cause Failure

Adverse Site Conditions Likely to Cause Failure	uPVC	HDPE	Cast Iron	DI	Steel	Concrete
Internal corrosion	Not Applicable	Not Applicable	Applicable	Applicable	Applicable	Applicable
External corrosion	Not Applicable	Not Applicable	Applicable	Applicable	Applicable	Not Applicable
Joint misalignment	Applicable	Not Applicable	Applicable	Applicable	Applicable	Applicable
Joint seal damaged, obstructed or misaligned	Applicable	Not Applicable	Applicable	Applicable	Not Applicable	Applicable
Excessive deflection	Applicable	Applicable	Not Applicable	Not Applicable	Applicable	Not Applicable
Imperfections in welded joints	Not Applicable	Applicable	Not Applicable	Not Applicable	Applicable	Not Applicable
Exposure to sunlight	Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Exposure to solvents	Applicable	Applicable	Not	Not	Not	Not



			Applicable	Applicable	Applicable	Applicable
Welding jointing weakness due to misalignment	Not Applicable	Applicable	Not Applicable	Not Applicable	Applicable	Not Applicable
Handling damage	Applicable	Not Applicable	Applicable	Applicable	Applicable	Applicable
Theft (in above ground applications)	Not Applicable	Not Applicable	Applicable	Applicable	Applicable	Not Applicable
Availability of Pipe Diameters	Applicable	Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Number of Failures Applicable	7	5	6	6	8	4

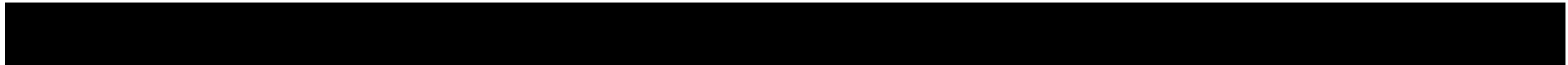
Concrete have the least applicable failures with a scoring of only 4. The expected depths of cover are significantly deep. Thus, a rigid pipe material (i.e. a pipe material which will be able to carry soil loads resulting from 3 to 6.5m cover of soil) desired for sections that will have excessive soil loading. Two options are considered; option 1 shall be using HDPE lined concrete pipes and option 2 shall be using concrete pipes lined with a sacrificial layer.

HDPE lined concrete pipes have all the concrete qualities and they are inert to internal corrosion. This then gives HDPE lined concrete a score of 3, which makes it the best material for this application. Therefore, depending on availability, option 1 (HDPE lined concrete pipes) are recommended for the construction of the outfall sewer. However, should HDPE lined concrete pipes not be available then option 2 (Concrete pipes lined with a sacrificial layer of OPC dolomite) is recommended.

Provide a description of the alternatives considered

No.	Alternative type , either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
	Described above	

In the event that no alternative(s) has/have been provided, a motivation must be included in the table below.



4 Physical size of the activity

Indicated the total physical size (footprint) of the proposal as well as alternatives. Footprints were to include all new infrastructure (roads, services etc.), impermeable surfaces and landscaped areas:

Proposed activity <i>(Total environmental landscaping, parking, etc.) and the building footprint</i>	Size of the activity: 20 ha (5ha)
Alternatives:	
Alternative 1 (if any)	
Alternative 2 (if any)	
	Ha/ m ²

or, for linear activities:

		Length of the activity:
Proposed activity: Sewer Outfall Upgrade		6.5 km
Alternatives:		

Indicate the size of the site(s) or servitudes (within which the above footprints will occur):

		Size of the site/servitude:
Proposed activity: Tembisa X25 Sewer Pipeline		6.5 ha
Alternatives:		

5 Site Access

Does ready access to the site exist, or is access directly from an existing road?	YES
If NO, what is the distance over which a new access road will be built	m
Describe the type of access road planned:	

Include the position of the access road on the site plan (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

Describe the type of access road planned:

PLEASE NOTE: Points 6 to 8 of Section A must be duplicated where relevant for alternatives

Section A 6-8 has been duplicated Number of times

(only complete when applicable)

6 Layout or Route Plan

A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached to this document. The site or route plans must indicate the following:

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
 - A4 size for activities with development footprint of 10sqm to 5 hectares;
 - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
 - A2 size for activities with development footprint of >20 hectares to 50 hectares);
 - A1 size for activities with development footprint of >50 hectares);
- The following should serve as a guide for scale issues on the layout plan:
 - A0 = 1: 500
 - A1 = 1: 1000
 - A2 = 1: 2000
 - A3 = 1: 4000
 - A4 = 1: 8000 (±10 000)
- shapefiles of the activity must be included in the electronic submission on the CD's;
- the property boundaries and Surveyor General numbers of all the properties within 50m of the site;

Table 3: Surveyor General numbers of all the properties within 50m of the site

Farm Name and Portion Number	SG Code
Portion 61 of Olifantsfontein 402	T0JR00000000040200061
Portion 98 of Olifantsfontein 402	T0JR00000000040200098
Portion 99 of Olifantsfontein 402	T0JR00000000040200099
Portion 84 of Olifantsfontein 402	T0JR00000000040200084
Portion 81 of Olifantsfontein 402	T0JR00000000040200081
Remainder of Olifantsfontein 402	T0JR00000000040200000
Portion 22 of Olifantsfontein 402	T0JR00000000040200022
Portion 60 of Olifantsfontein 402	T0JR00000000040200060

Farm Name and Portion Number	SG Code
Portion 43 of Olifantsfontein 410	TOJR00000000041000043
Portion 102 of Olifantsfontein 410	TOJR00000000041000102
Portion 96 of Olifantsfontein 410	TOJR00000000041000096
Portion 15 of Tembisa 9	TOIR00000000000900015
Portion 85 of Tembisa 9	TOIR00000000000900085

- the exact position of each element of the activity as well as any other structures on the site;
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure;
- servitudes indicating the purpose of the servitude;
- sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):
 - Rivers and wetlands;
 - the 1:100 and 1:50 year flood line;
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or infested with alien species);
- Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the position of the relevant buffer from the bank to be clearly indicated)

FOR LOCALITY MAP (NOTE THIS WAS ALSO INCLUDED IN THE APPLICATION FORM REQUIREMENTS)

- the scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map;
- the locality map and all other maps must be in colour;
- locality map must show property boundaries and numbers within 100m of the site, and for poultry and/or piggery, locality map must show properties within 500m and prevailing or predominant wind direction;

- for gentle slopes the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);
- locality map must show exact position of development site or sites;
- locality map showing and identifying (if possible) public and access roads; and
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites.

7 Site photographs

Color photographs from the center of the site were taken in at least the eight major compass directions with a description of each photograph. Photographs were attached under the appropriate Appendix. It has been supplemented with additional photographs of relevant features on the site, where applicable. [\(See Appendix B\)](#)

8 Facility Illustration

A detailed illustration of the activity was provided at a scale of 1:200 for activities that include structures. The illustrations were to scale and represented a realistic image of the planned activity. The illustration gave a representative view of the activity attached in the appropriate Appendix. [\(See Appendix C\)](#)

SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

Note: Complete Section B for the proposal and alternative(s) (if necessary)

Instructions for completion of Section B for linear activities

- 1) For linear activities (pipelines etc) it may be necessary to complete Section B for each section of the site that has a significantly different environment.
- 2) Indicate on a plan(s) the different environments identified
- 3) Complete Section B for each of the above areas identified
- 4) Attach to this form in a chronological order
- 5) Each copy of Section B must clearly indicate the corresponding sections of the route at the top of the next page.

Section B has been duplicated for sections times
of the route

Instructions for completion of Section B for location/route alternatives

- 1) For each location/route alternative identified the entire Section B needs to be completed
- 2) Each alternative location/route needs to be clearly indicated at the top of the next page
- 3) Attach the above documents in a chronological order

Section B has been duplicated for location/route times
alternatives
(complete only when appropriate)

Instructions for completion of Section B when both location/route alternatives and linear activities are applicable for the application

Section B was completed and attachments order in the following way

- All significantly different environments identified for Alternative 1 is to be completed and attached in a chronological order; then
- All significantly different environments identified for Alternative 2 is to be completed and attached chronological order, etc.

Section B - Section of Route (complete only when appropriate
for above)

Section B – Location/route Alternative No. (complete only when appropriate for above)

9 Property Description

Table 4: Property Description

Farm Name:	<p>The pipeline will be located within the existing servitude which traverses the following Farm Portions:</p> <ul style="list-style-type: none"> ■ Portion 61 of Olifantsfontein 402 ■ Portion 98 of Olifantsfontein 402 ■ Portion 99 of Olifantsfontein 402 ■ Portion 84 of Olifantsfontein 402 ■ Portion 81 of Olifantsfontein 402 ■ Remainder of Olifantsfontein 402 ■ Portion 22 of Olifantsfontein 402 ■ Portion 60 of Olifantsfontein 402 ■ Portion 43 of Olifantsfontein 410 ■ Portion 102 of Olifantsfontein 410 ■ Portion 96 of Olifantsfontein 410 ■ Portion 15 of Tembisa 9 ■ Portion 85 of Tembisa 9 	
Application Area (Ha):	6.5 ha	
Magisterial District:	City of Ekurhuleni	
Distance and direction from nearest town:	Midrand town is located approximately 15.2 km due south of Tembisa, in Gauteng province.	
21 digit Surveyor General Code	T0JR00000000040200061	
	T0JR00000000040200098	
	T0JR00000000040200099	
	T0JR00000000040200084	

for each farm portion:	TOJR00000000040200081	
	TOJR00000000040200000	
	TOJR00000000040200022	
	TOJR00000000040200060	
	TOJR00000000041000043	
	TOJR00000000041000102	
	TOJR00000000041000096	
	TOIR00000000000900015	
	TOIR00000000000900085	

10 Activity Position

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:

Latitude (S):

Longitude (E):

o

o

In the case of linear activities:

Tembisa X25 Sewer Pipeline	Latitude (S):	Longitude (E):
Starting point of the activity	25° 57' 32.57"	28° 13' 06.44"
Middle point of the activity	25° 58' 35.82"	28° 14' 05.28"
End point of the activity	25° 59' 49.82"	28° 14' 13.25"

For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

Addendum of route alternatives attached



The 21 digit Surveyor General code of each cadastral land parcel

Farm Name and Portion Number	SG Code
Portion 61 of Olifantsfontein 402	TOJR00000000040200061
Portion 98 of Olifantsfontein 402	TOJR00000000040200098

Farm Name and Portion Number	SG Code
Portion 99 of Olifantsfontein 402	TOJR00000000040200099
Portion 84 of Olifantsfontein 402	TOJR00000000040200084
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Portion 22 of Olifantsfontein 402	TOJR00000000040200022
Portion 60 of Olifantsfontein 402	TOJR00000000040200060
Portion 43 of Olifantsfontein 410	TOJR00000000041000043
Portion 102 of Olifantsfontein 410	TOJR00000000041000102
Portion 96 of Olifantsfontein 410	TOJR00000000041000096
Portion 15 of Tembisa 9	TOIR0000000000900015
Portion 85 of Tembisa 9	TOIR0000000000900085

11 Gradient of the Site

Indicate the general gradient of the site.

Flat	1:50	–	1:20	–	1:15 – 1:10	1:10	–	1:7,5	–	Steeper than
	1:20		1:15			1:7,5		1:5		1:5

12 Location in Landscape

Indicate the landform(s) that best describes the site.

Ridgeline	Plateau	Side slope of hill/ridge	Valley	Plain	Undulating plain/low hills	River front
-----------	---------	--------------------------	--------	-------	----------------------------	-------------

13 Groundwater, Soil and Geological stability of the site

a) Is the site located on any of the following?

Shallow water table (less than 1.5m deep)	YES	NO
Dolomite, sinkhole or doline areas	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO
Any other unstable soil or geological feature	YES	NO
An area sensitive to erosion	YES	NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s) **NO**

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**
 ° °

c) are any caves located within a 300m radius of the site(s) **NO**

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**
 ° °

d) are any sinkholes located within a 300m radius of the site(s) **NO**

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**
 ° °

If any of the answers to the above are “YES” or “unsure”, specialist input may be requested by the Department

14 Agriculture

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 4)? **NO**

Please note: The Department may request specialist input/studies in respect of the above.

15 Groundcover

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Indicate the types of groundcover present on the site and include the estimated percentage found on site

Natural veld in good condition % =	Natural veld with	Natural veld with heavy infestation	Veld dominated by alien species	Landscaped (vegetation) % =
---------------------------------------	--------------------------	-------------------------------------	---------------------------------	--------------------------------

	scattered aliens % =	% =	% =	
Sport field % =	Cultivated land % =	Paved surface (hard landscaping) % =	Building or other structure % =	Bare soil % =

Please note: The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there any rare or endangered flora or fauna species (including red list species) present on the site NO

If YES, specify and explain:

Are there any rare or endangered flora or fauna species (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) radius of the site. NO

If YES, specify and explain:

Are there any special or sensitive habitats or other natural features present on the site? YES

If YES, specify and explain:

[Please see Section 16 and 17 below](#)

16 Wetlands

16.1 National Freshwater Ecosystems Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach to the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of NWA (Act 36 of 1998). This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve

determination, and the setting and monitoring of resource quality objectives (Nel *et al.*, 2011). The NFEPA's are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's biodiversity goals (NEM:BA) (Act 10 of 2004), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel *et al.*, 2011).

One (1) wetland area was identified within the project area. The identified wetland was classified as a channelled valley bottom wetland. The wetland was characterised by an incised channel that held a moderate to steady flow of water. The wetland vegetation had been altered considerably. Dumping of solid waste around and within the wetland area had resulted in a build-up of pollutants within the wetland channel. The identified wetland can be seen in Figure 2 and the delineation is presented in Figure 4.



Figure 2: Identified Wetland



Figure 3: A tributary of the Kaalspruit River flowing beneath the R562 (Olifansfontein road)

PLAN 6

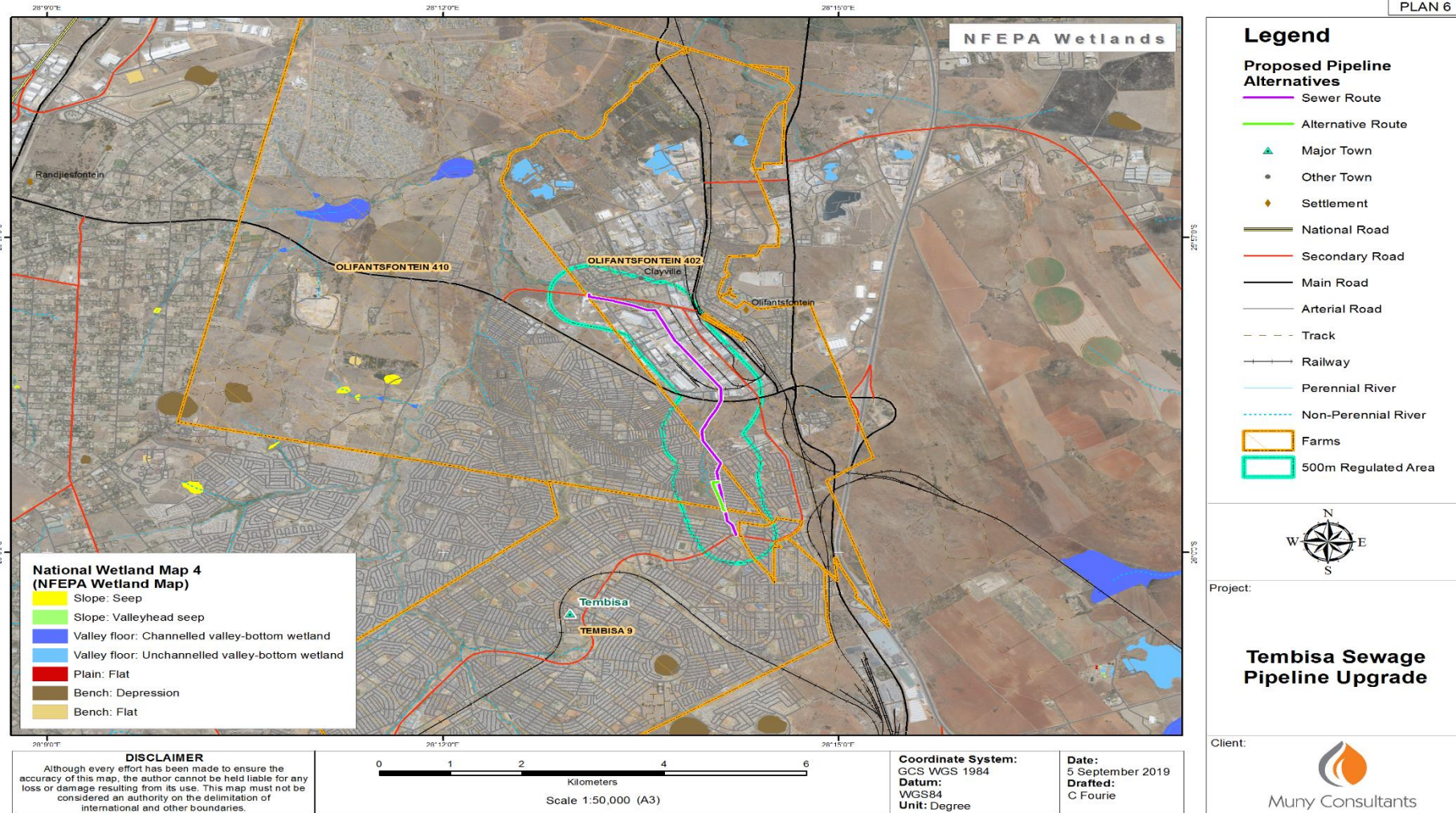


Figure 4: NFEPA wetland areas associated with the project

The wetland plant species that were identified included *Cyndodon dactylon*, *Cyperus spp.*, *Juncus effusus*, *Arundo donax*. and *Typha capensis*. The identified soil form was the Katspruit soil form. The identified wetland plants are shown in Figure 5 and the soil form are presented in Figure 6.



Figure 5: Identified wetland plants *Juncus effusus*



Figure 6: Identified soil form, Katspruit

The wetland area was classified based its Hydrogeomorphic Unit based on their landscape units. The wetland is classified as follows:

- HGM 1 – Channelled Valley Bottom.

The wetland classification of the delineated wetland area can be seen in Table 5.

Table 5: Wetland classification as per SANBI guideline (Ollis et al., 2013)

Wetland Name	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Highveld	Mesic Highveld Grassland Group 2	Valley Bottom	Channelled Valley Bottom	N/A	N/A

16.1.1 Present Ecological State (PES)

The PES scores for the assessed wetland are presented in Table 6. The overall wetland health for the wetland was determined to be Largely Modified (Class D).

Table 6: Summary of the scores for the wetland PES

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	Score	Rating	Score	Rating	Score
HGM 1	D: Largely Modified	4.0	D: Largely Modified	4.0	D: Largely Modified	4.2

A summary for the respective modules is as follows:

- The **hydrological component** for the HGM units have been altered by the current, reduced vegetative cover, and the development of roads and houses within the local catchment. The roads create hardened surfaces adjacent to the wetlands which causes increased flow velocities and erosion of downstream areas. In HGM 1 dumping of solid waste has resulted in impermeable areas within the wetland which impact on the hydrology.
- The **geomorphology component** for the HGM units assessed was moderately modified with the hydrological impacts altering the rating for HGM 2. The dumping of solid waste within the wetland has resulted in disturbed and altered soil characteristics for HGM 1(Figure 7).
- The **vegetation component** for HGM units was rated to be a Class D (Largely Modified) for the wetlands., The wetlands have low species diversity and bare areas in parts. The establishment of several alien plants within the wetland impacts on the wetland vegetation (Figure 7).



Figure 7: Identified wetland impacts a) Bare areas within wetland area and burning b) Dumping of solid waste in wetland

16.1.2 Ecosystem Services

The Ecosystem services provided by the wetland within the project area were assessed and rated using the WET-EcoServices method (Kotze, et al. 2009). The summarised results for the HGM units are shown in Table 7.

The wetland had an overall Intermediate level of service. The HGM 1 showed an elevated functionality for toxicant assimilation based on the level of waste from the surrounding residential areas.

Table 7: The EcoServices being provided by the wetlands associated with the project

Wetland Unit				HGM 1	
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Flood attenuation		1,6	
		Streamflow regulation		1,5	
		Regulating and supporting benefits	Water Quality enhancement benefits	Sediment trapping	1,8
				Phosphate assimilation	1,6
				Nitrate assimilation	1,7
				Toxicant assimilation	1,8
				Erosion control	1,8
		Carbon storage		1,3	
	Direct Benefits	Biodiversity maintenance			1,6
		Provisioning benefits	Provisioning of water for human use		0,8
			Provisioning of harvestable resources		0,4
			Provisioning of cultivated foods		0,4
		Cultural benefits	Cultural heritage		0,0
			Tourism and recreation		0,7
			Education and research		0,8
	Overall				18,0
Average				1,3	

16.1.3 Ecological Importance and Sensitivity

The EIS assessment was applied to the HGM unit described in the previous section in order to assess the levels of sensitivity and ecological importance of the wetland. The results of the assessment are shown in Table 8.

The Ecological Importance & Sensitivity for the wetlands was determined to have a Moderate (C) level of importance. The EIS was determined to be moderate as there were no signs of ecologically important taxa within the wetland area and none had been recorded within the area. The wetland did; however, provide some level of habitat for birds and other faunal species, especially in contrast to the urban area.

The Hydrological Functionality of wetlands was determined to have a Moderate (C) level of importance. The Direct Human Benefits were calculated to have a Marginal (D) level of importance.

Table 8: The EIS results for the delineated wetland

Wetland Importance and Sensitivity	
	Importance
	HGM 1
Ecological Importance & Sensitivity	1.5
Hydrological/Functional Importance	1.5
Direct Human Benefits	0.7

16.2 Buffer Zones

The wetland buffer zone tool was used to calculate the appropriate buffer required for the upgrade of the Tembisa X25 Outfall Sewer. The model shows that the largest risks (Moderate) posed by the project during the construction phase is that of “increased sediment inputs and turbidity” and “inputs of metal contaminants”. During the operational phase, the High risks identified for the project included “Increase in sediment inputs and turbidity”, “altered patterns of flows”, “inputs of toxic organic contaminants” and the “input of metal contaminants” (Table 11). These risks are calculated with no prescribed mitigation and the calculated buffer requirement is presented in Table 9.

Table 9: Pre-mitigation buffer requirement

Required Buffer before mitigation measures have been applied	
Construction Phase	31m
Operational Phase	16m

According to the buffer guideline (Macfarlane, et al. 2014) a high-risk activity would require a buffer that is 95% effective to reduce the risk of the impact to a low level threat.

The risks were then reduced to Low with the prescribed mitigation measures and therefore the recommended buffer was calculated to be 15m (Table 10) for the construction and operational phases.

Table 10: Post-mitigation buffer requirement

Required Buffer after mitigation measures have been applied	
Construction Phase	15 m

Operational Phase	15 m
--------------------------	-------------

A conservative buffer zone was suggested of 15 m for the construction and operation phases respectively, this buffer is calculated assuming mitigation measures are applied.

The buffer zone will not be applicable for areas of the project that traverse wetland areas, however, for all secondary activities such as lay down yards, storage areas and camp sites, the buffer zone must be implemented.

Table 11: The risk results from the wetland buffer model for the proposed project

Threat Posed by the proposed land use / activity		Specialist Threat Rating	Threat Rating after Mitigation	Recommended Mitigation
Construction Phase	1. Alteration to flow volumes	Very Low	Very Low	
	2. Alteration of patterns of flows (increased flood peaks)	Low	Low	
	3. Increase in sediment inputs & turbidity	Very High	Medium	There is an existing road over the wetland areas and the proposed project will not introduce a new impact. Dry season construction, silt traps, managed stockpiles, storm water management will reduce the risk of sedimentation during the construction.
	4. Increased nutrient inputs	Low	Low	
	5. Inputs of toxic organic contaminants	Medium	Very Low	
	6. Inputs of toxic heavy metal contaminants	Medium	Low	Off-site equipment vehicle fuelling and maintenance, storage in bunded area, no on-site fabrication, oil spill kits, equipment & vehicle inspections.
	7. Alteration of acidity (pH)	Low	Low	
	8. Increased inputs of salts (salinization)	N/A	N/A	
	9. Change (elevation) of water temperature	Very Low	Very Low	
	10. Pathogen inputs (i.e. disease-causing organisms)	Very Low	Very Low	
Operational Phase	1. Alteration to flow volumes	Medium	Low	The proposed pipeline will be underground and will not impact on the surface hydrology during the duration of its operation. An infrastructure monitoring plan will be devised to regularly check for leaks and remedy these. Furthermore, the project is for existing infrastructure upgrade and will minimise the current impacts.
	2. Alteration of patterns of flows (increased flood peaks)	High	Low	
	3. Increase in sediment inputs & turbidity	High	Low	
	4. Increased nutrient inputs	High	Low	
	5. Inputs of toxic organic contaminants	High	Medium	
	6. Inputs of toxic heavy metal contaminants	High	Low	
	7. Alteration of acidity (pH)	High	Low	
	8. Increased inputs of salts (salinization)	High	Low	
	9. Change (elevation) of water temperature	Medium	Low	
	10. Pathogen inputs (i.e. disease-causing organisms)	High	Medium	

17 Fauna and Flora

The project area was located within the Carletonville Dolomite Grassland vegetation unit (Figure 8).

The vegetation unit is found throughout the North-West, Gauteng, Free State and Mpumalanga provinces. The landscape is dominated rocky hills and ridges at altitudes that range between 1360m – 1620m. The status of the vegetation, as at the time of publishing (2006), is summarised in Table 12 and the dominant plant species within each vegetation unit are shown in Table 13.

This vegetation type occurs on rocky hills and ridges. The vegetation is a combination of dense woody vegetation and grass layer (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.). It is expected that over 15% of the unit has been transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. No serious alien invasions are reported (Mucina & Rutherford, 2006).

Table 12: Vegetation Status

Vegetation Name	Ecological Status	Conservation Status	% of Project Area
Carletonville Dolomite Grassland	Moderately Modified	Vulnerable	100%

Table 13: Dominant Plant Species

Vegetation Unit	Dominant Plant Species
Carletonville Dolomite Grassland	<i>Senegalia caffra</i> , <i>Combretum molle</i> , <i>Protea caffra</i> , <i>Andropogon shirensis</i> , <i>Cynodon dactylon</i> , <i>Eragrostis curvula</i> , <i>Eragrostis plana</i> , <i>Harpachloa falx</i> , <i>Aristida congesta</i> , <i>Sporobolus africana</i> , <i>Panicum natalense</i> , <i>Themeda triandra</i> , <i>Grewia occidentalis</i> , <i>Dombeya rotundifolia</i>

The Plants of Southern Africa (POSA) Database was utilised to obtain a list of plant species that may be of ecological importance that could occur within the project area. Table 14 presents plant species that have been listed as ecologically important or sensitive.

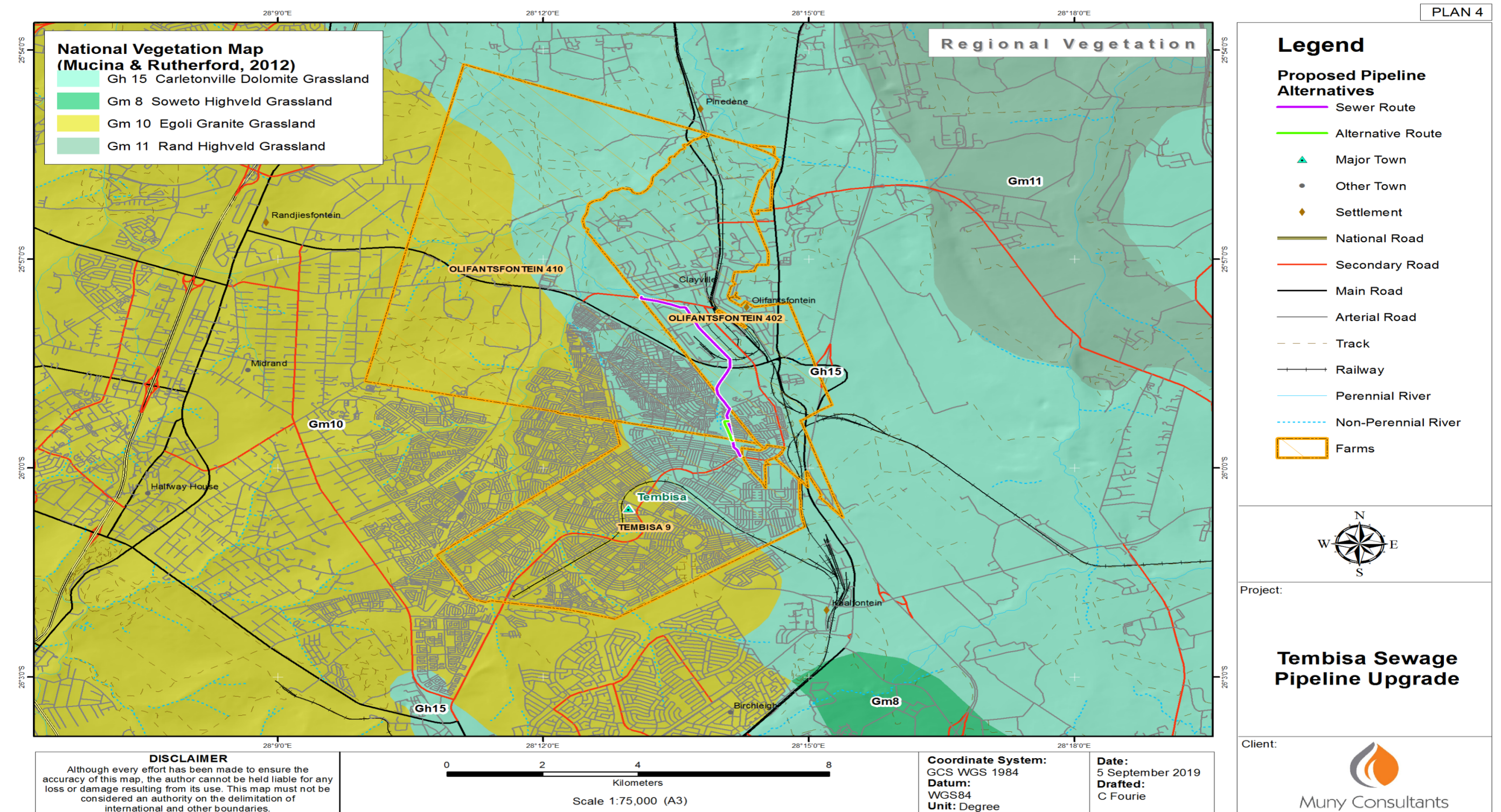


Figure 8: The regional vegetation associated with the proposed project

**Table 14: Ecologically Important Plant Taxa that may be found in the project area**

Family	Species	Threat status
Acanthaceae	<i>Dicliptera magaliesbergensis</i> K.Balkwill	VU
Amaryllidaceae	<i>Boophone disticha</i> (L.f.) Herb.	Declining
Amaryllidaceae	<i>Crinum macowanii</i> Baker	Declining
Anacardiaceae	<i>Searsia gracillima</i> (Engl.) Moffett var. <i>gracillima</i>	NT
Apocynaceae	<i>Ceropegia turricula</i> E.A.Bruce	NT
Apocynaceae	<i>Stenostelma umbelluliferum</i> (Schltr.) S.P.Bester & Nicholas	NT
Apocynaceae	<i>Ceropegia decidua</i> E.A.Bruce subsp. <i>pretoriensis</i> R.A.Dyer	VU
Aquifoliaceae	<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining
Asphodelaceae	<i>Trachyandra erythrorrhiza</i> (Conrath) Oberm.	NT
Asphodelaceae	<i>Aloe peglerae</i> Schönland	EN
Asteraceae	<i>Gnaphalium nelsonii</i> Burt Davy	Rare
Asteraceae	<i>Callilepis leptophylla</i> Harv.	Declining
Crassulaceae	<i>Adromischus umbraticola</i> C.A.Sm. subsp. <i>umbraticola</i>	NT
Crassulaceae	<i>Kalanchoe longiflora</i> Schltr. ex J.M.Wood	VU
Cucurbitaceae	<i>Cucumis humifructus</i> Stent	VU
Fabaceae	<i>Argyrolobium campicola</i> Harms	NT
Fabaceae	<i>Argyrolobium megarrhizum</i> Bolus	NT
Fabaceae	<i>Pearsonia bracteata</i> (Benth.) Polhill	NT
Fabaceae	<i>Acacia erioloba</i> E.Mey.	Declining
Fabaceae	<i>Melolobium subspicatum</i> Conrath	VU
Hyacinthaceae	<i>Drimia sanguinea</i> (Schinz) Jessop	NT
Hyacinthaceae	<i>Drimia altissima</i> (L.f.) Ker Gawl.	Declining
Hyacinthaceae	<i>Bowiea volubilis</i> Harv. ex Hook.f. subsp. <i>volubilis</i>	VU
Hypoxidaceae	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining
Mesembryanthemaceae	<i>Gibbaeum petrense</i> (N.E.Br.) Tischer	VU
Mesembryanthemaceae	<i>Drosanthemum micans</i> (L.) Schwantes	EN
Orchidaceae	<i>Habenaria bicolor</i> Conrath & Kraenzl.	NT
Orchidaceae	<i>Habenaria kraenzliniana</i> Schltr.	NT
Orchidaceae	<i>Holothrix randii</i> Rendle	NT
Poaceae	<i>Festuca dracomontana</i> H.P.Linder	VU
Proteaceae	<i>Leucospermum cordifolium</i> (Salisb. ex Knight) Fourc.	NT
Rhizophoraceae	<i>Cassipourea malosana</i> (Baker) Alston	Declining
Zamiaceae	<i>Encephalartos friderici-guilielmi</i> Lehm.	NT
Zamiaceae	<i>Encephalartos lehmannii</i> Lehm.	NT
Zamiaceae	<i>Encephalartos horridus</i> (Jacq.) Lehm.	EN



17.1.1 Fauna

A desktop assessment was performed with the aid of The Animal Demographic Unit Virtual Museum (ADU) and South African Bird Atlas Project 2 (SABAP 2). The study identified faunal species that may occur within the study area. It must be noted that the desktop study presents data over the entire Quarter Degree Square (QDS) 2528CD and is not limited to the study area. Table 15 presents bird species that are of ecological significance that may occur within the project area.

Table 15: The possible ecologically significant bird species

Common_name	Species Name	Threat status
Kestrel, Lesser	<i>Falco naumanni</i>	VU
Marsh-harrier, African	<i>Circus ranivorus</i>	VU
Vulture, Cape	<i>Gyps coprotheres</i>	VU
Falcon, Lanner	<i>Falco biarmicus</i>	NT
Flamingo, Greater	<i>Phoenicopterus ruber</i>	NT
Hawk-eagle, Ayres's	<i>Aquila ayresii</i>	NT
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>	NT
Secretarybird, Secretarybird	<i>Sagittarius serpentarius</i>	NT
Stork, Marabou	<i>Leptoptilos crumeniferus</i>	NT
Stork, Yellow-billed	<i>Mycteria ibis</i>	NT

The possible faunal species identified and presented in Table 16 represents historic data. The data presents the faunal species that may be identified within the project area in its natural and unmodified state. The species that are of ecological significance are presented at the top of the table.

Table 16: Faunal species that may occur within project area

Family	Species	Common name	Threat status
Felidae	<i>Panthera leo</i>	Lion	VU
Erinaceidae	<i>Atelerix frontalis</i>	Southern African Hedgehog	NT
Felidae	<i>Leptailurus serval</i>	Serval	NT
Hyaenidae	<i>Hyaena brunnea</i>	Brown Hyena	NT
Vespertilionidae	<i>Pipistrellus rusticus</i>	Rusty Pipistrelle	NT
Pyxicephalidae	<i>Pyxicephalus adspersus</i>	Giant Bull Frog	NT
Canidae	<i>Lycaon pictus</i>	African wild dog	EN
Mammals			
Muridae	<i>Lemniscomys rosalia</i>	Single-Striped Lemniscomys	LC



Family	Species	Common name	Threat status
Soricidae	<i>Crocidura hirta</i>	Lesser Red Musk Shrew	LC
Bathyergeridae	<i>Cryptomys hottentotus</i>	Southern African Mole-rat	LC
Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	LC
Galagidae	<i>Galago moholi</i>	Mohol Bushbaby	LC
Herpestidae	<i>Cynictis penicillata</i>	Yellow Mongoose	LC
Herpestidae	<i>Herpestes sanguineus</i>	Slender Mongoose	LC
Hyaenidae	<i>Proteles cristata</i>	Aardwolf	LC
Macroscelididae	<i>Elephantulus myurus</i>	Eastern Rock Elephant Shrew	LC
Molossidae	<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC
Muridae	<i>Mastomys coucha</i>	Southern African Mastomys	LC
Muridae	<i>Mastomys natalensis</i>	Natal Mastomys	LC
Muridae	<i>Otomys angoniensis</i>	Angoni Vlei Rat	LC
Muridae	<i>Rattus rattus</i>	Roof Rat	LC
Muridae	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	LC
Nesomyidae	<i>Steatomys pratensis</i>	Common African Fat Mouse	LC
Pteropodidae	<i>Epomophorus wahlbergi</i>		LC
Thryonomyidae	<i>Thryonomys swinderianus</i>	Greater Cane Rat	LC
Vespertilionidae	<i>Neoromicia capensis</i>	Cape Serotine	LC
Vespertilionidae	<i>Scotophilus dinganii</i>	Yellow-bellied House Bat	LC
Herpetofauna			
Bufonidae	<i>Poyntonophrynus vertebralis</i>	Southern Pygmy Toad	LC
Bufonidae	<i>Schismaderma carens</i>	Red Toad	LC
Bufonidae	<i>Sclerophrys garmani</i>	Olive Toad	LC
Bufonidae	<i>Sclerophrys gutturalis</i>	Guttural Toad	LC
Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	LC
Microhylidae	<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	LC
Pipidae	<i>Xenopus laevis</i>	Common Platanna	LC
Ptychadenidae	<i>Ptychadena porosissima</i>	Striped Grass Frog	LC
Pyxicephalidae	<i>Amietia delalandii</i>	Delalande's River Frog	LC
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	LC
Pyxicephalidae	<i>Pyxicephalus edulis</i>	African Bull Frog	LC
Pyxicephalidae	<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC
Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog	LC
Agamidae	<i>Acanthocercus atricollis</i> <i>subsp. atricollis</i>	Southern Tree Agama	LC



Family	Species	Common name	Threat status
Agamidae	<i>Agama atra</i>	Southern Rock Agama	LC
Chamaeleonidae	<i>Chamaeleo dilepis subsp. dilepis</i>	Common Flap-neck Chameleon	LC
Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC
Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC
Colubridae	<i>Dispholidus typus subsp. typus</i>	Boomslang	LC
Colubridae	<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	LC
Colubridae	<i>Philothamnus semivariatus</i>	Spotted Bush Snake	LC
Colubridae	<i>Telescopus semiannulatus subsp. semiannulatus</i>	Eastern Tiger Snake	LC
Cordylidae	<i>Cordylus jonesii</i>	Jones' Girdled Lizard	LC
Cordylidae	<i>Cordylus vittifer</i>	Common Girdled Lizard	LC
Elapidae	<i>Naja annulifera</i>	Snouted Cobra	LC
Elapidae	<i>Naja mossambica</i>	Mozambique Spitting Cobra	LC
Gekkonidae	<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	LC
Gekkonidae	<i>Lygodactylus capensis subsp. capensis</i>	Common Dwarf Gecko	LC
Gekkonidae	<i>Pachydactylus affinis</i>	Transvaal Gecko	LC
Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	LC
Gerrhosauridae	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC
Lacertidae	<i>Nucras holubi</i>	Holub's Sandveld Lizard	LC
Lamprophiidae	<i>Amblyodipsas polylepis subsp. polylepis</i>	Common Purple-glossed Snake	LC
Lamprophiidae	<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC
Lamprophiidae	<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	LC
Lamprophiidae	<i>Boaedon capensis</i>	Brown House Snake	LC
Lamprophiidae	<i>Lamprophis aurora</i>	Aurora House Snake	LC
Lamprophiidae	<i>Lycophidion capense subsp. capense</i>	Cape Wolf Snake	LC
Lamprophiidae	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	LC
Lamprophiidae	<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	LC
Lamprophiidae	<i>Psammophylax rhombeatus subsp. rhombeatus</i>	Spotted Grass Snake	LC
Lamprophiidae	<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC
Pelomedusidae	<i>Pelomedusa subrufa</i>	Central Marsh Terrapin	LC
Scincidae	<i>Mochlus sundevallii subsp. sundevallii</i>	Sundevall's Writhing Skink	LC
Scincidae	<i>Trachylepis capensis</i>	Cape Skink	LC



Family	Species	Common name	Threat status
Scincidae	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC
Scincidae	<i>Trachylepis varia</i>	Variable Skink	LC
Testudinidae	<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	LC
Testudinidae	<i>Kinixys spekii</i>	Speke's Hinged Tortoise	LC
Testudinidae	<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC
Typhlopidae	<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	LC
Typhlopidae	<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC
Varanidae	<i>Varanus albigularis</i> subsp. <i>albigularis</i>	Rock Monitor	LC
Viperidae	<i>Bitis arietans</i> subsp. <i>marietans</i>	Puff Adder	LC
Viperidae	<i>Causus rhombeatus</i>	Rhombic Night Adder	LC
Procaviidae	<i>Procavia capensis</i>	Cape Rock Hyrax	LC
Bovidae	<i>Oryx dammah</i>	Scimitar-horned Oryx	LC
Camelidae	<i>Camelus dromedarius</i>	One-humped Camel	LC
Canidae	<i>Canis</i>	Jackals and Wolves	LC
Cercopithecidae	<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC
Galagidae	<i>Galago senegalensis</i>	Senegal Bushbaby	LC
Muridae	<i>Aethomys</i>	Veld rats	LC
Muridae	<i>Mastomys</i>	Multimammate Mice	LC
Muridae	<i>Otomys</i>	Vlei Rats	LC
Muridae	<i>Rattus</i>	Genus Rattus	LC
Soricidae	<i>Suncus</i>	Dwarf Shrews	LC
Vespertilionidae	<i>Neoromicia</i>		LC
Elapidae	<i>Elapsoidea sundevallii</i> subsp. <i>media</i>	Highveld Garter Snake	LC
Leptotyphlopidae	<i>Leptotyphlops scutifrons</i> subsp. <i>conjunctus</i>	Eastern Thread Snake	LC
Leptotyphlopidae	<i>Leptotyphlops scutifrons</i> subsp. <i>scutifrons</i>	Peters' Thread Snake	LC
Pyxicephalidae	<i>Amietia</i>		LC

17.2 Vegetation

The vegetation in the vicinity of the pipeline route within the project area was dominated by a short grassland. The dominant grass species, that were identified, were *Cynodon dactylon* and *Aristida spp.* as can be seen in Figure 9. The vegetation is largely modified from the natural state. Species such as *Helichyrum spp.*, and *Tagetes minuta* were identified within the grassland vegetation. The identification of the vegetation was limited due to seasonal changes.



Figure 9: The dominant vegetation along the pipeline route

The grassland area did have large areas of bare soil as result of vehicular, human traffic and livestock grazing through the area. The level of disturbance has reduced the species diversity of the grassland, primarily through overgrazing and indiscriminate dumping (Figure 10). Patches of invasive trees such *Pinus spp* and *Eucalyptus camaldulensis* were observed in the area. A small area that was used for the cultivation of maize was observed in the area (Figure

11). **Error! Reference source not found.** presents the plant species that could be positively identified within the project area.



Figure 10: Livestock grazing and indiscriminate dumping in the area



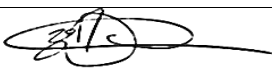
Figure 11: A stand of *Eucalyptus camaldulensis* surrounded by a small maize crop field within the project area

17.2.1 Fauna

The fauna assessment did not identify any faunal activity within the project area. This may be as a result of the brevity of the survey and the level of impact within the project area. The encroachment of informal human settlements, the noise from the industrial areas and vehicular movement within the surrounding area is likely to have displaced fauna. Loss of habitat and human contact are the most significant causes for the displacement of fauna.

17.2.2 Avifauna

The only avifaunal species identified within the project area were *Hadeda ibis* (Hadeda), *Charadrius hiaticula* (Common ringed Plover) and *Columba livia domestica* (Pigeon). This may be a result of the seasonal activities of the bird species as the site investigation was conducted during the dry season. Furthermore, the alterations to the habitat and continued anthropogenic presence within the area may have led to the low species number identified in the project area. The project area follows a linear route aligned with residential areas and the roads which limits the habitat available to faunal species.

Was a specialist consulted to assist with completing this section		YES	
If yes complete specialist details			
Name of the specialist:	Ndumiso Dlamini		
Qualification(s) of the specialist:	BSC Hon Botany		
Postal address:	Maxwell Office Park, Building 4, Magwa Crescent, Waterfall City		
➤ Postal code:	2090		
Telephone:	010 005 5770	Cell:	071 343 1503
E-mail:	ndumiso@munyconsult.com	Fax:	
Are any further specialist studies recommended by the specialist?			NO
If YES, specify:			
If YES, is such a report(s) attached?		YES	NO
If YES list the specialist reports attached below			
Signature of specialist:		Date:	October 2019

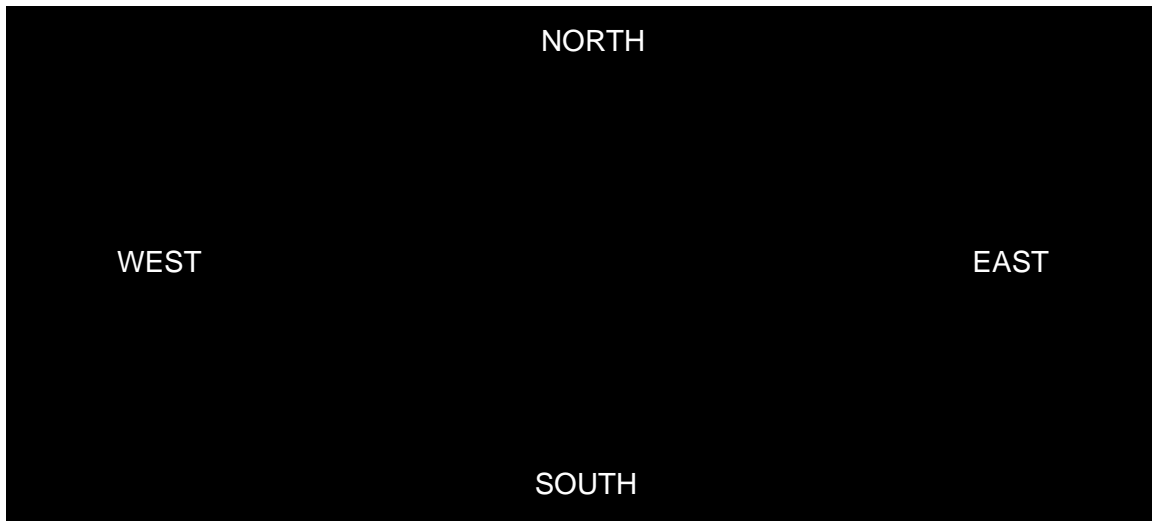
Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

18 Land use character of surrounding area

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site

1. Vacant land	2. River, stream, wetland	3. Nature conservation area	4. Public open space	5. Koppie or ridge
6. Dam or reservoir	7. Agriculture	8. Low density residential	9. Medium to high density residential	10. Informal residential
11. Old age home	12. Retail	13. Offices	14. Commercial & warehousing	15. Light industrial
16. Heavy industrial ^{AN}	17. Hospitality facility	18. Church	19. Education facilities	20. Sport facilities
21. Golf course/polo fields	22. Airport ^N	23. Train station or shunting yard ^N	24. Railway line ^N	25. Major road (4 lanes or more) ^N
26. Sewage treatment plant ^A	27. Landfill or waste treatment site ^A	28. Historical building	29. Graveyard	30. Archeological site
31. Open cast mine	32. Underground mine	33. Spoil heap or slimes dam ^A	34. Small Holdings	
Other land uses (describe):				

NOTE: Each block represents an area of 250m X 250m, if your proposed development is larger than this please use the appropriate number and orientation of hashed blocks



Note: More than one (1) Land-use may be indicated in a block

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies. Specialist reports that look at health & air quality and noise impacts may be required for any feature above and in particular those features marked with an “A” and with an “N” respectively.

Have specialist reports been attached	YES	
If yes indicate the type of reports below		
1. Wetland Delineation and Impact Assessment Report		
2. Biodiversity Impact Assessment Report		
3. Surface Water Assessment		

19 Socio-Economic Context

Describe the existing social and economic characteristics of the area and the community condition as baseline information to assess the potential social, economic and community impacts.



19.1 Socio-economic Characteristics

According to 2011 census data, the small areas (Tembisa included) covering the Tembisa precinct had a population of approximately 5,351 people, approximately 1,993 households and an average household size of 2.6 people per household. The immediate surrounding areas had a population of approximately 13,404 people, approximately 4,111 households, and an average of 3.3 persons per household. The precinct had a slightly lower average household size than that of the immediate surroundings and that of the CoE. It was evident that the Tembisa precinct had a limited residential population and the area has not shown much historical growth in population. A study conducted by the GAPP Consortium titled “Tembisa Central Business District Urban Design Precinct Plan” (November 2018), revealed the following;

- 75% of the population are within the Economically Active Population (EAP) group, aged between 15 and 64 years;
- 55% of the population aged 20 years and older, that reside within the precinct, have a Matric qualification or higher (compared to 51% across the CoE);
- 1% of the population aged 20 years and older have no schooling (compared to 4% across the CoE);
- According to the 2011 census, approximately three quarters of the precinct population were within working age. Of this, approximately 87% were employed (compared to 63% across CoE).
- There is one crèche within the precinct and numerous in the surrounding suburbs;
- Although not within the precinct, there is one primary school immediately west of the precinct;
- There is one secondary school within the precinct, and numerous in the surrounding suburbs;
- There is one clinic within the precinct;
- There are two hospitals in the suburbs west of the precinct;
- Tembisa Police Station is located within the precinct;
- The Tembisa Library is a local community library located within the precinct. A larger branch library is located north-west of the precinct.

The status quo has revealed that the financial and business services sector is the major economic contributor to the economy of Tembisa, followed closely by the trade sector and the community and social services sector. There were numerous applications for residential and business rights within the SDA of the CBD, which revealed that the Tembisa precinct and surrounds was ready for development. The precinct has great potential for further development, investment in retail and commercial activities, and ultimately to create employment opportunities for local residents.

20 Cultural/Historical Features

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposal or alternatives, then you are requested to furnish this Department with written comment from the South African Heritage Resource Agency (SAHRA) – Attach comment in appropriate annexure

38. (1) *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-*

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

(i) exceeding 5 000 m² in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources

authority;

(d) the re-zoning of a site exceeding 10 000 m² in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?

NO

If YES, explain:

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.



Briefly explain the findings of the specialist if one was already appointed:

- The project was located in a region (Gauteng Province) that is rich in archaeology and heritage resources.
- No other archaeological or historical resources were identified in the project area.
- Some graves are often not marked and subterranean in nature, they and might not have been identified during the initial site visit and survey.
- The SAHRA Paleo-Sensitivity Layer (**Error! Reference source not found.**) shows that the significant part of the pipeline fell within the area of low to high palaeontological sensitivity
- Based on the nature of the project, surface activities were unlikely to impact upon the fossil heritage if preserved in the development footprint because of previous disturbance. Once excavations for the pipelines commence, Vryheid Formation fossils might be discovered. The geological structures suggested that the rest of the rocks were either much too old to contain fossils or contain only trace fossils, i.e. stromatolites. Since there were very small chances that fossils from the Vryheid Formation were to be disturbed a Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low;
- Based on the geology of the area (**Error! Reference source not found.**) and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The sandstones and shales of the Vryheid Formation might contain fossils of the Glossopteris flora, but none has been recorded from this site;

Will any building or structure older than 60 years be affected in any way?

NO

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

NO

If yes, please attached the comments from SAHRA in the appropriate Appendix

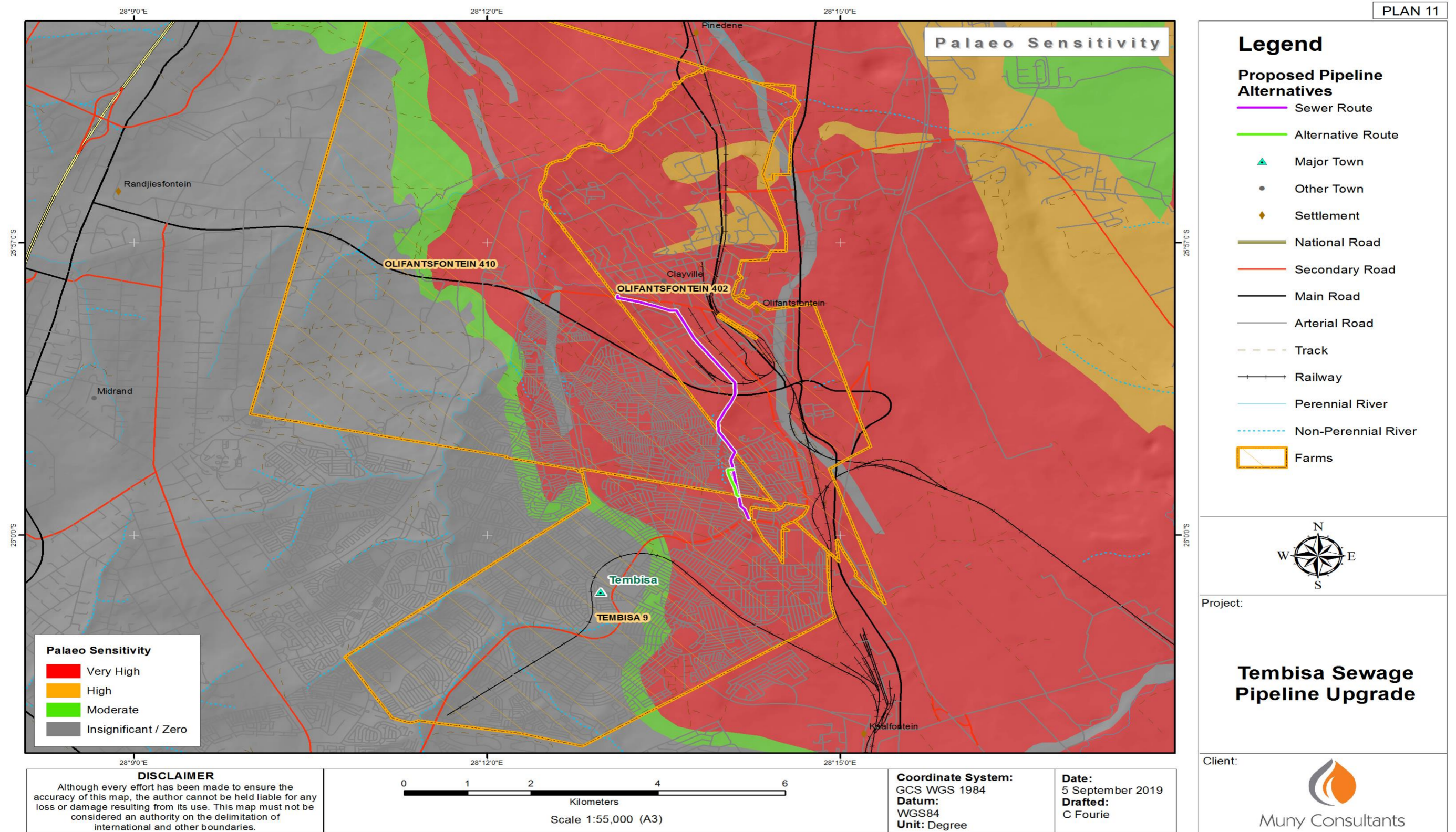


Figure 12: Palaeo sensitivity map

SECTION C: PUBLIC PARTICIPATION (SECTION 41)

The Environmental Assessment Practitioner must conduct public participation process in accordance with the requirement of the EIA Regulations, 2014.

21 Local Authority Participation

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority.

Was the draft report submitted to the local authority for comment?

YES

If yes, has any comments been received from the local authority?

YES

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):

- In terms of Gauteng C-Plan Version 3. 3, part of the proposed site falls within Ecological support area, Critical Biodiversity Area, Wetland buffer, and is covered by Dolomite. The applicant must compile all the specialist studies related to the proposed activity and attach them to the final Basic Assessment Report (BAR).
- Comments of the storm water and traffic impact studies from the City of Ekurhuleni Department of Road and Storm water must form part of the final BAR.
- The public participation process must be conducted according to the minimum requirements of EIA Regulations 2014 and must be attached to the Final Basic Assessment Report.
- Please note that the proposed development is also listed in terms of Listing Notice 3, Activity 14 of Environmental Impact Assessment (EIA) Regulations, 2014 published under the National Environmental Management Act (NEMA) (Act No. 107 of 1998) (as amended).

If "NO" briefly explain why no comments have been received or why the report was not submitted if that is the case.

22 Consultation with Other Stakeholders

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least **thirty (30) calendar days** before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?

YES

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):



The questions / comments / concerns raised were captured as raised at the Tembisa meeting and has not been categorised according to impact.

- ❖ Mpho Kgwedi from Winnie Mandela Zone 1 questioned the width of the pipeline?
 - TM responded by saying that the pipeline would be of varying widths – some sections would be 1200mm - 120cm and in other sections the pipeline would be 600mm – 60cm in width.

- ❖ Peggy from Ward 2 questioned that there were smaller pipelines, and ever since the bigger pipelines (protruding ones were installed), there were constant blockages. She wanted to know if the new ones would not cause the same problems?
 - Tinashe Maramba (TM) responded by informing Peggy that in sections where the man holes were elevated, the rationale was to ensure that whenever there was a blockage, the elevated sections would buy time for the municipality to come and unblock the pipeline.
 - TM also retorted that there were projects that had been undertaken on the same project prior and as such, it would have possible that previous work done on the pipeline was not up to standard. TM further reported that according to the project's Preliminary Design Report, the projects engineers were informed by a study that showed that the pressure within the sewer pipeline was low and as such, not conveying the amount of sewer that the pipeline was designed for. This further fortified the need to install wider pipelines.

- ❖ Mimi from Ward 2 complained about water getting into residents' households. She lamented how her children were made to manoeuvre round puddles of water that emanated from blocked sewer lines.
 - TM responded by saying that it would not be possible for Muny to answer for work previously done or problems that were currently plaguing the residence of Ward 2. TM eluded to the fact that the current scope of work included a Method statement and a Maintenance plan. These documents explain how the pipelines are going to be built. These documents, TM further explained, were going to ensure that such negative issues would not be encountered after the construction of the Tembisa X25 sewer outfall upgrade. TM fortified the afore mentioned point by eluding to the fact that The CoE would not be issued a Water Use Licence without such critical documentation.

- ❖ Vusi from Zone 1 questioned the issue of man holes that were installed in residents' yards. He asked if something was going to be done about them.
 - Nhlanhla Ndlovu (NN) responded by explaining that in areas where the sewer pipeline ran underneath fences, the pipeline was going to be demolished and reinstalled outside peoples' yards.

- ❖ Elliot from hospital view complained about a man hole in his house. He retorted that the man hole was always blocked. Elliot further exclaimed that he could not extend his house as a result of the manhole. He demanded that he be given a timeframe in relation to the removal of the manhole. Elliot added to say he had live with the same problem for over 23 years.
- NN responded that if the manhole in question was along the proposed sewer pipeline to be upgraded, then it would be removed and re-aligned. NN, however could not commit to a set timeframe as there were many factors that could affect the project such as the issuance of the water us licence by the department of Human Settlements, Water and Sanitation.

If "NO" briefly explain why no comments have been received

23 General Public Participation Requirements

The Environmental Assessment Practitioner must ensure that the public participation process is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees and ratepayers associations. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was flawed.

The EAP must record all comments and respond to each comment of the public / interested and affected party before the application report is submitted. The comments and responses must be captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.

APPENDICES FOR PUBLIC PARTICIPATION

All public participation information is to be attached in the appropriate Appendix. The information in this Appendix is to be ordered as detailed below:

Appendix E1 – Stakeholder Database

Appendix E2 – Background Information Letter

Appendix E3 – Proof of newspaper advertisements

Appendix E4 –Site Notices Report

Appendix E5 – Minutes of any public and/or stakeholder meetings

Appendix E6 - Comments and Responses Report

Appendix E7 –Comments from I&APs on Basic Assessment (BA) Report

Appendix E8 –Comments from I&APs on amendments to the BA Report

Appendix E9 – Copy of the register of I&APs

SECTION D: RESOURCE USE AND PROCESS DETAILS

Note: Section D is to be completed for the proposal and alternative(s) (if necessary)

Instructions for completion of Section D for alternatives

- 1) For each alternative under investigation, where such alternatives will have different resource and process details (e.g. technology alternative) the entire Section D needs to be completed
- 4) Each alternative needs to be clearly indicated in the box below
- 5) Attach the above documents in a chronological order

Section D has been duplicated for times alternatives

(complete only when appropriate)

Section D Alternative "insert alternative number" (complete only when appropriate for above)
No.

24 Waste, Effluent, and Emission Management

24.1 Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? YES

If yes, what estimated quantity will be produced per month? 6 m³

How will the construction solid waste be disposed of (describe)?

All the solid waste is to be collected in marked waste disposal bins. The construction waste generated on site is separated into their waste streams i.e. general waste, construction rubble, hazardous waste, scrap metal and other construction waste. All bins and skips are clearly labelled to indicate the waste stream. The waste skip containing hazardous waste has been kept within a concreted, bunded area. The contents of the bins is collected by a registered waste collector and is disposed of at the Rietfontein Landfill which is a registered waste disposal facility.

Will the activity produce solid waste during its operational phase? NO

If yes, what estimated quantity will be produced per month? m³

How will the solid waste be disposed of (describe)?

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity? YES NO

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? NO

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility? NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

24.2 Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system? NO

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)?

Will the activity produce any effluent that will be treated and/or disposed of on site? NO

If yes, what estimated quantity will be produced per month? m³

If yes describe the nature of the effluent and how it will be disposed.

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility? NO

If yes, provide the particulars of the facility:

Facility name:

Contact person:

Postal address:

Postal code:

Telephone: Cell:

E-mail: Fax:

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

24.3 Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system? NO

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)? YES NO

Will the activity produce any effluent that will be treated and/or disposed of on site? NO

If yes describe how it will be treated and disposed off.

24.4 Emissions into the atmosphere

Will the activity release emissions into the atmosphere? NO

If yes, is it controlled by any legislation of any sphere of government? YES NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

During construction, excavation of trenches to lay the pipeline in resulted in the production of dust. However, the amount of dust was not envisaged to cause any detrimental harm to the surrounding environment. .

25 Water Use

Indicate the source(s) of water that will be used for the activity

municipal	Directly from water board	groundwater	river, dam or lake	stream, other	the activity will not use water
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month: liters

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs? YES

If yes, list the permits required

General Authorisation

If yes, have you applied for the water use permit(s)? YES

If yes, have you received approval(s)? (attached in appropriate appendix) NO

26 Power Supply

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

If power supply is not available, where will power be sourced from?

Human Capital and mechanized machinery would be utilised.

27 Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

SECTION E: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts as well as the impacts of not implementing the activity (Section 24(4)(b)(i)).

28 Issues raised by interested and affected parties

Summarize the issues raised by interested and affected parties.

[See Appendix E6- Comments and Response Report](#)

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included)

(A full response must be provided in the Comments and Response Report that must be attached to this report): [Appendix E6](#)

29 Impacts that may Result from the Construction and Operational Phase

Briefly describe the methodology utilised in the rating of significance of impacts

29.1 Impact Assessment Methodology

29.1.1 Impact Rating

The impact rating process was designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model. It must be noted that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defensible methodology of rating the relative significance of impacts in a specific context. This I gave the project applicant a greater understanding of the impacts of the project and the issues which needed to be addressed by management. It also gave the regulators information on which to base their decisions.

The significance rating process follows the established impact/risk assessment formula given in Figure 13 .

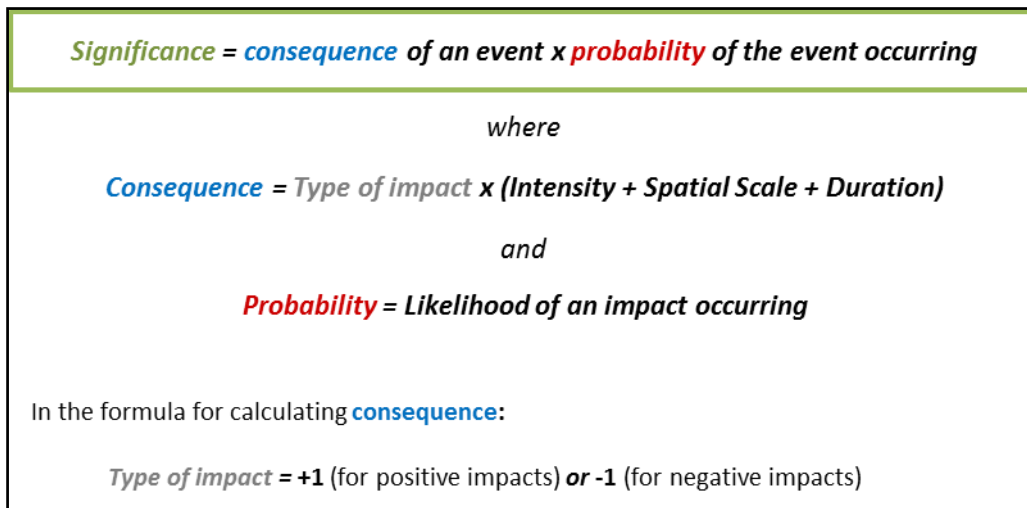


Figure 13: Significance Rating Methodology

The matrix calculated the rating out of 147, whereby Severity, Spatial Scale, Duration and Probability were rated out of seven. Please refer to Table 17 for the parameter ratings which was used to assign a weighting for both positive and negative impacts.

The significance of an impact was determined and categorised into one of eight categories, as indicated in Table 18 which is extracted from Figure 14. Impacts were rated prior to mitigation and again after consideration of the proposed mitigation measure included in the EMP.

Table 17: Impact Assessment Parameter Ratings

Rating	Severity/Intensity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
7	<p>Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.</p> <p>The positive impact resulted in a significant improvement to the initial/post disturbance environmental status and I benefited ecological and natural resources.</p>	<p>Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.</p> <p>The positive impact was of high significance which resulted the improvement of the socio-economic status of a greater area beyond the boundary of the directly affected of the community and/or promote archaeological and heritage awareness and contribute towards research and documentation of sites and artefacts through phase two assessments.</p>	<p>International</p> <p>The effect occur across international borders</p>	<p>Permanent: No Mitigation</p> <p>No mitigation measures of natural process reducedd the impact after implementation.</p>	<p>Certain/ Definite.</p> <p>The impact will occur regardless of the implementation of any preventative or corrective actions.</p>
6	<p>Significant impact on highly valued species, habitat or ecosystem.</p> <p>The positive impact is of high significance which will result in a vast improvement to the environment such as ecological diversification and/or rehabilitation of endangered species</p>	<p>Irreparable damage to highly valued items of cultural significance or breakdown of social order.</p> <p>The positive impact will be of high significance and will result in the upliftment of the surrounding community and/or contribute towards research and documentation of sites and artefacts through phase two assessments</p>	<p>National</p> <p>Will affect the entire country</p>	<p>Permanent:</p> <p>Mitigation measures of natural process will reduce the impact.</p>	<p>Almost certain/Highly probable</p> <p>It is most likely that the impact will occur.</p>

Rating	Severity/Intensity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
5	<p>Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate</p> <p>The positive impact will be moderately high and will have a long term beneficial effect on the natural environment</p>	<p>Very serious widespread social impacts. Irreparable damage to highly valued items</p> <p>The positive impact will be moderately high and will result in visible improvements on the socio-economic environment of the local and regional community, and/or promote archaeological and heritage awareness through mitigation</p>	<p>Cercle/ Region</p> <p>Will affect the entire Cercle or region</p>	<p>Project Life</p> <p>The impact will cease after the operational life span of the project.</p>	<p>Likely</p> <p>The impact may occur.</p>
4	<p>Serious medium term environmental effects. Environmental damage can be reversed in less than a year</p> <p>The positive impact on the environment will be moderate with visible improvement to the natural resources and regional biodiversity</p>	<p>On-going serious social issues. Significant damage to structures / items of cultural significance</p> <p>The positive impact on the socio-economic environment will be of a moderate extent and benefits should be experience across the local extent and/or potential benefits for archaeological and heritage conservation</p>	<p>Commune Area</p> <p>Will affect the whole municipal area</p>	<p>Long term</p> <p>6-15 years</p>	<p>Probable</p> <p>Has occurred here or elsewhere and could therefore occur.</p>



Rating	Severity/Intensity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
3	<p>Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.</p> <p>The positive impact will be moderately beneficial to the natural environment, but will be short lived.</p>	<p>Ongoing social issues. Damage to items of cultural significance.</p> <p>The positive impact will be moderately beneficial for some community members and/or employees, but will be short lived and/or there will be a moderate possibility for archaeological and heritage conservation</p>	<p>Local</p> <p>Local extending only as far as the development site area</p>	<p>Medium term</p> <p>1-5 years</p>	<p>Unlikely</p> <p>Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.</p>
2	<p>Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.</p> <p>The positive impacts will be minor and slight environmental improvement will be visible.</p>	<p>Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.</p> <p>Minor positive impacts on the social/cultural and/ or economic environment</p>	<p>Limited</p> <p>Limited to the site and its immediate surroundings</p>	<p>Short term</p> <p>Less than 1 year</p>	<p>Rare/ improbable</p> <p>Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures</p>

Rating	Severity/Intensity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment. The positive impact on the environment will be insignificant and will not result in visible improvements.	Low-level repairable damage to commonplace structures. The positive impact on social and cultural aspects will be insignificant	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen.

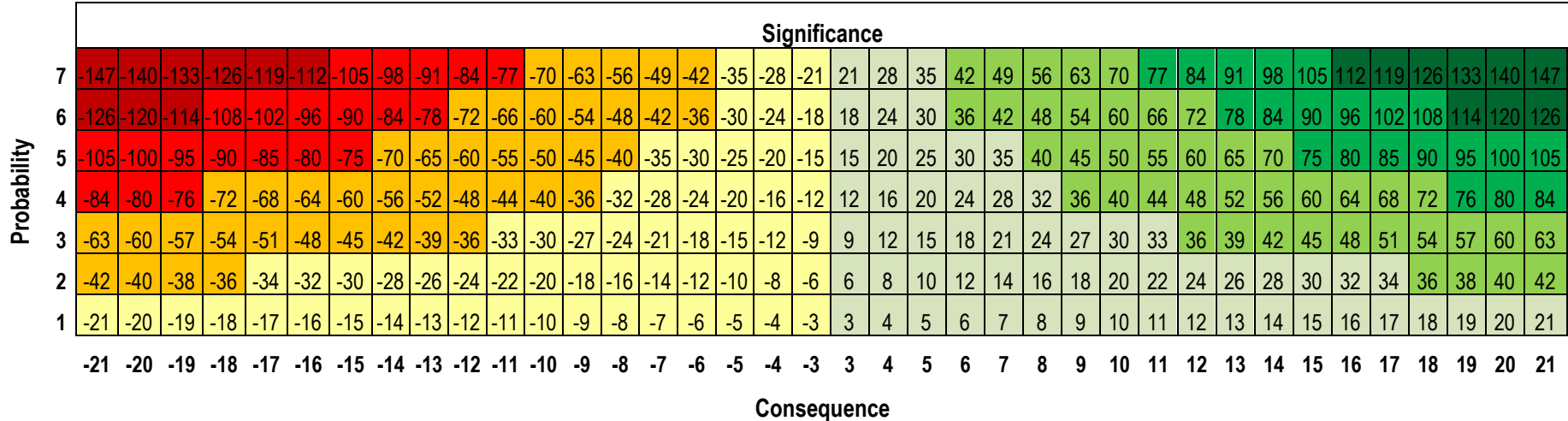


Figure 14: Relationship between Consequence, Probability and Significance Ratings

Table 18: Significance Ratings

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and / or natural environment	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and / or natural environment	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and / or natural environment	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe effects	Moderate (negative)
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects	Major (negative)

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

29.2 Assessment of each Identified Potentially Significant Impact and Risk for Tembisa Sewer Outfall

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
PRE-CONSTRUCTION PHASE										
Pre-planning and pipeline route design	The location of pipeline infrastructure within delineated water resource areas and within the 32 m or 100 m zones of regulation	Pre-Construction	Negative (-1)	Moderate (3)	Commune area (4)	Project life (5)	Likely (5)	Minor (negative) (-60)	<ul style="list-style-type: none"> Ensure that as far as possible all infrastructures result in the least disturbance to delineated water resource features present; Ensure that sound environmental management is in place during the planning phase e.g. ensure that all site documentation to be drafted including method statements are approved by the ECO; Ensure that during the planning phase stormwater control measures such as the construction of berms to prevent gully formation, siltation of freshwater resources as well as contamination of surface water resources are implemented. This must be prioritised in areas where the pipeline crosses a watercourse; Ensure that the design of the pipeline infrastructure is environmentally and structurally sound and all possible precautions are taken to prevent possible sewer spillages into surface water resources. 	Negligible (negative)
Establishment of the Construction site camp	Disturbance to the environment i.e. Indigenous Vegetation, Soil & Land Capability, Freshwater features and Groundwater	Pre-Construction	Negative (-1)	Moderate (3)	Commune area (4)	Medium Term (3)	Likely (5)	Minor (negative) (-50)	<ul style="list-style-type: none"> The construction site camp should preferably be located in an already disturbed area During the planning of the construction site camp layout, ensure that the site layout makes provision for a storage area for hazardous material. This storage area must be concreted, bunded, covered, labelled and well ventilated; The waste skip that will contain hazardous waste will be kept within a bunded area; If the contractor will repair or maintain vehicles at the site camp, the site camp layout plan must make provision for a bunded maintenance area; The location of the laydown area, hazardous material storage, waste area including hazardous waste and ablution facilities should not be located within sensitive areas. 	Negligible (positive)
CONSTRUCTION PHASE										
Access to the Construction site	Soil compaction caused by vehicles and heavy machineries	Construction	Negative (-1)	Moderate (3)	Site only (2)	Medium Term (3)	High (6)	Minor (negative) (-48)	<ul style="list-style-type: none"> Access to site must be gained through use of existing roads; The contractor must use the existing tracks that run along the pipeline servitude for access; The areas that were disturbed e.g. areas used for parking, must be ripped and reseeded during rehabilitation. 	Negligible (negative)
Construction site setup	Potential contamination of water resources,	Construction	Negative (-1)	Moderate (3)	Local (3)	Medium Term (3)	High (6)	Minor (negative) (-54)	<ul style="list-style-type: none"> Ensure that all equipment e.g. generator, waste bins, spill kit and hazardous material are kept outside freshwater resources including wetlands. A buffer zone of at least 32m from the outer edge of the wetland and 100m from a stream must be maintained when setting up on site; 	Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
									<ul style="list-style-type: none"> Ensure that the area to be designated as parking area is outside of water resources. A buffer zone of 32m from the outer edge of a wetland or 100m from a stream must be maintained. Stockpiling of the pipes to be installed must be limited to only what is required and only be stored in designated areas to avoid any unnecessary impact to drainage lines. No pipes or any materials shall be stored within 100m from the watercourse. Ensure that stationery vehicles have a drip tray placed underneath; All hazardous material including oil and paint should be kept within a drip tray while on site. 	
Vegetation Clearing for the construction activities	Removal of the natural vegetation	Construction	Negative (-1)	Moderate (3)	Site only (2)	Long term (4)	Definite (7)	Minor (negative) (-63)	<ul style="list-style-type: none"> Vegetation clearing must take place only within the pipeline servitude; Areas designated for vegetation clearing should be identified and visibly marked off. Exposed areas should be rehabilitated with indigenous plants to the project area as soon as construction is finished. 	Negligible (negative)
	Disturbance to animals on site	Construction	Negative (-1)	Low (2)	Site only (2)	Long term (4)	High (6)	Minor (negative) (-48)	<ul style="list-style-type: none"> Do not disturb nests, breeding sites or young ones (especially along the streams that the pipeline crosses). Do not attempt to kill or capture snakes unless directly threatening the safety of employees. Dogs or other pets are not allowed to the worksite as they are threats to the natural wild animal A low speed limit should be enforced on site to reduce wild animal-vehicle collisions No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harms remaining faunal species. The ECO must conduct regular site inspections of removing any snares or traps that have been erected. Employees and contractors should be made aware of the presence of, and rules regarding, flora and fauna through suitable induction training and on-site signage. 	Negligible (negative)
Vegetation Clearing for the construction activities	Increased soil erosion, increase in silt loads and sedimentation	Construction	Negative (-1)	High (5)	Local (3)	Long term (4)	Definite (7)	Moderate (negative) (-84)	<ul style="list-style-type: none"> Following construction, rehabilitation of disturbed areas is required; especially next to the drainage lines the pipeline crosses. Avoid areas with sensitive soils, steep slopes during rain or windy season. During the construction phase, berms should be installed to prevent gully formation and siltation of the freshwater resources. The following points should serve to guide 	Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
									<p>the placement of berms. The material for the construction of the berms must be sourced legally by the contractor appointed to construct the pipeline:</p> <ul style="list-style-type: none"> ▪ Where the track has slope of less than 2%, berms every 50 m should be installed; ▪ Where the track slopes between 2% and 10%, berms every 25 m should be installed; ▪ Where the track slopes between 10%-15%, berms every 20 m should be installed; and ▪ Where the track has slope greater than 15%, berms every 10 m should be installed. <p>▪ Have a rehabilitation strategy such as a clean-up plan/strategy if spills occur and proper facilities (ablution) to ensure no sewage spills into drainage lines and streams.</p>	
	Establishment and spread of declared weeds	Construction	Negative (-1)	High (5)	Local (3)	Long term (4)	Definite (7)	Moderate (negative) (-84)	<ul style="list-style-type: none"> ▪ The best mitigation measure for alien and invasive species is the early detection and eradication of these species which will be ensured with the use of a monitoring programme. ▪ An alien invasive management programme should be developed and implemented in order to control alien invasive species 	Negligible (negative)
	Loss of wetland Features Habitat and Ecological Structure	Construction	Negative (-1)	High (5)	Local (3)	Medium Term (3)	Medium (6)	Minor (negative) (-66)	<ul style="list-style-type: none"> ▪ Ensure that vegetation clearing and indiscriminate vehicle driving does not occur outside of the demarcated areas; ▪ Minimize construction footprints prior to commencement of the construction and control the edge effects from construction activities; and ▪ Implement alien vegetation control program within the wetland features. ▪ Ensure that all activities impacting on the wetland features are managed according to the relevant DWS Licensing regulations (where applicable); and ▪ As far as possible, all construction activities should occur in the low flow season, during the drier winter months 	Negligible (negative)
	Changes to Ecological and Socio-Cultural Services Provision	Construction	Negative (-1)	Serious (4)	Local (3)	Short Term (2)	Likely (5)	Minor (negative) (-45)	<ul style="list-style-type: none"> ▪ During construction use techniques which support the hydrology and sediment control functions of the freshwater features; and normal as soon as possible after construction. ▪ Limit excavations to a limited extent to ensure that drainage patterns within the features returns to pre-construction state ▪ Restrict construction to the drier winter months if possible to avoid sedimentation of the freshwater feature and to minimize the severity of disturbance of the features and hydraulic function. 	Negligible (negative)
	Loss of hydrological function and sediment balance	Construction	Negative (-1)	High (5)	Commune area (4)	Long term (4)	High (6)	Moderate (negative) (-78)	<ul style="list-style-type: none"> ▪ Any construction-related waste must not be placed in the vicinity of the wetland features; and 	Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
									<ul style="list-style-type: none"> Limit the footprint area of the construction activity to what is absolutely essential in order to minimize environmental damage. Stockpiled soil must be removed and the area must be levelled to avoid sedimentation of the wetland features from runoff; and As far as possible, all construction activities should occur in the low flow season, during the drier summer months. 	
Excavation of trenches and associated soil stockpiling	Increased soil erosion	Construction	Negative (-1)	High (5)	Local (3)	Long term (4)	High (6)	Minor (negative) (-72)	<ul style="list-style-type: none"> Do not stockpile soil for more than four (4) month; Earth works e.g. excavation, must be prioritised during the dry winter season; The speed limit on site should be kept at 20kmph to minimise dust generation; Install stormwater control measures e.g. berms around stockpiled soil to minimise the impact of surface water runoff. 	Negligible (negative)
	Loss of wetland Features Habitat and Ecological Structure	Construction	Negative (-1)	High (5)	Local (3)	Medium Term (3)	Medium (6)	Minor (negative) (-66)	<ul style="list-style-type: none"> Ensure that vegetation clearing and indiscriminate vehicle driving does not occur outside of the demarcated areas; Minimize construction footprints prior to commencement of the construction and control the edge effects from construction activities; and Implement alien vegetation control program within the wetland features. Ensure that all activities impacting on the wetland features are managed according to the relevant DWS Licensing regulations (where applicable); and As far as possible, all construction activities should occur in the low flow season, during the drier winter months 	Negligible (negative)
	Changes to Ecological and Socio-Cultural Services Provision	Construction	Negative (-1)	Serious (4)	Local (3)	Short Term (2)	Likely (5)	Minor (negative) (-45)	<ul style="list-style-type: none"> During construction use techniques which support the hydrology and sediment control functions of the freshwater features; and normal as soon as possible after construction. Limit excavations to a limited extent to ensure that drainage patterns within the features returns to pre-construction state Restrict construction to the drier winter months if possible to avoid sedimentation of the freshwater feature and to minimize the severity of disturbance of the features and hydraulic function. 	Negligible (negative)
	Loss of hydrological function and sediment balance	Construction	Negative (-1)	High (5)	Commune area (4)	Long term (4)	High (6)	Moderate (negative) (-78)	<ul style="list-style-type: none"> Any construction-related waste must not be placed in the vicinity of the wetland features; and Limit the footprint area of the construction activity to what is absolutely essential in order to minimize environmental damage. Stockpiled soil must be removed and the area must be levelled to avoid sedimentation of the wetland features from runoff; and 	Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
									<ul style="list-style-type: none"> As far as possible, all construction activities should occur in the low flow season, during the drier summer months. 	
Waste generation	Pollution due to oil and fuel spills, erosion, and ablution facilities.	Construction	Negative (-1)	High (5)	Local (3)	Long term (4)	Definite (7)	Moderate (negative) (-84)	<ul style="list-style-type: none"> Ensure that all stationery vehicles have a drip tray underneath; Ensure that there is always a spill kit available; Should a spill occur, ensure that it is cleaned up immediately and the contaminated soil is stored as hazardous waste; Proper ablution facilities on site must be provided. Regular monitoring of the pipeline to ensure that there are no leaks Hazardous material must be kept within a drip tray while on site and stored within a bund area at the construction site camp. All spills must be reported to the ECO; No vehicles or machineries may be maintained/repaired on site. This must be done at a workshop area within a bund wall; Proper Standard Operating Procedures in place regulating refuelling and other potential polluting activities. 	Negligible (negative)
	Mishandling of construction waste	Construction	Negative (-1)	High (5)	Local (3)	Short Term (2)	High (6)	Minor (negative) (-60)	<ul style="list-style-type: none"> All construction employees and visitors must undergo an environmental induction by ECO. The ECO must clearly highlight the management of waste on site; The construction waste generated on site must be separated into their waste streams i.e. general waste, construction rubble, hazardous waste, scrap metal and other construction waste; All bins and skips must be clearly labelled to indicate the waste stream; The waste skip containing hazardous waste must be kept within a concreted, banded area; Use a licensed waste contractor for the collection of waste generated on site. The collected waste must be disposed off at a registered/authorised landfill site and proof of disposal must be kept; The ECO should keep all records of waste generated and disposed off. A waste register must be part of these records. Building rubble must be re-used where possible; Do not bury wastes on-site; Burning of waste is not allowed. 	Negligible (negative)
Installation of the pipeline	Contamination of groundwater due to hydrocarbon spillages.	Construction	Negative (-1)	High (5)	Local (3)	Long term (4)	High (6)	Minor (negative) (-72)	<ul style="list-style-type: none"> Ensure that all stationery vehicles have a drip tray underneath; Ensure that there is always a spill kit available; Should a spill occur, ensure that it is cleaned up immediately and the contaminated soil is stored as hazardous waste; 	Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
									<ul style="list-style-type: none"> Generators must be placed within their own drip tray; Hazardous material must be kept within a drip tray while on site and stored within a bund area at the construction site camp. All spills must be reported to the ECO; No vehicles or machineries may be maintained/repared on site. This must be done at a workshop area within a bund wall; Ensure that vehicles are maintained according to their maintenance plan. 	
	Loss of wetland Features Habitat and Ecological Structure	Construction	Negative (-1)	High (5)	Local (3)	Medium Term (3)	High (6)	Minor (negative) (-66)	<ul style="list-style-type: none"> Ensure that vegetation clearing and indiscriminate vehicle driving does not occur outside of the demarcated areas; Minimize construction footprints prior to commencement of the construction and control the edge effects from construction activities; and Implement alien vegetation control program within the wetland features. Ensure that all activities impacting on the wetland features are managed according to the relevant DWS Licensing regulations (where applicable); and As far as possible, all construction activities should occur in the low flow season, during the drier winter months 	Negligible (negative)
	Changes to Ecological and Socio-Cultural Services Provision	Construction	Negative (-1)	Serious (4)	Local (3)	Short Term (2)	Likely (5)	Minor (negative) (-45)	<ul style="list-style-type: none"> During construction use techniques which support the hydrology and sediment control functions of the freshwater features; and normal as soon as possible after construction. Limit excavations to a limited extent to ensure that drainage patterns within the features returns to pre-construction state Restrict construction to the drier winter months if possible to avoid sedimentation of the freshwater feature and to minimize the severity of disturbance of the features and hydraulic function. 	Negligible (negative)
	Loss of hydrological function and sediment balance	Construction	Negative (-1)	High (5)	Commune area (4)	Long term (4)	High (6)	Moderate (negative) (-78)	<ul style="list-style-type: none"> Any construction-related waste must not be placed in the vicinity of the wetland features; and Limit the footprint area of the construction activity to what is absolutely essential in order to minimize environmental damage. Stockpiled soil must be removed and the area must be levelled to avoid sedimentation of the wetland features from runoff; and As far as possible, all construction activities should occur in the low flow season, during the drier summer months. 	Negligible (negative)
Construction of the Pipeline and associated clearance activities	Creation of employment opportunities	Construction	Positive (+1)	Low (2)	Commune area (4)	Short term (2)	Probable (4)	Negligible (positive) (+32)	<ul style="list-style-type: none"> Where feasible, promote the creation of employment opportunities for women and youth; Where possible, construction workers must be sourced from areas within the EMM; 	Minor (positive)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
	Enhancement of the local economy through sourcing of goods and services								<ul style="list-style-type: none"> Source goods and services within the local study area to maximise economic growth for SMEs; Partner with existing community organisations and social departments to jointly assist affected communities, to strengthen the economic development opportunities provided as a result of the project. 	
OPERATIONAL PHASE										
Site access by vehicles for maintenance purposes	Loss of hydrological function and sediment balance	Operational	Negative (-1)	Low (2)	Site only (2)	Short term (2)	Rare / improbable (3)	Negligible (negative) (-12)	<ul style="list-style-type: none"> Vehicles should not be driven indiscriminately within the wetland features during maintenance activities to prevent soil compaction, contamination of the water resource and disturbance thereof. 	Negligible (negative)
Operation of the pipeline and Clearance of vegetation for maintenance purposes	Establishment and spread of declared weeds	Operational	Negative (-1)	High (5)	Local (3)	Long term (4)	Definite (7)	Moderate (negative) (-84)	<ul style="list-style-type: none"> The best mitigation measure for alien and invasive species is the early detection and eradication of these species which will be ensured with the use of a monitoring programme. An alien invasive management programme should be developed and implemented in order to control alien invasive species 	Negligible (negative)
	Loss of wetland Features Habitat and Ecological Structure	Operational	Negative (-1)	Low (2)	Site only (2)	Short term (2)	Unlikely (3)	Negligible (negative) (-18)	<ul style="list-style-type: none"> Any areas where active erosion within the wetland features are observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is reinstated to conditions which are as natural as possible; Cutting/ clearing of the herbaceous layer within the wetland areas along the linear development should be avoided so as to retain soil stability provided by the grass root structures 	Negligible (negative)
	Changes to Ecological and Socio-Cultural Services Provision	Operational	Negative (-1)	Low (2)	Site only (2)	Short term (2)	Likely (5)	Negligible (negative) (-30)	<ul style="list-style-type: none"> Monitor the wetland feature for erosion and incision; Maintain the REC for each of the wetland features, as stated within the report during the life of the development; and Implement an alien vegetation control program within the wetland features and ensure establishment of indigenous species within areas previously dominated by alien vegetation. 	Negligible (negative)
Maintenance of the pipeline	Sporadic disturbance of habitat	Operational	Negative (-1)	Minor (2)	Local (3)	Immediate (1)	High (6)	Minor (negative) (-36)	<ul style="list-style-type: none"> Do not disturb nests, breeding sites or young ones (especially along the wetlands that the pipelines traverses); Do not attempt to kill or capture snakes unless directly threatening the safety of employees; A low speed limit should be enforced on site to reduce wild animal-vehicle collisions; No animals should be intentionally killed, and poaching and hunting should not be permitted on the site; 	Negligible (negative)
	Disturbance of faunal communities	Operational	Negative (-1)	Minor (2)	Local (3)	Immediate (1)	High (6)	Minor (negative) (-36)		Negligible (negative)

Activity/Aspect	Impact	Phase	Nature	Intensity	Spatial Scale	Duration	Probability	Rating Pre Mitigation	Mitigation measures	Rating Post Mitigation
	Continuation of jobs during the operational phase of the pipeline through maintenance of the pipeline	Operational	Positive (+1)	Low (2)	Local (3)	Long term (4)	Unlikely (3)	Negligible (positive) (+27)	<ul style="list-style-type: none"> ▪ Empower the workforce to develop skills that could be transferred to other sectors of the economy; ▪ Training and skills development initiatives should be initiated; and 	Minor (positive)

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

Wetland Delineation and Impact Assessment Report
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Biodiversity Impact Assessment

Surface Water Impact Assessment

Describe any gaps in knowledge or assumptions made in the assessment of the environment and the impacts associated with the proposed development.

Basic Assessment Report

The following assumptions were made during the compilation of the BAR:

- As no detail engineering designs were available at the time of the BAR compilation it was assumed that the length of the existing pipeline is approximately 6.5 km
- This environmental authorisation application is for the upgrade of the existing Tembisa X25 Sewer pipeline in Tembisa, Gauteng.

Biodiversity and Wetlands Specialist Study

The following limitations were encountered during this study:

- The survey was conducted within the dry season and the identification of plant species was limited as a result of seasonal changes. Faunal activity would be limited as a result of the season and the anthropogenic footprint within the area;
- It is assumed that the proposed pipeline route will follow the road reserve as far as possible; and
- No activities list has been provided and as such the risk assessment will be conducted based on general risks

30 Impacts that may Result from the Decommissioning and Closure Phase

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

The project is not envisaged to be decommissioned as it pertains to the provision of a basic service in line with projected population growth

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.



Where applicable indicate the detailed financial provisions for rehabilitation, closure and ongoing post decommissioning management for the negative environmental impacts. (Not Applicable)

31 Cumulative impacts

Describe potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment. Substantiate response:

If the proposed pipelines developments are approved, the majority of cumulative impacts will be related to the construction phase. Pipeline developments within an urban residential area have very low to no environmental impacts during the operational phase.

- Traffic flow could be negatively affected by the proposed construction activities coupled with peak traffic hours. Traffic flow along the M63, M45 and R51 maybe arduously affected during peak traffic. It is thus important that use of access roads be limited to off-peak hours.
- Cumulative negative visual impact on surrounding views due to the camp site, movement of construction vehicles and construction works e.g. mounds of stockpiled soil. This impact may be minimized by locating the site camp and storage areas in an area with low visibility from surrounding developments and road networks.
- During the construction phase some safety problems (especially for the surrounding residents and road users) are likely to occur due to construction activities. In order to minimize this, site workers are not to be allowed to sleep on the construction site at night and provision for adequate security / site supervision must be made during the day.

As illustrated, these cumulative impacts can be mitigated if activities are correctly planned and mitigation measures are implemented to manage activities which could cause any negative cumulative impacts.

32 Environmental impact statement

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



32.1 Tembisa X25 Sewer Pipeline Upgrade

The construction of the 32.1 Tembisa X25 Sewer Pipeline route poses possible negative impacts on the socio-economic and natural environments of the project area.

The socio-economic impacts were enhanced as some sections of the Tembisa X25 Sewer Pipeline falls within a medium density residential area. Possible impacts include noise and dust production, traffic retardation and congestion during peak hours, infringement on privacy, visual nuisance and a heightened safety threat. All of the mentioned impacts will occur during the construction phase with the impacts ranging from negligible (negative) to minor (negative). After mitigation, all the possible impacts were assessed to be negligible.

The environmental impacts around the proposed project area were mainly centred around biodiversity and identified wetlands. The Tembisa X25 Sewer Pipeline route would follow an existing road servitude for most of the footprint area. The Gauteng Conservation Plan indicated that the pipeline would border but not traverse an 'Important Area' however it will traverse an 'Ecological Support Area'. The possible impacts on the identified sensitive natural environments ranged from being Negligible (negative) to Moderate (negative). After the application of mitigation measures, the significance of the impacts ranged from minor (negative) to negligible (negative).

32.2 Impact Summary of the Proposal or Preferred Alternative

Project Phase	Receiving Environment	Impact Description	Pre-Mitigation	Post-Mitigation
Construction	Biodiversity	<ul style="list-style-type: none"> Removal of the natural vegetation Disturbance to animals on site 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> Increased soil erosion, increase in silt loads and sedimentation Establishment and spread of declared weeds 	Moderate (-ve)	Negligible (-ve)
Construction and Operational	Biodiversity	<ul style="list-style-type: none"> Pollution due to oil and fuel spills, erosion, and ablution facilities. 	Moderate (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> Pollution due to construction waste 	Minor (-ve)	Negligible (-ve)
Construction	Soil and land capability	<ul style="list-style-type: none"> Soil compaction caused by vehicles and heavy machineries onsite 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> Increased soil erosion 	Minor (-ve)	Negligible (-ve)
Construction	Water resources	<ul style="list-style-type: none"> Loss of wetland Features Habitat and Ecological Structure 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> Changes to Ecological and Socio-Cultural Services Provision 	Minor (-ve)	Negligible (-ve)
		<ul style="list-style-type: none"> Loss of hydrological function and sediment balance 	Moderate (-ve)	Negligible (-ve)

Project Phase	Receiving Environment	Impact Description	Pre-Mitigation	Post-Mitigation
Operational	Water resources	▪ Loss of wetland Features Habitat and Ecological Structure	Negligible (-ve)	Negligible (-ve)
		▪ Changes to Ecological and Socio-Cultural Services Provision	Negligible (-ve)	Negligible (-ve)
		▪ Loss of hydrological function and sediment balance	Negligible (-ve)	Negligible (-ve)
Construction	Social	▪ Creation of employment opportunities during the construction of the pipeline	Negligible (+ve)	Minor (+ve)
Operational		▪ Enhancement of the local economy	Negligible (+ve)	Minor (+ve)
		▪ Continuation of jobs during the operational phase of the pipeline through maintenance of the pipeline	Negligible (+ve)	Minor (+ve)

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

33 Spatial development tools

Indicate the application of any spatial development tool protocols on the proposed development and the outcome thereof.

Spatial data was used to determine the agricultural potential, presence of rivers and wetlands and paleontological sensitivity. Together with the Gauteng Conservation Plan (C-plan) data, the presence of ecological support areas, important areas and irreplaceable areas were also established.

34 Recommendation of the practitioner

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner as bound by professional ethical standards and the code of conduct of EAPASA).

YES	
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If “NO”, indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

If “YES”, please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:



The construction and operation of the sewer outfall should be implemented according to the specifications of the EMPr to ensure mitigation and management of potential impacts associated with construction and operation activities are mitigated. The activities should be monitored against the approved EMPr, the Environmental Authorisation (once issued) and all other relevant environmental legislation.

- Monitoring to be undertaken during the construction phase of the pipeline must be completed daily by an external independent Environmental Control Officer (ECO);
- An external independent ECO must be appointed prior to the commencement of the construction activities;
- The ECO must keep monthly environmental monitoring reports on site;
- The ECO must approve all method statements and procedures to be implemented during construction e.g. vegetation method statement, alien and invasive species management procedure/plan etc;
- The ECO must conduct a monthly compliance audits to assess compliance to the conditions of the EA;
- Construction vehicles and machinery repairs may not be undertaken within the project area. A designated workshop at the construction camp must be established for repairs;
- Extra precautions should be taken in areas within 32 meters of the wetland areas to prevent any potential impact to the water course, which includes effective storm water control measures around soil stockpiles to prevent sedimentation of the wetland areas;
- The pipeline must be constructed in sections not exceeding 200 m per section. A maximum of four sections may be active at the same time, by the undertaking of one of the following activities per section:
 - Vegetation Clearance;
 - Digging of the trench (where applicable);
 - Installation of the pipeline; or
 - Backfilling of the trench and rehabilitation of the footprint.

This means that no more than 800m of pipeline route will be affected at any given time, and concurrent rehabilitation of the pipeline footprint will be implemented. For example, the project will commence with vegetation clearance on Section 1. Once complete, vegetation clearance can continue to Section 2, while excavation of the trench can commence on Section 1. Once complete, vegetation clearance will continue to Section 3, with trench excavation continuing on Section 2, and pipe installation commencing on Section 1. Finally, Section 1 will be backfilled and rehabilitated, Pipe installation will be undertaken in Section 2, Excavation of the trench will progress to Section 3 and vegetation clearance will progress to Section 4 of the pipeline route. Soil removed for the pipeline construction should be stockpiled and utilised as backfill once each section of pipeline has been constructed;



- Soil removed for the pipeline construction should be stockpiled and utilised as backfill once each section of pipeline has been constructed;
- Ensure soil management programme is implemented and maintained to minimise erosion and sedimentation;
- All surfaces that are susceptible to erosion must be re-vegetated as soon as construction is completed;
- Limit the footprint area of the construction activities to what is essential. Clearing of vegetation must be kept within a 10 m corridor during the construction phase;
- No material may be dumped or stockpiled within 32m of any wetlands or within 100 m of any rivers, tributaries or drainage lines in the vicinity of the proposed pipeline;
- An alien and invasive management plan must be developed and adhered to;
- Wetland monitoring should be carried out monthly during construction and decommissioning and annually during rehabilitation;
- Ongoing wetland rehabilitation is necessary within and in the vicinity of the proposed construction;
- The refuelling of vehicles must take place at the construction camp within a bunded area or at a petrol station;
- Hazardous chemicals must be clearly labelled and stored within a bunded area. During transportation of these substances, the use of drip tray is recommended;
- The use of existing access road is recommended to minimise soil compaction.
- Establish Project-specific Chance and Fossil Find Protocols and Procedures (CFPs).

35 The Needs and Desirability of the Proposed Development (as per notice 792 of 2012, or the updated version of this guideline)

The City of Ekurhuleni Water Master Plan has earmarked Tembisa X25 township to have future residential and industrial developments. Investigations undertaken by the design engineers (Tangos Consultants) have indicated that Tembisa Extension 25 and 8 are expected to be developed as industrial areas. This is further confirmed by the City of Ekurhuleni Town Planning Department. The Municipality's town planning department further indicated that there will also be future residential developments of Tembisa. Access to efficient sanitation is a basic human need, this initiative is considered to be of high priority.

Furthermore, the proposed development will provide employment opportunities to the local community both during the construction and operational phases. In addition, it will

contribute to the upliftment of the community through the provision of infrastructure and services in the form of bulk water services in the area.

36 Period for which the Environmental Authorization is required

It is proposed that the construction of the pipelines be completed within twelve (12) months of commencement of construction works, however a contingency has been provided should delays be experienced (due to economic circumstances, adverse weather conditions or other unforeseen circumstances). Therefore, the authorization to complete the construction phase should be valid for 10 years. It is unknown how long the pipelines will operate for therefore authorization for the operation of the pipeline should be authorized indefinitely until the pipeline is no longer required and is decommissioned.

37 Environmental Management Programme (EMPr)

If the EAP answers “Yes” to Point 37 above, then an EMP is to be attached to this report as an Appendix ([See Appendix H](#))

EMPr attached	✓
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38 Undertaking

The EAP herewith confirms: -

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the Environmental Assessment Practitioner:	
Name of Company	Muny Consultants (Pty) Ltd
Date	February 2020

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Outfall Sewer, **Gauteng**

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Appendix A: Site Plans

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Appendix B: Site Photographs

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Appendix C: Facility Illustration

Appendix D: Route Position

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Appendix E: Public Participation Process

Appendix E 1: Stakeholder Database

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Appendix E 2: Background Information Letter

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Appendix E 3: Advertisement

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Appendix F: Water Use Authorisation Report

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Appendix G: Specialists Reports

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Appendix G 1: Wetland Impact Assessment

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Appendix G 2: Biodiversity Impact Assessment

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Appendix G 3: Heritage Impact Assessment

Appendix G 4: Paleontological Impact Assessment

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Appendix G 5: GeoTechnical Assessment

Appendix H: Environmental Management Programme

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