DRAFT BASIC ASSESSMENT FOR THE PROPOSED STORMILL EXT. 2 SEWER PIPE REPLACEMENT, CITY OF JOHANNESBURG, GAUTENG PROVINCE

GDARD REFERENCE NO.: GAUT 002/20-21/E2710

DATE: October 2020




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GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014 (Version 1)

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.

2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

3. **A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.**

4. **A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.**

5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.

6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.

8. An incomplete report may lead to an application for environmental authorisation being refused.

9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**

10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.

11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.

12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.

13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

DEPARTMENTAL DETAILS

Gauteng Department of Agriculture and Rural Development
Attention: Administrative Unit of the of the Environmental Affairs Branch
P.O. Box 8769
Johannesburg
2000

Administrative Unit of the of the Environmental Affairs Branch
Ground floor Diamond Building
11 Diagonal Street, Johannesburg

Administrative Unit telephone number: (011) 240 3377
Department central telephone number: (011) 240 2500

(For official use only)

NEAS Reference Number:						
File Reference Number:						
Application Number:						
Date Received:						

If this BAR has not been submitted within 90 days of receipt of the application by the competent authority and permission was not requested to submit within 140 days, please indicate the reasons for not submitting within time frame.

N/A – This is a Draft Basic Assessment Report

Is a closure plan applicable for this application and has it been included in this report? **NO**

if not, state reasons for not including the closure plan.

Decommissioning and closure phase has not been considered as part of this application as the end use of the site and required decommissioning activities are not known at this time. In addition, the current environmental baseline conditions may change overtime; it is therefore not possible to predict the potential environmental impacts. In addition, it is unlikely that decommissioning will be contemplated due to the nature of the development. However, closure and decommissioning would require a separate EIA process. If decommissioning is considered in future, the developer/ license holder will undertake the required actions by applying for decommissioning.

Has a draft report for this application been submitted to a competent authority and all State Departments administering a law relating to a matter likely to be affected as a result of this activity? **YES**

Is a list of the State Departments referred to above attached to this report including their full contact details and contact person? **YES**

If no, state reasons for not attaching the list.

Have State Departments including the competent authority commented? **N/A**

If no, why?

The Report is currently in the Draft (BAR) phase and is being released to the public and state departments for review and comments. Comments received during this phase will be included in the Final Basic Assessment Report.

I. PROJECT DETAILS

Report Title	:	Basic Assessment Report
Report Status	:	Draft
Review Period	:	20 October 2020 – 19 November 2020
Project Title	:	The Proposed Stormill Ext. 2 Sewer Pipe Replacement, City of Johannesburg, Gauteng Province
Applicant	:	Johannesburg Water SOC Ltd
Environmental Consultant	:	Envirolution Consulting (Pty) Ltd
GDARD Reference No.:	:	GAUT 002/20-21/E2710

II. DOCUMENT CONTROL

PREPARED BY:

Sameera Ismail
(MA Environmental Management)

REVIEWED BY:

Karthigesan Govender
(Pr.Sci.Nat. No: 400049/12)

III. DECLARATION

Envirolution Consulting Pty Ltd was contracted by Johannesburg Water SOC Ltd (hereinafter referred to as Johannesburg Water) as the independent environmental consultant to undertake the Environmental Basic Assessment process for the proposed project. Envirolution Consulting (Pty) Ltd is not a subsidiary of, or affiliated to Johannesburg Water. Furthermore, Envirolution Consulting does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

IV. APPLICANT DETAILS

Name of applicant:	Johannesburg Water SOC Ltd
Applicant representative:	Thendo Makuya
Position:	Environmental Manager
Contact number/s:	011 688 1443 / 1716
E-mail address:	thendo.makuya@jwater.co.za ; joyce.ngobele@jwater.co.za
Physical address:	17 Harrison Street, Marshalltown, Johannesburg, 2000
Postal address:	PO BOX 61542 Marshalltown, 2107

V. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)'s DETAILS

Environmental Assessment Practitioner (EAP):	Karthigesan Govender		
Contact person:	Sameera Ismail		
Postal address:	PO Box 1898, Sunninghill		
Postal code:	2157		
Telephone:	(0861) 444499	Cell:	083 419 8905
E-mail:	gesan@envirolution.co.za	Fax:	(086) 162 62 22
EAP Qualifications	BSc. Honours Botany		
EAP Registrations/ Associations	Registered with the South African Council for Natural Scientific Professions (No: 400049/12) and the Environmental Assessment Practitioners Association of South Africa (No: 2019/317).		

Details of the EAP's expertise to carry out Basic Assessment procedures

The EAPs from Envirolution Consulting who are responsible for this project are (refer to **Appendix I** for CVs):

- Karthigesan Govender – The principle Environmental Assessment Practitioner (EAP) for this project is a registered Professional Natural Scientist and holds an Honours Degree in Botany. He has over 19 years of experience within the field of environmental management. His key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline

development. He is currently responsible for the project management of EIAs for several diverse projects across the country.

- Sameera Ismail – The principle author of this Basic Assessment Report, holds a MA Environmental Management degree from the University of Johannesburg. She has 4 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; the identification of environmental management solutions and mitigation/risk minimising measures; and Water Use License processes. Sameera is currently a Project Manager and Environmental Consultant at Envirolution Consulting Pty Ltd.

VI. SPECIALIST'S DETAILS

Name of Specialist	Title of specialist report/ s as attached in Appendix G	Date issued
Limosella Consulting	Wetland/Riparian Delineation and Functional Assessment	October 2020
	General Wetland Rehabilitation and Monitoring Plan	October 2020
Dimela Eco Consulting	Vegetation Assessment	October 2020
J A van Schalkwyk	Heritage Impact Assessment	March 2020

ABBREVIATIONS

BAR	Basic Assessment Report
CoJ	City of Johannesburg
DBAR	Draft Basic Assessment Report
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
FBAR	Final Basic Assessment Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
JW	Johannesburg Water (SOC) Ltd
NEMA	National Environmental Management Act (Act No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SMP	Stormwater Management Plan
WULA	Water Use License Application

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SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

1.1 Project Title

The Proposed Stormill Ext. 2 Sewer Pipe Replacement, City of Johannesburg, Gauteng Province.

1.2 Background

Pipe replacement programme within the City of Johannesburg is one of the key strategies aimed at combating the problem of aging sewer infrastructure and improving the level of service to the residents of the City. In order to create an objective pipe replacement priority list, Johannesburg Water Infrastructure Planning Section commissioned a desktop study to identify areas requiring urgent pipe replacement interventions. From the investigation and assessment, ageing is the main contributing factor to the frequent pipe blockages and bursts as most of the pipes have reached their useful life (RUL).

A Project Charter was compiled by Johannesburg Water Infrastructure Planning requesting for the replacement of the existing vitrified clay pipes with HDPE PE100 PN8 sewer pipe within the streets of Spyker, Spokeshave, Staal and Shaft in Stormill Ext 2 by means of pipe cracking/bursting. The sewer replacement project in Stormill Ext 2 is based on a collection of the extent of sewer failure experiences in certain network and collector pipes within the entire area. The existing pipeline was laid in 1975, thus has exceeded the 40 year design life span.

1.3 Project Description

The total length of the water pipe replacement is approximately 2124m. The replacement is of the 150mm Ø and 200mm Ø existing vitrified clay pipes with 1310m of 160mm Ø HDPE PE100 PN8 sewer pipe and 814m of 200mm Ø HDPE PE100 PN8 sewer pipe.

The scope of works also includes:

- Dealing with sewage flow during construction.
- Location and protection of existing services in the area.
- Repair and reinstatement of existing manholes.
- Reconnecting to the existing sewer.
- Reinstatement of any damaged surfaces.
- Reconnection of erf connections to the new system.
- Excavation of trenches for launching and receiving points.
- Tying in the new sewer pipes to existing pipes.

It is important to note, a wetland area and its buffer is located at the back of the houses along Spyker Crescent which is towards the east of the study area. This section of the pipe upgrade falls within the wetland buffer as well as the floodline of the river. The pipeline areas where upgrades and replacement are required within the wetland area and its buffers and the floodline are being applied for in this application. The areas outside the watercourse do not trigger any listed activities and are thus not being applied for in this application.

1.4 Listed Activities

In terms of Sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as amended, and as read with Listing Notice 1 and Listing Notice 3 (Government Notices R. 327 and R. 324, in Government Gazette 40772 of 07 April 2017), the development will trigger a Basic Assessment process as per the following activities:

Table 1: Listed Activities

Indicate the number of the relevant Government Notice:	Activity No (s) (relevant notice): e.g. Listing notices 1, 2 or 3	Describe each listed activity as per the wording in the listing notices:
GN 983 of 08 Dec 2014, as amended (327 of 07 April 2017)	Listing Notice 1	**Activity 19:** The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells grit, pebbles or rock of more than 10 cubic metres from a watercourse. *The proposed project may result in infilling or removal of more than 10m³ or more of material into/from a watercourse during the replacement upgrade of the sewer pipe and associated infrastructure.*
GNR 985 of 08 Dec 2014, as amended (324 of 07 April 2017)	Listing Notice 3	**Activity 12:** 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 c. Gauteng ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans. *There is vegetation coverage adjacent to the proposed works areas (and as a result of the wetland area). The clearance of vegetation of approximately 300 square metres may occur within the wetland and buffer area. A section of the proposed activities falls directly adjacent to an Important Area and is within close proximity to an Ecological Support Area.*
GNR 985 of 08 Dec 2014, as amended (324 of 07 April 2017)	Listing Notice 3	**Activity 14:** The development of:– (xii) infrastructure or structures with a physical footprint of 10 square meters or more – where such development occurs - a) within a watercourse; b) In Gauteng:

		iv. sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) Gauteng Conservation Plan or in bioregional plans. *The physical combined footprint of the proposed works is over ± 10m² directly adjacent to a wetland area, an area identified as sensitive area, and to an Important Area and is within close proximity to an Ecological Support Area as per the Gauteng Conservation Plan.* *The development will occur within close proximity to a wetland area which is regarded as a sensitive area protected by the National Water Act (Act No. 36 of 1998).*
GNR 985 of 08 Dec 2014, as amended (324 of 07 April 2017)	Listing Notice 3	**Activity 23:** The expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse. **c. Gauteng** (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans. *The physical combined footprint is to be expanded by over ± 10m² adjacent to a wetland area, an area identified as sensitive area, and to an Important Area and is within close proximity to an Ecological Support Area as per the Gauteng Conservation Plan.* *The development will occur within close proximity to a wetland area which is regarded as a sensitive area protected by the National Water Act (Act No. 36 of 1998).*

1.5 Locality of study site

The proposed works are to take place along Shaft Street, Spokeshave Street, Staal Road and Spyker Crescent in the suburb of Stormill Ext 2, Roodepoort, approximately 12km west of Johannesburg CBD, Gauteng Province under Region C of the City of Johannesburg. The main areas surrounding the proposed project include Orlando, Florida, Westdene, Industria and Diepkloof. The central GPS coordinates of the site are 26°12'16.16"S 27°56'44.22"E. Refer to Figure 1 below for the locality map.

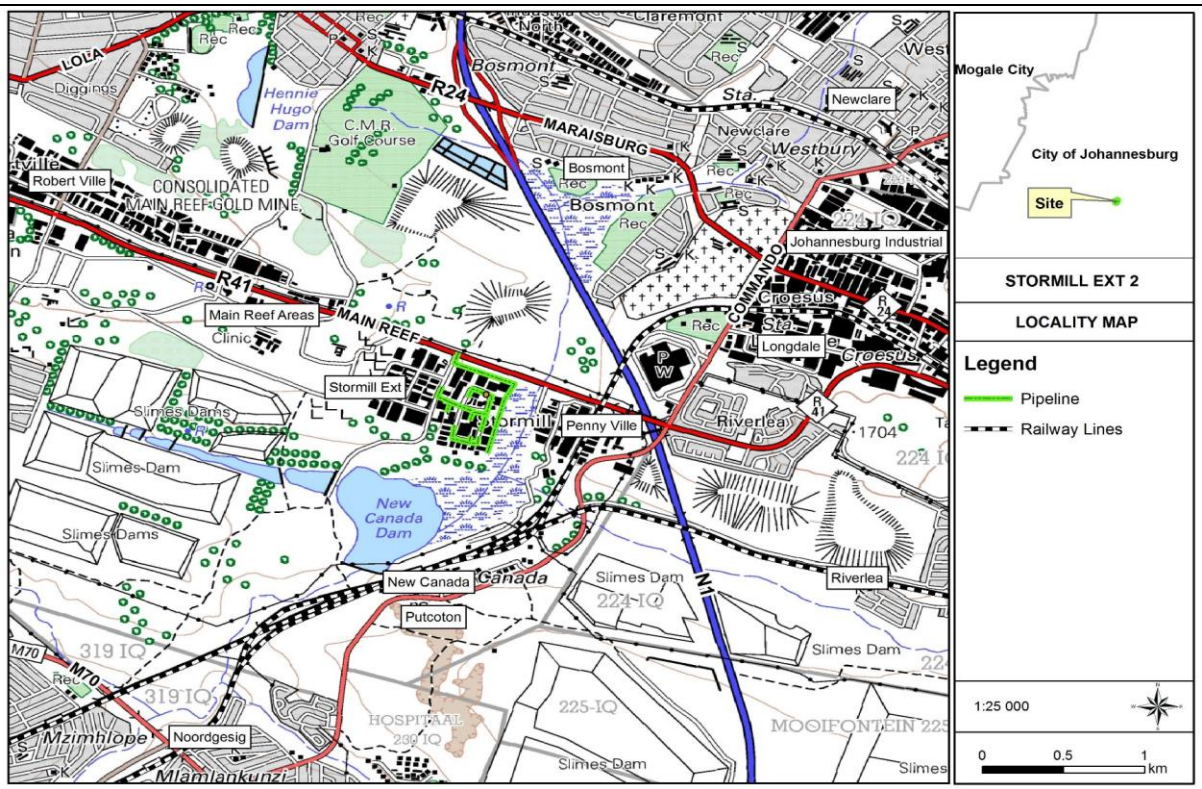


Figure 1: Locality Map

Select the appropriate box

The application is for an upgrade of an existing development	✓	The application is for a new development	[redacted]	Other, specify	[redacted]

Does the activity also require any authorisation other than NEMA EIA authorisation?

[redacted]	YES ✓

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

A section of the sewer pipeline will be crossing a watercourse/ wetland area. It is for such reasons that a Water Use License application process has to be undertaken for the development. According to the National Water Act (NWA), 1998 (Act No. 36 of 1998), the proposed development requires a Water Use License as per the following regulations:

- Section 21(c): Impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse.

The Competent Authority responsible for issuing Water Use Licenses is the Department of Water and Sanitation (DWS).

If yes, have you applied for the authorisation(s)?	YES	
If yes, have you received approval(s)? (attach in appropriate appendix)		NO

A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal. Refer to **Appendix F** for proof thereof. Impacts on the watercourse have been assessed through the Basic Assessment process (**Appendix G1** – Wetland Report). The following reports/ studies as outlined below will be required to be uploaded with the Water Use License Application:

- Basic Assessment Report;
- Wetland Assessment Report;
- Risk Assessment; and
- General Wetland Rehabilitation and Monitoring Plan.

The nature and characteristic of the proposed project may not commence without an environmental authorisation from the competent authority, Gauteng Department of Agriculture and Rural Development (GDARD). It is for this reason that a Basic Assessment Process is being conducted and to ensure that:

- The potential environmental impacts associated with the proposed project are taken into consideration;
- Public Participation is conducted i.e. to afford any Interested and/ or Affected Parties (I&APs) sufficient opportunity to provide comments; and
- Sufficient information is provided to the competent authority for an informed record of decision.

2. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

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

Table 2: Applicable Legislation, Policies and/or Guidelines

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
National Environmental Management Act (Act No. 107 of 1998)	NEMA requires, inter alia, that: • Development must be socially, environmentally, and economically sustainable. • Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. • Risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.	National Department of Agriculture, Forestry and Fisheries (DAFF) Gauteng Department of Agriculture and Rural Development (GDARD)	The Basic Assessment is undertaken in accordance with the requirements of Government Notice R982 of December 2014, as required in terms of the National Environmental Management, 1998 (Act No. 107 of 1998).
National Environmental Management Act (Act No. 107 of 1998)	A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts. In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.	National Department of Agriculture, Forestry and Fisheries (DAFF) Gauteng Department of Agriculture and Rural Development (GDARD)	While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the impact assessment phase.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
			The implementation of mitigation measures is included as part of the Project EMPr and will continue to apply throughout the life cycle of the project.
National Water Act (Act No. 36 of 1998)	Section 21 water uses as per the NWA includes: 21(a): Taking water from a water resource; 21(b): Storing water; 21(c): Impeding or diverting the flow of water in a watercourse; 21(d): Engaging in a stream flow reduction activity; 21(e): Engaging in a controlled activity; 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit; 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource; 21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process; 21(i): Altering the bed, banks, course or characteristics of a watercourse; 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and 21(k): Using water for recreational purposes.	Department of Water and Sanitation (DWS)	The proposed development requires a Water Use License as Section 21 c and i of the NWA are triggered as a result of the proximity to a wetland. A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	For wetland areas, development within a 500m buffer triggers the act. For rivers, development within a 100m buffer triggers the act. Any activity that triggers any of the above water uses will require a Water Use License. Given the sensitivity associated with a project, DWS will determine whether the project will follow a General Authorisation process or a Water Use License Application process.		
National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)	This Act provides management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act (Act No. 107 of 1998); the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project in proper management of the sensitive area (wetland) identified on site.
National Environmental Management: Waste Act (Act No. 59 of 2008)	The NEMA: WA came into effect on the on 1st July 2009. Section 20 of the Environment Conservation Act (Act No. 73 of 1989), under which waste management was previously governed, was repealed. In general, the act seeks to ensure that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the constitution, in ensuring an environment that is not harmful to health and wellbeing.	Department of Agriculture, Forestry and Fisheries (DAFF) National Department of Environmental Affairs – lead authority for regulating hazardous waste. Provincial Environmental	No waste license activities are applicable to this project. The developer will however be required to store and manage waste in accordance with the requirements of this Act and associated Standards.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
		Department – for regulating general waste	
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Section 18, 19 and 20 of the Act allow certain areas to be declared and managed as "priority areas". The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. Dust Control Regulation Control Regulations, R. No. 827 of 1 November 2013.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation for the site, this Act will find application during the construction phase of the project. The implementation of dust mitigation measures are included as part of the project EMPr and will continue to apply throughout the life cycle of the project. Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan
National Heritage Resource Act, 1999 (Act No. 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including the construction of a road, exceeding 300m in length. In accordance with the NHRA, an independent heritage consultant is to conduct a cultural heritage assessment to determine any impact on any sites, features or objects of cultural heritage significance. If none are identified, any archaeological sites or graves to be exposed	South African Heritage Resources Association (SAHRA) Provincial Heritage Resource Authority	Should any heritage sites be unearthed during excavations, a permit would be required to be obtained from SAHRA.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	during construction work must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. If a permit is required as per section 34 of the NHRA, no works are to commence before the permit is obtained.	Gauteng (PHRAG)	
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	Legislation that allows the public access to information about activities that influence their well-being and to make contributions to decision making.	Department of Agriculture, Forestry and Fisheries (DAFF)	No permitting is required. The act finds applicability during the public participation process phase of the Basic Assessment process.
Occupational Health and Safety Act (Act No. 85 of 1993)	The Occupational Health and Safety Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.	Department of Labour	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. Health and safety precautions measures must be put in place for the construction crew and the general public. E.g. Protection of workers on site through provision of Personal Protective Equipment's; Training and other health and safety amenities.

3. ALTERNATIVES

Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is 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.

Provide a description of the alternatives considered

Table 3: Description of Alternatives

No.	Alternative type, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
1.	**Site Alternatives**	There are no site alternatives as the sewer pipe infrastructure in Stormill Ext 2 itself requires rehabilitation and upgrading given the current state.
2.	**Method Alternatives**	**Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)** The proposed sewer line is located within the midblock. When pipe cracking the existing sewer the new sewer will be installed in the same alignment and slope of the existing sewer with the flowing sewer over-pumped from one manhole to the other. This method is preferred where there are services underneath and within stand boundaries as well as road crossings. This method has minimal disruption to the existing services and man-made features.
		Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve This alternative involves moving the existing midblock pipelines to the road reserve. This gives access to the pipeline and manholes for maintenance purposes in case of blockages since it has been found that it is not easy for operations to access the midblock pipeline. The stands are big and pipeline connections are at the back side of the business premises. This alternative will require long connections which may not have the required slopes thereby compromising on standards and pose potential sewer overflows in the properties.

		In some areas there are also services and big trees on the road reserve which limits the space to relocate the pipelines to the road reserves. Therefore, this alternative is not preferred.
3	**No-go Alternative**	This alternative is a no action plan, meaning nothing will be done to address the current situation. The remaining useful life (RUL) of the existing pipe has been reached and pipes will no longer have structural integrity which will pose serious health and occupational as well as environmental consequences. This alternative is not acceptable since the situation requires urgent attention.

Detailed Design of Preferred Alternative – Pipe cracking of existing sewer line

1. Design Philosophy

The installation of all new sewer infrastructure shall be in accordance with the recent Johannesburg Water's Guidelines and Standards for the Design and Maintenance of Water and Sanitation Services, 2013 Version 1. The Guidelines for Human Settlement Planning and Design shall be used to cover any aspects not properly covered in the Johannesburg Water's Guidelines.

2. Design Criteria

The design of the sewer pipe replacement is in accordance with Johannesburg Water's Guidelines and Standards for the Design and Maintenance of Water and Sanitation Services. Reference was also made to the Guidelines for Human Settlement Planning and Design (Red Book).

The following parameters were adopted for the design and the construction thereof:

Table 4: Sewage Design Parameters

Parameter	Description	Design Guideline
Sanitation system	Level of service	Standard level
Minimum velocity at full flow	Gravity sewers	0,7 m/s
Maximum velocity	Gravity sewers	3,0 m/s
Peak Factor	Low income areas	2.5
Stormwater infiltration (extraneous flow)		15%
Pipe Capacity	Flow level in pipe	67% of pipe Ø at design peak flow
Hydraulic Calculations	Manning equation	n = 0,009 for HDPE
Pipe Material		HDPE PE 100 PN 10
Design Flows		Calculated and IMQS inflows were used and higher values were used for analysis. Calculated flows were based on the JW Guidelines.
Locations of Sewers and manholes		As per Layout Plan attached within Appendix C.
Minimum cover over pipe[1]	In road reserves	1.4m
	Other areas	1.0m

[1] Where cover is less than the indicated depth, gabions and reno mattresses and selected or imported filled will be used.

Manholes	Spacing	80m maximum
	Material	Minimum 1.05m Ø or 1.5m Ø precast concrete with steps and concrete steel lipped covers for manhole depth deeper than 3m.

Refer to **Appendix C** for the Layout Plan.

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

[redacted]

4. PHYSICAL SIZE OF THE ACTIVITY

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

	Size of the activity:
Proposed activity (Alternative 1 – preferred)	[redacted]
Alternative 2	
Alternative 3	

m^2

or, for linear activities:

	Length of the activity:
Proposed activity (All Method Alternatives)	+/-2124m
Alternative 3	[redacted]

m/km

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

	Size of the site/servitude:
Proposed activity	2m
Alternative	[redacted]

Ha/m^2

Servitude

In accordance with the Johannesburg Water Design Standards, the minimum acceptable width for pipes not exceeding 200mm diameter is 2 meters. For large diameter pipes as well as for trenches deeper than 1.5m, the servitude width shall be calculated using the following formula:

$ws = \Theta + 2d$

Where, ws is the servitude width, Θ is the pipe diameter and d is the trench depth

In this instance the pipes on the layout plans are not greater than 200mm in diameter; therefore, the width of the servitude is 2 meters.

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	[redacted]
Describe the type of access road planned:	

Maximum use of existing roads shall be made.

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).

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

Section A 6-8 has been duplicated [redacted] 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)
- shape files` 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;
- 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 IS 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.

The Locality Map and Sensitivity Maps for the proposed development are attached within **Appendix A**.

7. SITE PHOTOGRAPHS

Colour photographs from the center of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under the appropriate Appendix. It should be supplemented with additional photographs of relevant features on the site, where applicable.

Site photographs are attached within **Appendix B**.

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity to be attached in the appropriate Appendix.

The layout plan of the proposed replacement and upgrade is included within **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 of the route | 0 | times

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 alterative 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 alternatives | 0 | times | (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 is to be 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 | [redacted] | (complete only when appropriate for above)

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

It is worth noting that all method alternatives are proposed in the same receiving environment and therefore will be assessed together as impacts will be similar. It is for this reason that the section will not be duplicated.

1. PROPERTY DESCRIPTION

Property description: (Including Physical Address and Farm name, portion etc.)	The proposed sewer pipeline network in Stormill Ext 2 is to be constructed on Paardekraal 226 IQ, Portion 153.

2. 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.

Proposed Activity:	**Latitude (S):**	**Longitude (E):**
Centre point of the activity	26°12'16.16"S	27°56'44.22"E

In the case of linear activities:

Proposed Activity:	Latitude (S):	Longitude (E):
▪ Starting point of the activity	[redacted]	[redacted]
▪ Middle point of the activity	[redacted]	[redacted]
▪ End point of the activity	[redacted]	[redacted]

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. Please find attached in

Addendum of route alternatives attached [redacted]

The 21 digit Surveyor General code of each cadastral land parcel

Farm/Erf Number:	**Portion:**	**SG Codes:**
Paardekraal 226 IQ	153	T0IQ00000000022600153

3. GRADIENT OF THE SITE

Indicate the general gradient of the site.

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

4. 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**

5. 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 [redacted]

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

(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

Hydrology

The site is situated in the C22A Quaternary Catchment. In this catchment, the precipitation rate is considerably lower than the evaporation rate with a Mean Annual Precipitation (MAP) to Potential Evapotranspiration (PET) of 0.32 for Quaternary Catchment C22A. Consequently, wetlands in this area are sensitive to changes in regional hydrology, particularly where their catchment becomes transformed and the water available to sustain them becomes redirected.

Nine Water Management Areas (WMA) were established by, and their boundaries defined in Government Gazette Nr. 40279, dated 16 September 2016. Quaternary Catchment C22A falls within the fifth WMA, the Vaal Major (West) and Marico. The major rivers that are located within this WMA include the Wilge-, Liebenbergsvlei-, Mooi-, Renoster-, Vals-, Sand-, Vet-, Harts-, Molopo and Vaal River.

The watercourse flows directly east of the pipeline network. The watercourse historically drained into the New Canada Dam south of the site. However, flood water and erosion has seemingly altered the flow of water through the wetland area. The wetland forms a tributary of the Klip River. The Klip River lies approximately 13km south of

the site. The Klip River eventually confluences with the Vaal River. This river of strategic importance is the third largest river in South Africa after the Orange River (2200 km long) and the Limpopo River (1750 km long) and was established as the main source of water for the great Witswatersrand area after the gold rush during the 19th Century. The wetland vegetation group of the study area is Mesic Highveld Grassland Group 3.

Refer to Figure 2 below which depicts the pipeline in relation to the hydrological network within the surrounding area. Figure 3 below depicts the wetland delineation map which indicates the pipeline location in relation to the 30m and 500m buffers.

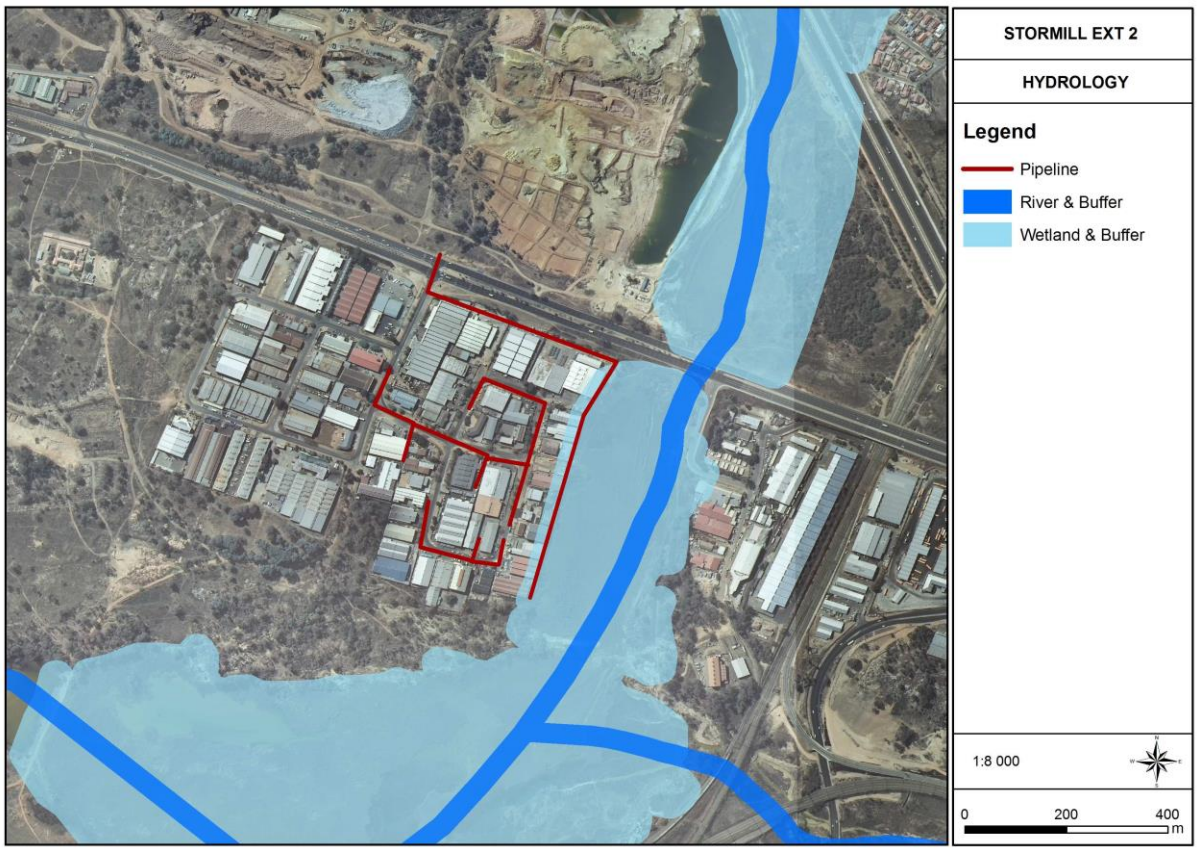


Figure 2: Hydrology Map

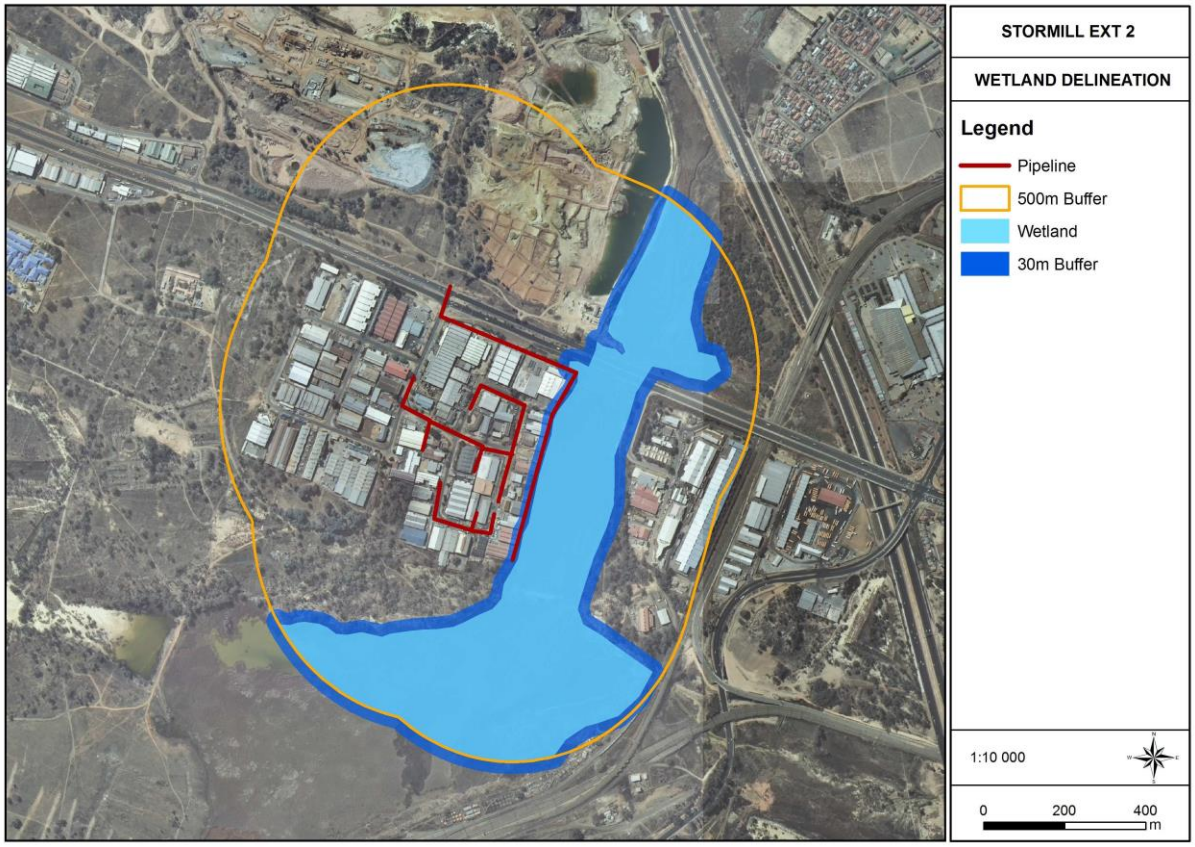


Figure 3: Wetland Map

The Unchannelled Valley Bottom wetland scored a PES of 7.5 (**E – Largely Modified)**. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable. The wetland conditions recorded on the study site are likely to remain stable over the next 5 years.

The EIS score of **0.5** for all the wetlands fall into a category characterised by **Low** ecological importance and sensitivity. Wetlands that fall into this category are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers.

The Recommended Ecological Category (REC) score is **D**.

Table 5 below provides a summary of the results recorded for the wetland unit potentially affected by the proposed pipeline upgrade.

Table 5: Summary of results for wetland unit

Classification (SANBI, 2013)	PES (Macfarlane *et al*, 2007)	EIS (DWAF, 1999)	WetEcoServices (3 most prominent scores)	Buffer (Macfarlane et al 2015)	REC
Channelled Valley Bottom	7.5 E	0.5 (D - Low)	Flood attenuation – 3.0 Toxicant removal – 3.2 Sediment trapping – 3.5	30 m	D

Geology and Soils

The Jeppestown Subgroup of the lower West Rand Group underlies the entire study site. The soil of the area is summarised in Table 6 and Figure 4 below.

Table 6: Soil of Study Area

Soil Name	Description	Relation to wetlands
U	Unconsolidated/Urban Soil Usually considered a disturbed soil which no longer retains recognizable profiles following anthropogenic disturbance.	None

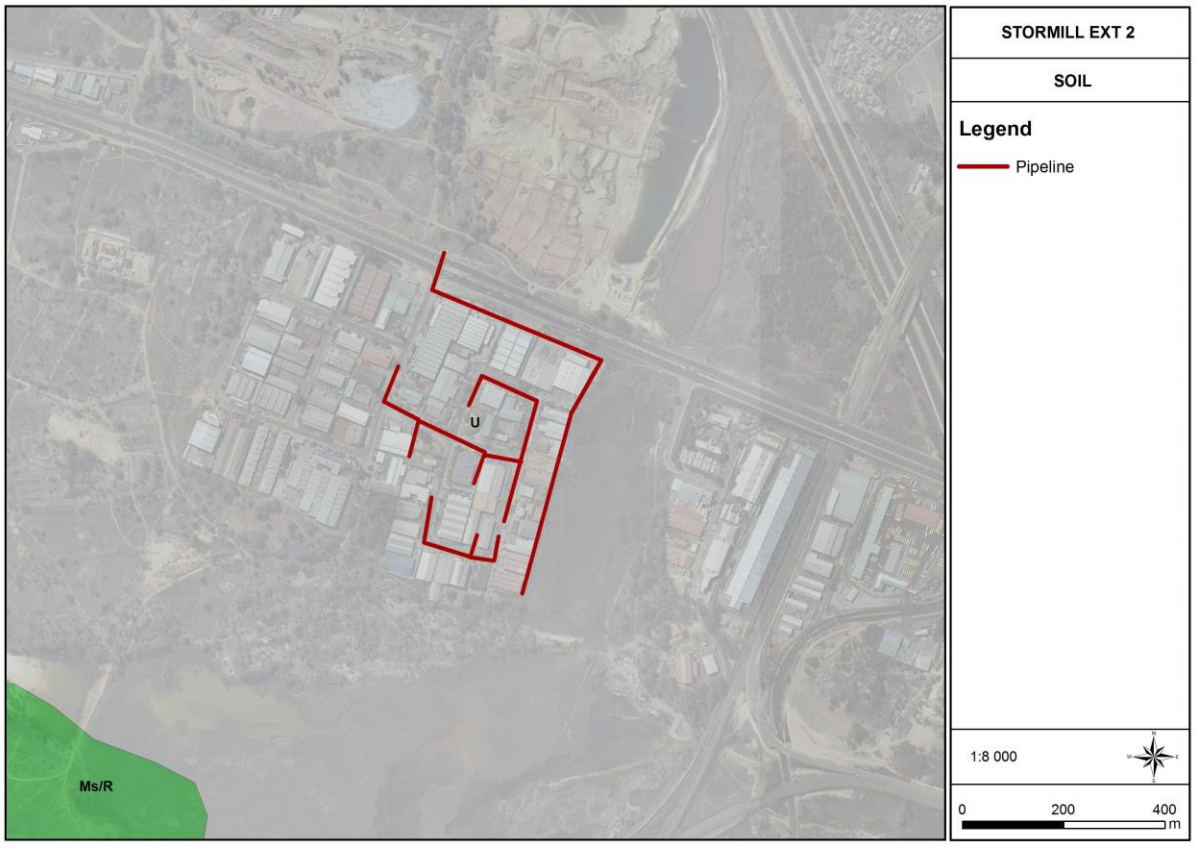


Figure 4: Soil of study area

Refer to **Appendix G1 – Wetland Assessment** for full report.

6. 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.

7. 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 - good condition % =	**Natural veld with scattered aliens % = 5%**	**Natural veld with heavy alien infestation % = 5%**	Veld dominated by alien species % =	**Landscaped (vegetation) % = 5%**
Sport field % =	Cultivated land % =	**Paved surface (hard landscaping) % = 80%**	**Building or other structure % = 5%**	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:

Regional Vegetation

The pipeline project falls within the Grassland Biome. The Grassland Biome comprises several vegetation types of which the Soweto Highveld Grassland underlies the project area. This vegetation type is greatly transformed and classified as being Endangered. The vegetation grows on gently to moderately undulating landscapes of the Highveld Plateau and supports short to medium-high, dense, tufted grassland, dominated by a variety of grass,

mainly *Themeda triandra*.

Protected areas within 10km of site

The nearest Protected Area (PA) is the Melville Koppies Nature Reserve, situated about 7km north-east of Stormill Ext. 2. No National Protected Areas Expansion Strategy (NPAES) areas occur within 10km of site.

Ecological drivers and processes

Grassland experiences summer rainfall and dry winters with frost (and fire), which are unfavourable to tree growth. Therefore, grasslands comprise mainly of grasses and plants with perennial underground storage organs, for example bulbs, tubers and suffrutex species. In some grassland areas, the surface topography (e.g. rocky hills and protected valleys) creates habitats that are favourable to shrublands and trees.

The permanence of water within and along the wetland will greatly determine the vegetation species present. Reeds and tall grasses (e.g. Phragmites) favour the permanently wet areas where water tends to flow faster. Whereas smaller forb species colonise temporary wet areas along watercourses.

Listed Ecosystems

The South African Biodiversity Act (Act No. 10 of 2004) provides for the listing of threatened or protected ecosystems. These ecosystems are grouped into Critically Endangered-, Endangered-, Vulnerable- and Protected Ecosystems (Section 52(1) (a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011).

The pipeline project area falls within the historical extent of Kliprivier Highveld Grassland, listed as a Critically Endangered Ecosystem. However, the vegetation along the pipeline network has been built-up and natural to semi-natural vegetation are present along the watercourse east of the pipeline network.

Gauteng Ridge Policy

Ridges are protected environments within Gauteng. Development on ridges and buffer zones of ridges are restricted, depending on the classification of each ridge. The Gauteng Development Guideline for Ridges classified ridges into four classes based on the percentage of the ridge that has been transformed. No ridges overlap the project area.

Gauteng Conservation Plan

The Gauteng Conservation Plan (Version 3.3) classifies areas within the province based on the contribution to reach the conservation targets within the province. These areas are grouped as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). The CBAs comprise 'Irreplaceable' areas that must be conserved

and areas classified as 'Important' to reach the conservation targets of the Province. ESA's are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless plays an important role in supporting the ecological functioning of CBA's and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration to ensure sustainability in the long term.

According to the Gauteng Conservation Plan (Version 3.3) the wetland area east and south of the site is classified as an Important Area. The CBA offers natural to semi-natural vegetation and potential habitat to near-threatened plant species. Most of the surrounding open space is classified as ESAs. The bulk of the pipeline network is not considered natural habitat and are not classified as conservation concern. Refer to Figure 5 below.

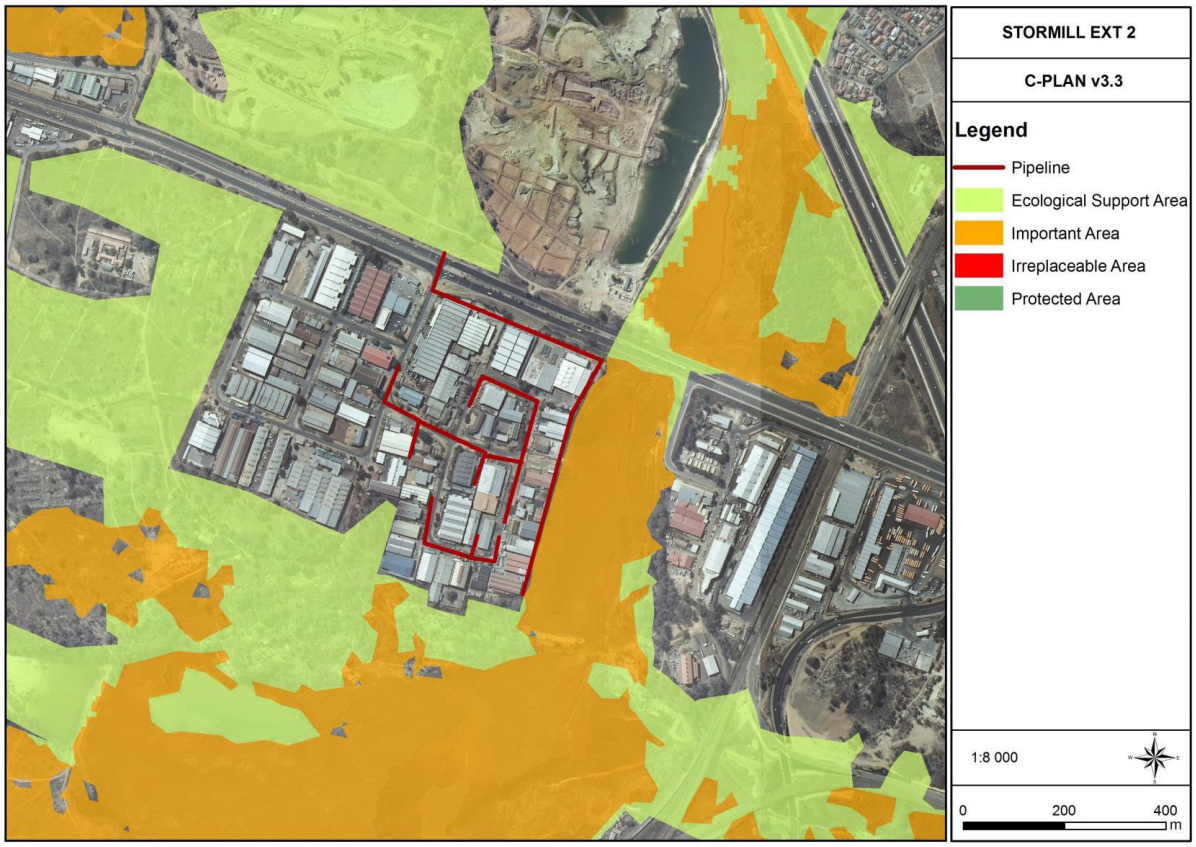


Figure 5: Gauteng Conservation Areas associated with the study site

Vegetation Survey Overview

The bulk of the pipeline network traverses built-up areas where the vegetation is modified, and no natural vegetation remains. Modified landscapes are regarded as areas where the vegetation structure and composition have been compromised and are not representative of the reference state, in this case Soweto Highveld Grassland.

Several indigenous trees were recorded on sidewalks and within developed properties; however, none that could be seen from accessible areas are threatened or protected. Modified vegetation is present along the boundary of

the built-up area with the wetland area, which was dominated by the grass *Phragmites australis* (commom reed). The only natural vegetation remaining is within the wetland area, east of the site. Vegetation within 30m of the route was mapped. Refer to Figure 6 below.

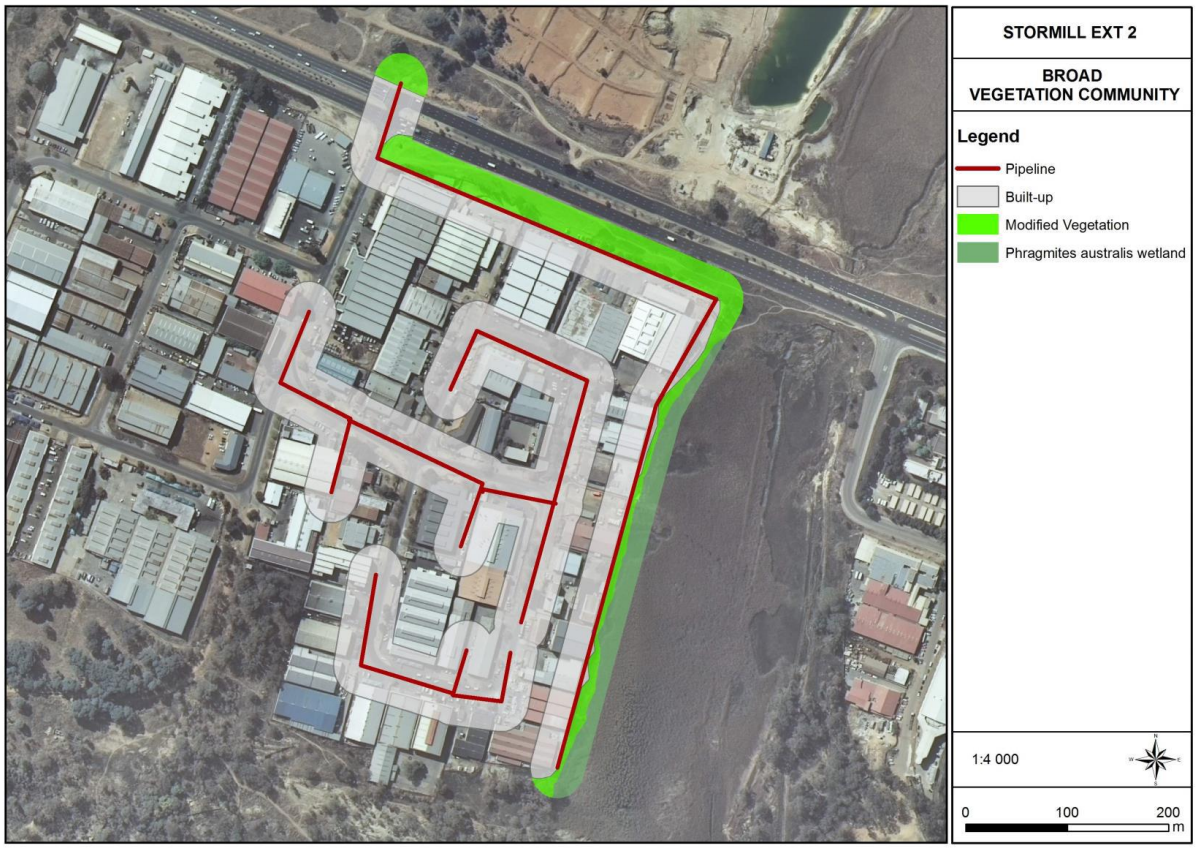


Figure 6: Vegetation along the pipeline network (mapped to 30m on either side of the route)

Plant species that were recorded at the time of the site visit are listed in Appendix B of the Vegetation Assessment Report attached as **Appendix G2** to this report. The following vegetation groups were delineated:

1. Irreversibly modified: sidewalks, paved- and built-up areas

Most of the vegetation along the proposed route was irreversibly modified from the natural state, with no natural vegetation remaining. Sidewalks comprised hard surfaces, weedy lawns or grass patches, trees, and some ornamental shrubs. Refer to Figure 7 below. The most common indigenous street tree noted was of the *Searsia* genus (karee). Exotic and invasive trees are most common and include *Grevillea robusta* (Australian silky oak), *Pinus* species (pine), *Celtis australis* (exotic stinkwood) and *Acacia melanoxylon* (blackwood).

Figure 7: Typical sidewalks within the project area

The main concern within the irreversibly modified: sidewalks and built-up areas is the health of indigenous trees within the development and along roads. No vegetation of concern was recorded or is expected to occur. The species diversity is poor and indigenous species are limited. The vegetation was irreversibly modified. Where lawns are present on the sidewalk, it does play a small role in groundwater recharge and soil stabilisation

2. Modified vegetation

The modified vegetation is discussed as the northern section (from directly south of Main Reef Road to north of Main Reef Road) and the modified vegetation on the border of the industrial area and the wetland. No plant species of conservation concern were recorded within the modified vegetation, due to ongoing trampling and dumping, as well as historic impacts from the development and border fences, it is highly unlikely that such species persist.

Northern section:

The northern portion of the pipeline network along Main Reef Road, comprise some semi-natural vegetation which has been modified. A portion of the pipeline traverses Main Reef Road. The vegetation in this most northern section is disturbed and degraded and pioneer grasses such as *Hyparrhenia hirta* (thatch grass), *Cynodon dactylon* (couch grass) and *Panicum ecklonii* were noted. Refer to Figure 8 below. The category 1b invasive tree *Ailanthus altissima* (tree of heaven) dominated the landscape. The area seems to be a servitude for existing pipelines and a powerline.

Figure 8: Most northern extent of the pipeline route where is crosses over Main Reed Road into degraded vegetation

South of Main Reef Road, the pipeline follows the border fences of industrial properties. The pipe seems to fall within landscaped gardens but the semi-natural vegetation outside of the fence will also be impacted on. Refer to Figure 9 below. Gardens included mostly exotic ornamentals, some of which has spread into the surrounding landscape e.g. *Cotoneaster* species. A footpath traverses the modified vegetation and grass species such as *Hyparrhenia hirta, Setaria sphacelata* (common bristle grass) and *Panicum maximum* (Guinea grass) were recorded. Tree cover was dominated by the category 1b invasive *Robinia pseudoacacia* (black locust tree) and *Acacia melanoxylon* (blackwood). Refer to Figure 10 below. The forb layer was dominated by weedy species such as *Tagetes minuta (khaki bush), Verbena bonariense* (verbena), *V tenuisecta, Plantago lanceolata (*narrow-leaved Plantain) and *Oenothera rosea* (rose evening primrose). One indigenous forb species, *Cucumis zeyheri* (wild cucumber), was noted in the modified vegetation.

Figure 9: Gardens within industrial properties (left) and the modified vegetation between Main Reed Road and the boundary of the Stormill industrial area

Figure 10: Modified vegetation between Main Reed Road and the boundary of the Stormill industrial area

Border of the industrial area and the wetland:

A footpath follows the border of the wetland with the industrial area. Refer to Figure 11 below. The wetland edge has been eroded in some areas and the soils around the footpath were compacted. Although the grass was burnt, the dominant species seems to be *Setaria incrassata*, along with species of the genus *Paspalum*. Limited forb species were recorded with *Lactuca inermis* being the only indigenous species.

Invasive species included *Agave* species, *Schinus molle* (pepper tree), *Celtis australis* (exotic stinkwood) and *Solanum mauritianum* (bugweed). The forb layer was dominated by *Verbena bonariensis*, which invaded the temporary moist areas along the wetland. Other weedy species included *Hypochaeris radiata* (wild lettuce) and *Plantago lanceolata*. The tall growing grass *Phragmites australis* was also present in the area, indicating that it is still part of the watercourse, although compacted and degraded.

Figure 11: Footpath

Southern tip of pipeline along the watercourse:

The most southern tip of the pipeline along the industrial and wetland border is situated in a degraded area. The indigenous grass *Imperata cylindrica* formed a patch here in moist, but disturbed soils. Large *Eucalyptus* trees were present as well as the invasive grass *Pennisetum clandestinum* (kikuyu). Refer to Figure 12 below.

Figure 12: The most southern tip of the pipeline within the wetland area

3. *Phragmites australis* wetland

The wetland area east of the pipeline network was entirely dominated by *Phragmites australis* (common reed) that grew densely in the permanently wetland areas, as well as along the wetland edge. This is depicted in Figure 13 below. This grass form stands and limited other species can compete. Therefore, the plant species diversity within *Phragmites* wetlands are typically low. However, *Phragmites* plays an important role in wetlands, particularly disturbed or impacted wetlands as it has an extensive root system that binds soils and prevents erosion. It can withstand high levels of environmental contamination and can assimilate heavy metals, nitrogen and phosphorous.

Figure 13: Dense stands of *Phragmites australis*

The northern extent of the *Phragmites* wetland included a remnant of a floodplain that has not eroded. Refer to Figure 14 below. This area was searched for plant species of conservation concern; however, none were noted. The forb layer was dominated by exotic and invasive species of *Raphanus rugosum* (wild mustard), *Chenopodium album* (white goosefoot), *Rumex crispus* (curly dock), *Capsella bursa-pastoris* (shepards's purse) and *Trifolium repens* (white clover).

Figure 14: Remnant wetland or floodplain vegetation along the edges of the *Phragmites* wetland, just south of Main Reef Road

No plant species of conservation concern were recorded. However, the floodplain area does provide suitable habitat to at least two plant species of conservation concern. These species may have been dormant at the time, although it is thought that they are unlikely to occur.

Plant Species of Conservation Concern

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining. Chapter 4, Part 2 of NEMA Biodiversity Act, 2004 (Act No. 10, 2004) provides for listing of species that are threatened or in need of protection to ensure their survival in the wild, while regulating the activities, including trade, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival.

A list of plants of conservation concern was compiled using information from the South African National Biodiversity Institute's (SANBI) checklist, Raimondo *et al*, (2009) and information received from the GDARD for the quarter degree square (qds) 2628BB. A list of seven plants of conservation concern that were previously recorded in the quarter degree square (qds) that the project area is situated in and for which suitable habitat is present within the study area is given in Appendix C of the Vegetation Assessment Report attached as **Appendix G2** to this report. None of these species were recorded in sampled areas. Although some species may have been dormant at the time of the assessment, it is thought that there is a medium to low possibility of occurring.

Pipe cracking should have a limited impact on the modified vegetation with limited to no impact on the *Phragmites* wetland which provides the suitable habitat to these species.

Protected plants

- NEMBA Threatened or Protected Plant Species (TOPS) – No TOPS species were recorded or are expected to occur.

- Provincially Protected Plants – No provincially protected plant species was recorded within the mapped 30m buffer.

Alien Invasive Plant Species

The alien plant species identified on the study site are listed in Appendix B of the Vegetation Report attached as **Appendix G2** to this report. Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

(a) notify the competent authority in writing

(b) take steps to manage the listed invasive species in compliance with

i. section 75 of the Act;
ii. the relevant invasive species management programme developed in terms of regulation 4; and
iii. any directive issued in terms of section 73(3) of the Act.

Several alien species were observed along the route. The category 1b invaders are listed in Table 7 below.

Table 7: Category 1b alien invasive species recorded along the route

Species	Common name
Ailanthus altissima	Tree of heaven / Hemelboom
Cotoneaster species	
Eucalyptus camaldulensis	Red River Gum
Pennisetum clandestinum	Kikuyu Grass
Robinia pseudoacacia	Black Locust Tree
Solanum mauritianum	Bugweed
Verbena bonariensis	Wild Verbena

Ecological Vulnerability and Importance

Low sensitivity: built-up areas

Most of the pipeline network traverses irreversibly modified land with planted gardens and trees, most of which is exotic and paved areas. The vegetation is modified from the reference state of Soweto Highveld Grassland and does not contribute to conservation of this type of grassland at all. Edge effects to other proximate sensitivity classes can be mitigated or prevented.

Low-medium sensitivity: modified vegetation in northern section of pipeline network

The modified vegetation north of the pipeline network is degraded with a low indigenous species diversity. It does play a role in ground water recharge; however, its conservation potential is limited. No plant species of

conservation concern were recorded here or are expected to occur.

Medium sensitivity: modified vegetation along the wetland edge

Although the species diversity was low within the modified vegetation along the wetland, it acts as buffer to the wetland area and protects the soil from erosion. Furthermore, the vegetation falls within a CBA and although not of conservation concern, its proximity to the wetland areas and the potential occurrence of plant species of conservation concern increases its importance. This vegetation will be impacted by pipe cracking as machinery and equipment will likely be moved along the edge of the wetland. Impacts must be strictly mitigated to prevent impacts and ensure successful rehabilitation of the vegetation post construction.

High sensitivity

The species diversity of the *Phragmites* wetland is typically low. However, the vegetation plays an important role in flood attenuation and water purification. Also, some floodplain patches could support plant species of conservation concern. This area is unlikely to be directly impacted on by pipe cracking; however, edge effects could have a significant impact and must be mitigated or prevented.

Table 8 below is a summary of the ecological vulnerability and importance associated with the broad vegetation community groups. This is also depicted in Figure 15 below.

Table 8: Scoring of vegetation that occur along the pipeline network

Broad vegetation community	Conservation Status of regional Vegetation* unit	Predominant state	Protection by legislation/ policies	Species of conservation concern	Ecological Function	Conservation Importance / unique habitat	Total Score out of max of 18	Importance and vulnerability
Irreversibly modified: sidewalks and built-up areas	N/A	0	0	0	1	0	1	Low-
Modified vegetation-north	2	0	2*	0	0	1	5	Low Medium
Modified vegetation-north	2	1	2*	1	2	2	10	Medium
Phragmites australis wetland	2	3	3#	1	3	3	15	High

*falls within an ESA / CBA

Water Act

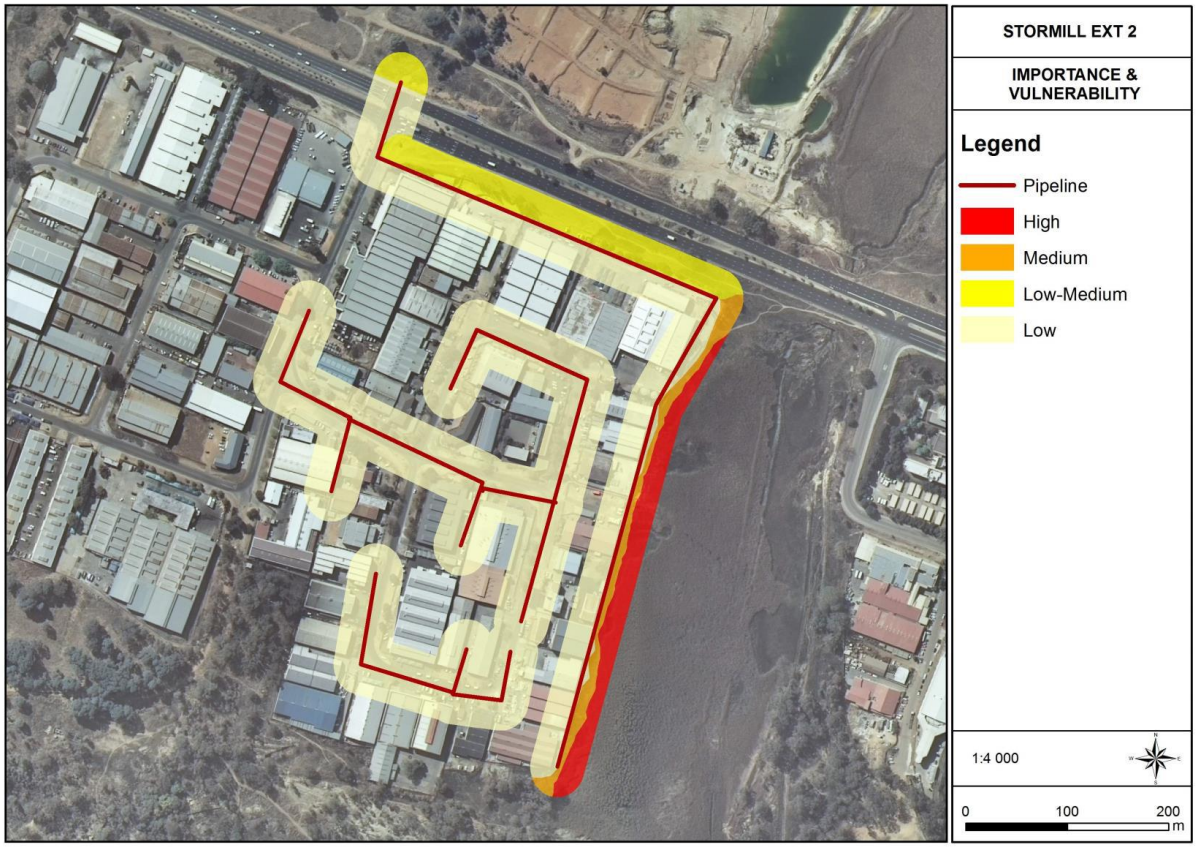


Figure 15: Sensitivity Map (mapped to 30m buffer around the route)

Refer to **Appendix G1 – Wetland Assessment** and **Appendix G2 – Vegetation Assessment** for full reports.

Was a specialist consulted to assist with completing this section YES [redacted]
If yes complete specialist details

1) Wetland Specialist

Name of the specialist:	Antoinette Bootsma		
Qualification(s) of the specialist:	B. Sc (Botany & Zoology) University of South Africa (1997 - 2001), B. Sc (Hons) Botany University of Pretoria (2003-2005), MSc Ecology, University of South Africa (2010 - ongoing), Short course in wetland delineation, legislation and rehabilitation, University of Pretoria (2007) and Short course in wetland soils, Terrasoil Science (2009).		
Postal address:	P.O. Box 32733, Waverley, Pretoria		
Postal code:	0135		
Telephone:	012 543 9982	Cell:	083 4545 454
E-mail:	antoinette@limosella.co.za	Fax:	

Are any further specialist studies recommended by the specialist? [redacted] **NO**
If YES, specify: [redacted]
If YES, is such a report(s) attached? [redacted]
If YES list the specialist reports attached below
[redacted]

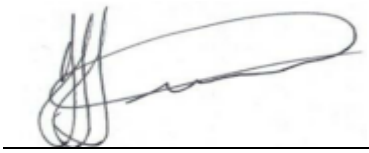
Signature of specialist:		Date:	October 2020

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

2) Vegetation Specialist

Name of the specialist:	Antoinette Eyssell-Knox		
Qualification(s) of the specialist:	• M.Sc Environmental Science, University of Pretoria (2010) Dissertation: *Land cover change and its effect on future land uses* • B. Sc (Hons) Horticulture, University of Pretoria (1999-2000) Dissertation: *Horticultural uses of the indigenous Barleria species* • B. Sc (Agriculture) Horticulture, University of Pretoria (1993-1996)		
Postal address:	[redacted]		
Postal code:			
Telephone:	[redacted]	Cell:	082 642 6295
E-mail:	Antoinette@dimela-eco.co.za	Fax:	[redacted]

Are any further specialist studies recommended by the specialist?	**NO**
If YES, specify:	[redacted]
If YES, is such a report(s) attached?	[redacted]
If YES list the specialist reports attached below	[redacted]

Signature of specialist:		Date:	October 2020

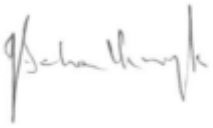
3) Heritage Specialist

Name of the specialist:	J van Schalkwyk		
Qualification(s) of the specialist:	J A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 30 years. Based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape, Northern Cape, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 60 papers, many in scientifically accredited journals.		
Postal address:	62 Coetzer Avenue, Monument Park, 0181		
Postal code:	2194		
Telephone:	[redacted]	Cell:	076 790 6777
E-mail:	jvschalkwyk@mweb.co.za	Fax:	[redacted]

Are any further specialist studies recommended by the specialist?	**NO**
If YES, specify:	[redacted]

If YES, is such a report(s) attached? [redacted]
If YES list the specialist reports attached below

[redacted]

Signature of specialist:		Date:	March 2020

8. 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

NORTH

	1	32	32	2	2
	15	15	32	2	2
WEST	15	15		1, 2	15
	1	1, 32	32	2	2
	2, 32	2, 32	2, 32	2	2

EAST

SOUTH

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

Appendix G1 – Wetland/Riparian Delineation and Functional Assessment
Appendix G2 – Vegetation Assessment

Appendix G3 – Heritage Impact Assessment

Land Use/ Cover

The network of sewer pipes to be replaced lie in an industrial area bordered by Main Reef Road (R41) to the north. The bulk of the pipeline network follows roads or paved areas. This site lies in the mining belt, an area that has been the focus of gold mining for close to a century and includes historic tailings dams, stands of invasive trees such as *Eucalyptus* and *Acacia* (wattles). Mine soils are visible directly north of the site and also to the south and east. The New Canada Dam lies south of the site. Very little untransformed habit remains in this area. A concrete readymix manufacturer is located immediately north of the pipe network, also bordering on the wetland system. The wetland area south of the project area has degraded over time. The most easterly section of the pipeline network infringes on the wetland area. The pipeline route seems to follow the border walls and fences of the industrial development and is partly underneath these boundaries. A well-trodden footpath follows the boundary fences along the edge of the wetland. Dumping takes place within the wetland area at access areas from the industrial area to the wetland.

Figures 16 and 17 below shows the land cover from 2010 and 2020 respectively which depicts the abovementioned land use.

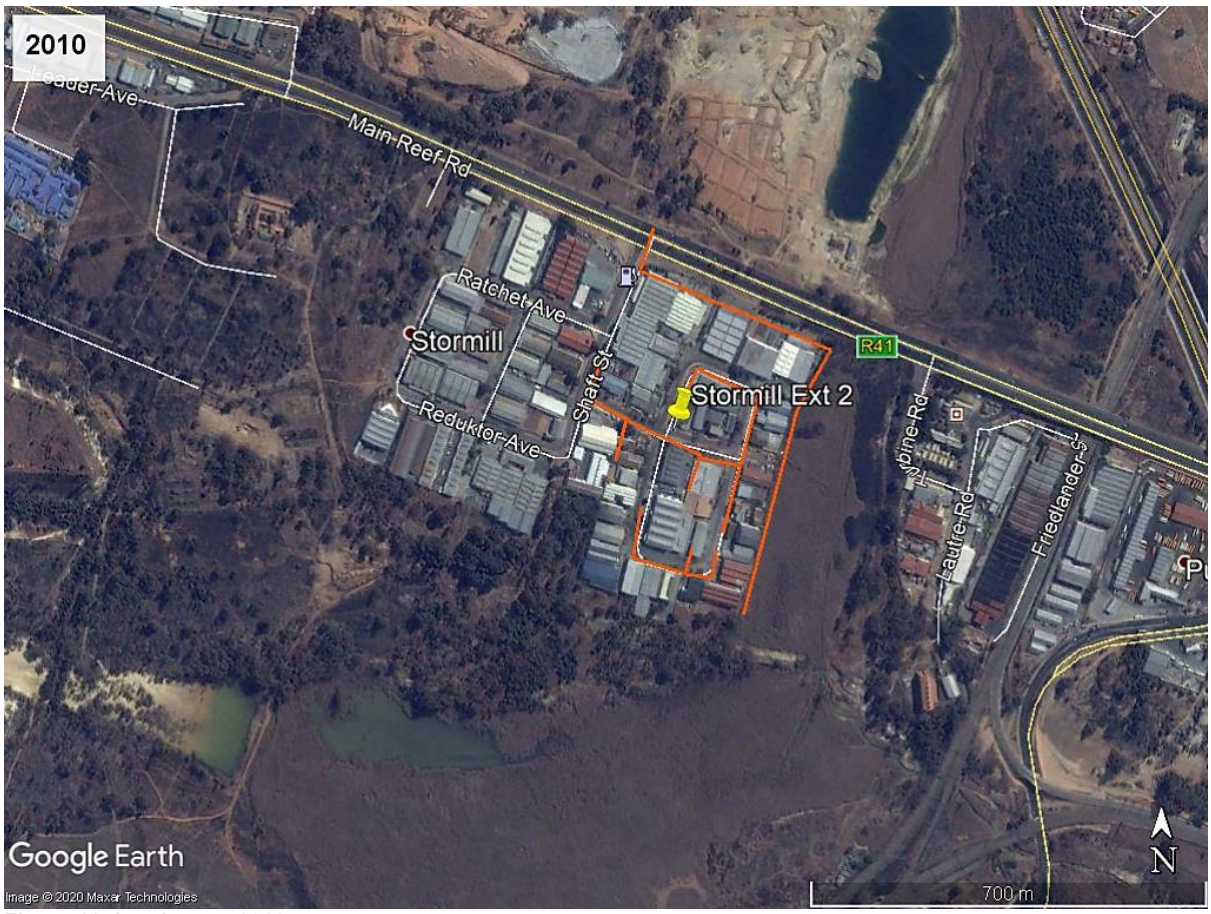


Figure 16: Land cover 2010

Figure 17: Land cover 2020

9. 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.

The City of Johannesburg Local Municipality is situated in Gauteng province and covers an area of 1645km². The City of Johannesburg Local Municipality is divided into seven regions, designated alphabetically from A to G. The proposed development is located within **Region C**.

Population

The City of Johannesburg has a population of approximately 4.4 million people made up primarily of a young population aged between 30 and 39 years. The total population translates into roughly 1.4 million households with an average household size of 3 persons. At a regional level, Region D is the most densely populated region in the City with 24.4% followed by Regions G (16.7%), F (13.4%), A (12.6%), E (11.8%), **C (11.6%)** and B (9.4%) respectively.

In terms of gender, 50.2% of the population is male and 49.8% is female. Majority of the population are black (76.4%), followed by 12.3% white, 5.6% coloured, 4.9% indian, and 0.8% other. The predominant languages

within the City are Zulu (23.1%), followed by English (19.8%) and Sotho (9.5%).

Stormill falls within the Roodepoort area. Roodepoort covers an area of 161.50 km² with a total population of approximately 326 416 inhabitants within 109 707 households. In terms of gender, 50.33% of the population is female and 49.67% is male. Majority of the population are black (51.42%), followed 35.40% white, 8.23% coloured, 4.01% indian and 0.94% other. The predominant languages are English (29.81%) and Afrikaans (23.97%).

Stormill covers an area of 2.17 km² with a total population of approximately 259 inhabitants. In terms of gender, 62% of the population is female and 38% is male. Majority of the population are black (98.07%), followed 1.93% coloured.

Economic Profile

The City of Johannesburg's economy is driven primarily by four economic sectors which are: (a) finance and business services, (b) community services, (c) manufacturing, and (d) trade. These four economic sectors collectively account for more than 82% of economic activity within the City. These sectors also account for the highest levels of formal and informal employment. This state of affairs suggests that the City of Johannesburg's economy is highly concentrated; making it vulnerable to sudden external shocks such as the recession experienced during 2008/09. Every opportunity should therefore be explored to diversify the economy into other sectors in which the City enjoys a comparative advantage.

Roodepoort has seen large population growth due to urban sprawl. Areas of interest for entertainment include the Featherbrooke Village shopping centre which is one of the student hotspots. Roodepoort has a wide variety of restaurants and shopping centres such as Clearwater Mall, Westgate Shopping Centre and 14th Avenue District Shopping Centre, within close proximity to the Stormill area.

Employment

The City has a high unemployment level of 25%. Of the 1 228 666 economically active youth (15–35 years), 31.5% are unemployed. Regional analysis shows that Region D had the highest level of unemployment (42.7%) followed by Regions G (28.1%), F (26.2%) and A (15.7%). Regions E, B and **C** have the lowest rates of unemployment at 2.3%, 9.2% and **11.7%** respectively. Youth unemployment remains a major challenge both nationally and for the City. Low education levels and slow formal sector growth are two of the major causes of youth unemployment. The vast majority of the youthful population in Johannesburg has only a matric certificate preventing access to the labour market (CoJ IDP 2012/2016).

Stormill is an industrial area so majority of the people coming to the area are employed there.

Education

In terms of education within the City of Johannesburg Local Municipality, of those 20 years and older 3.4% have completed primary school, 32.4% have some secondary education, 34.9% have completed matric, 19.2% have some form of higher education, and 2.9% of those aged 20 years and older have no form of schooling.

1.8% of the population aged 20+ Roodepoort have received no education, 29.7% has received some form of higher education, and 36.1% has completed matric. Roodepoort is home to several schools including Florida Primary School, Ruimsig Academy, Constantia Kloof Primary School, Discovery Primary School Full Service School and St Catherine's Convent School amongst many others. Roodepoort is also home to the science campus of the University of South Africa (UNISA).

Stormill is situated within close proximity to a few schools including Life College of Learning Westrand, Fleurhof Primary School, Future Nation Pre-School and Lebowa Primary School.

10. 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, power line, 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 cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which eventually gave rise to an urban and industrial (mining) component.

During the physical survey conducted by the Heritage Specialist, no sites, features or objects of cultural significance were identified. Please see Figure 18 below.

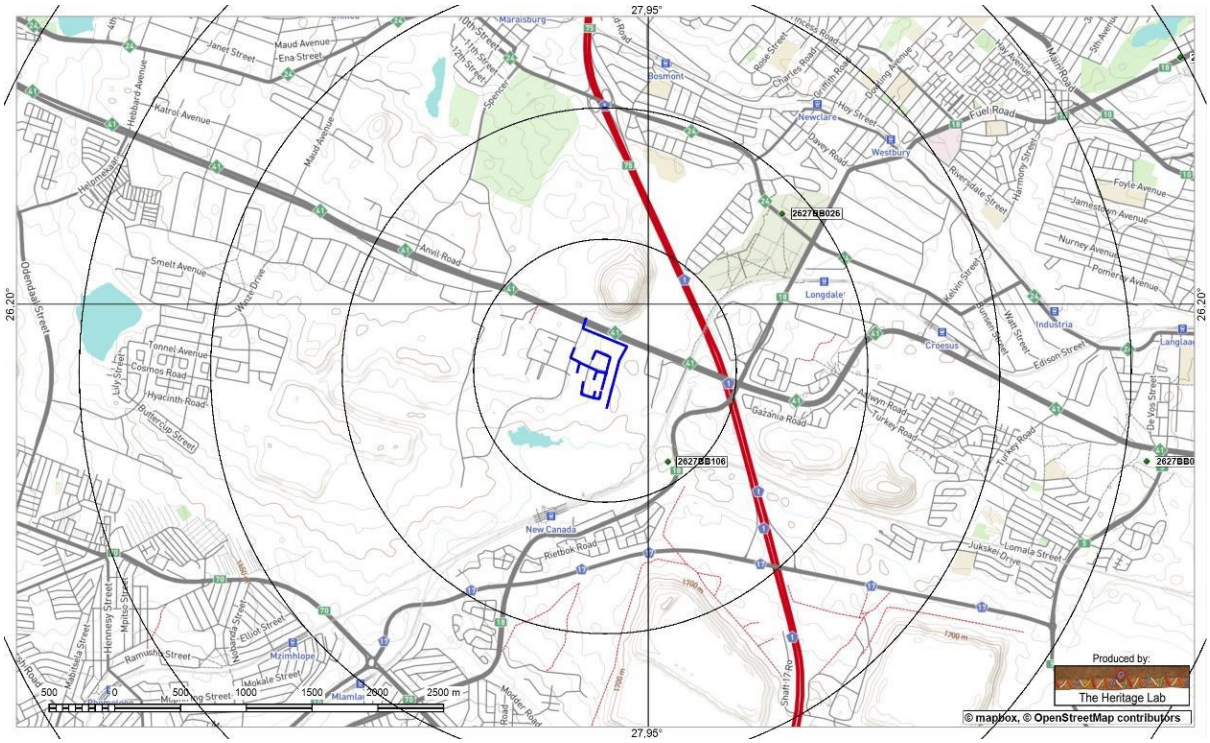
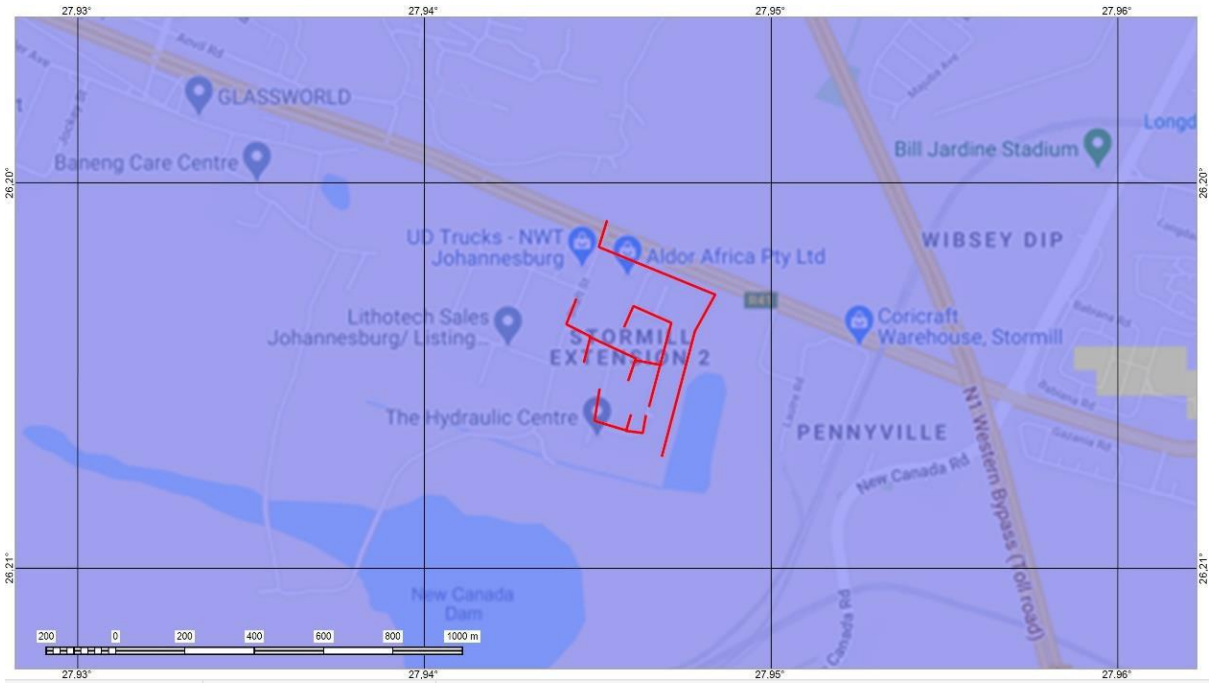


Figure 18: Location of known heritage sites and features in relation to the study area (Circles spaced at a distance of 1km: heritage sites = coded green dots)

The assessment has determined that no sites, features or objects of heritage significance occur in the study area. If heritage features are identified during construction, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits. From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the following conditions:

- The Paleontological Sensitivity Map (SAHRIS) indicate that study area has a low possibility of fossil remains to be found and although no paleontological assessment is required, a protocol for finds in required. Please see Figure 19 below.

- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 19: Palaeontological sensitivity of the study area

Refer to **Appendix G3 – Heritage Impact Assessment** for full report.

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	

SECTION C: PUBLIC PARTICIPATION (SECTION 41)

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

2. 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?	NO

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

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

The report is at a draft stage and is being submitted to the local authority for the 30 days legislated commenting period. Comments are anticipated during the 30-day review period.

3. 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?	NO

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

The DBAR review period is currently underway. Once concluded, the issues and comments raised by IAP's will be collated and responded to. These responses will be incorporated into the Final BAR.

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

4. 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.

The following public participation will be conducted:

Identification of stakeholders, including occupiers of the property, owners and occupiers of land adjacent to the site, municipal officials and relevant State Departments as part of the Public Participation Process. All respondents were then placed on the project database. The database will be used throughout the process to inform the stakeholders of the project.

In order to canvass the issues and concerns of the broader public and to ensure that all IAPs are afforded the opportunity to comment on the proposed development, the proposed project was announced as follows to notify the public about the Basic Assessment process and invite members of the public to register as I&APs on the project's database, as well as availability of the Draft Basic Assessment Report:

- Erection of site notices, size A2 advertising the proposed development and displaying the contact details of the EAP was prepared and displayed on-site. The site notices serve the purpose of informing potential IAPs of the project and therefore afford them the opportunity to comment.
- Distribution of the notification letters with a registration and comment sheet and the locality map to state departments and other potential stakeholders through emails.
- Notification letters were distributed on site and to adjacent landowners through knock and drops.
- An advert was placed in a local newspaper to notify the public about the Basic Assessment process and invite members of the public to register as I&APs on the project's database, as well as availability of the Draft Basic Assessment Report.

The following is proposed to continue with the Public Participation Process:

1. Meetings:

A meeting will be scheduled with the councillor to discuss the project.

If I&AP's would require a meeting, a zoom meeting will be arranged with the EAP, engineer, the councillor, community representatives, as well as anyone from the community who wished to join.

Objective: To introduce the project and present the findings of the DBAR to the ward councillor and community.

2. Record of Decision Notification:

- Email notifications;
- The councillor will be requested to use all platforms as reasonably possible to inform the community.

Objective: To inform stakeholders and I&AP's of the decision made by competent authority and allow them an appeal period.

5. 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 1 – Proof of site notice Attached as **Appendix E1**

Appendix 2 – Written notices issued as required in terms of the regulations Attached as **Appendix E2**

Appendix 3 – Proof of newspaper advertisements Attached as **Appendix E3**

Appendix 4 – Communications to and from interested and affected parties – **N/A at this stage**

Appendix 5 – Minutes of any public and/or stakeholder meetings – **N/A at this stage**

Appendix 6 – Comments and Responses Report – **N/A at this stage**

Appendix 7 – Comments from I&APs on Basic Assessment (BA) Report – **N/A at this stage**

Appendix 8 – Comments from I&APs on amendments to the BA Report – **N/A**

Appendix 9 – Copy of the register of I&APs Attached as **Appendix E9**

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 alterative needs to be clearly indicated in the box below
5) Attach the above documents in a chronological order

Section D has been duplicated for alternatives [redacted] times (complete only when appropriate)

Section D Alternative No. [redacted] (complete only when appropriate for above)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? YES [redacted]
If yes, what estimated quantity will be produced per month? Could not be determined at this stage

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

Construction rubble/ solid waste will be temporarily stored on site in designated waste skips and then removed by an appropriate waste contractor appointed by the main construction contractor to an approved landfill site. This will be managed through the EMPr – **Appendix H**.

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

General waste removed from site will be disposed of at a suitably licensed disposal facility. The nearest licensed landfill site shall be utilised. Safe disposal certificates must be obtained and kept on site for the duration of the construction phase.

Will the activity produce solid waste during its operational phase? [redacted] NO
If yes, what estimated quantity will be produced per month?

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

[redacted]

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? [redacted] NO

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

[redacted]

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:

During Construction, wastes must be separated at source and disposed at relevant suitably licensed facilities. Waste should be separated into recyclable and non-recyclable materials and distributed for recycling where applicable. During the construction phase, construction waste rubble should be used as fill material and as foundation for the proposed upgrade processes where possible. The re-use of construction waste materials will minimize the amount of waste that will need to be disposed of at registered municipal waste facilities. In addition, there will be extensive earthworks, but import and export of material will be minimised by balancing cut and fill requirements as far as possible.

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?
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?

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:

Liquid effluent (domestic sewage)

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

system?
If yes, what estimated quantity will be produced per month?
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity (ies)?
Will the activity produce any effluent that will be treated and/or disposed of on site?
If yes describe how it will be treated and disposed off.

Chemical toilets are going to be used and the sewage waste will be collected by the Waste service provider for treatment at a treatment facility.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere? YES
If yes, is it controlled by any legislation of any sphere of government? 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:

The activity itself will not contribute directly to emissions released into the atmosphere except possible short-term dust emissions during the construction phase. Emissions generated will be in the form of dust, carbon dioxide and other vehicle emissions generated by diesel powered machinery and trucks during the construction process i.e. tip trucks, TLB's, excavators and dust from the movement of the construction vehicles. These emissions will be composed primarily of CO_2 and will be of a low concentration.

2. WATER USE

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

Municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity process itself will not use water

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:

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

The proposed development also requires a Water Use License from the Department of Water and Sanitation in terms of National Water Act No. 36 of 1998 for the following specific water uses:

- Section 21(c): Impeding or diverting the flow of water in a watercourse; and
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

If yes, have you applied for the water use permit(s)? YES
If yes, have you received approval(s)? (attached in appropriate appendix) NO

A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal. Refer to **Appendix F** for proof thereof.

3. POWER SUPPLY

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

The development will not require power supply during its operation phase. However generators will be used as a source of power if needed during the construction phase.

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

As above.

4. ENERGY EFFICIENCY

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

No particular considerations of energy saving/ conservation were deemed applicable in this project. The scope of work will be structured in a way that, where possible, the use of labour intensive methods will be employed. Not only will it serve the local community but it also saves the use of Pneumatic Equipment that requires a lot of energy input.

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

The proposed development is not an energy-intensive development that will require energy/electricity input for its continued operations and will therefore not consume energy during its operation phase.

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).

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summarise the issues raised by interested and affected parties.

Issue/ Comment/ Concern	Response
The DBAR review period is currently underway. Once concluded, the issues and comments raised by IAP's will be collated and responded to. These responses will be incorporated into the Final BAR.	

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):

The DBAR review period is currently underway. Once concluded, the issues and comments raised by IAP's throughout the process will be collated and responded to accordingly. These responses will be incorporated into the Final BAR for submission to GDARD for review and decision-making.

2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASE

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

The following methodology and criteria was used in assessing impacts related to the proposed development.

- The **Nature**, a description of what causes the effect, what will be affected, and how it will be affected.

- The **Extent**, wherein it is indicated whether:

  - 1 is limited to the immediate area or site of development
  - 2 is the local area
  - 3 is regional
  - 4 is national
  - 5 is international

- The **Duration**, wherein it is indicated whether:

  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or;
  - Permanent - assigned a score of 5.

- The **Magnitude**, quantified on a scale from 0-10, where a score is assigned:

- 0 is small and will have no effect on the environment;
- 2 is minor and will not result in an impact on processes;
- 4 is low and will cause a slight impact on processes;
- 6 is moderate and will result in processes continuing but in a modified way;
- 8 is high (processes are altered to the extent that they temporarily cease); and
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

➢ The **Probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:

- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely); and
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

➢ The **Significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.

- The status, which is described as **positive**, **negative** or **neutral**.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

S= (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The significance weightings for each potential impact are as follows:

- **< 30 points:** **Low** (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points:** **Medium** (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **> 60 points:** **High** (i.e. where the impact must have an influence on the decision process to develop in the area).

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.

Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)

Table 9: Construction Impacts

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Nature of Impact: Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.

Source: The source of this impact includes the compaction of soil and the clearing of vegetation parallel to the watercourse which is partly canalised.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.
• Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr. High energy stormwater input into the watercourses should be prevented at all cost.
• Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions.</td><td>Impacts to the flow characteristics of this watercourse are likely to be permanent unless mitigated and/ or rehabilitated.</td></tr>
<tr><td>Nature of Impact: Changes in sediment entering and exiting the system.

Source: Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction and maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation although this will be limited to the vertical shafts adjacent</td><td>• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.
• Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.
• Construction in and around watercourses must be restricted to the dryer</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>to watercourses. Trenching through watercourses will have an increased risk of sediment pollution. Possible sources of the impacts include:

Possible sources of the impacts include:

• Earthwork activities during construction and trenching adjacent to the watercourse.
• Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil.
• Disturbance of soil surface.
• Disturbance of slopes through creation of roads and tracks adjacent to the watercourse.
• Erosion (e.g. gully formation, bank collapse).

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>winter months where possible.
• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.
• Runoff from the construction area must be managed to avoid erosion and pollution problems.
• Implementation of best management practices.
• Maintain buffer zones to trap sediments.
• Monitoring should be done to ensure that sediment pollution is timeously dressed.</td><td></td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of watercourse habitat and fringe vegetation.</td><td>• Where construction occurs in the demarcated watercourse and buffer, extra precautions should be implemented to so as to minimise watercourse loss.</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>

Source: Trenching parallel to the watercourse may affect remaining natural wetland habitat although this is unlikely since the habitat is largely transformed.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Possible (2)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>22 (Low)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>

</td><td>

- Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones.
- Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas.
- Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.

</td><td>effective rehabilitation of the site is undertaken where necessary.</td></tr>
<tr><td>

Nature of the Impact: Changes in water quality due to foreign materials and increased nutrients.

Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>

</td><td>

- Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.
- Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.
- The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.
- Maintenance of construction vehicles/ equipment should not take place within the watercourse or watercourse buffer.
- Maintenance of buffer zones to trap sediments with associated toxins
- Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
- Control of waste discharges and do not allow dirty water from

</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>operational activities to enter the watercourse.
• Treatment of pollution identified should be prioritized accordingly.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Destruction of vegetation of medium sensitivity along the wetland.</u>

All removal of vegetation, whether sensitive or not, could have an impact on soil stabilisation and water infiltration. Impacts on this vegetation will have an edge effect into the Phragmites wetland. Pipe jacking will minimise the impact, however, several machinery and movement along the pipeline will take place.

The sources of this impact could include:

• Clearing of and damage to vegetation in construction footprint, access roads, construction camps, vehicle/ machinery traffic and trampling by workers;
• Illegal disposal and dumping of construction material such as cement or oil, as well as maintenance materials during construction.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>60 (Medium)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Construction camps can be placed within road verges or other areas of low sensitivity. Avoid placing construction camps within the vegetation classified as medium or high.
• An independent Ecological Control Officer (ECO) should be appointed to oversee construction.
• A temporary fence or demarcation must be erected around the construction area to prevent access to adjacent Phragmites wetlands;
• Make provision for the current pedestrians along the wetland boundary to ensure that a footpath is not created within the wetland area to avoid the construction areas.
• Prohibit vehicular or pedestrian access beyond the demarcated boundary of the construction area.
• No open fires are permitted within naturally vegetated areas or open spaces.
• Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.
• Only remove vegetation where necessary and retain vegetation in place for as long as possible prior to removal.
• A vegetation rehabilitation plan should already be implemented during construction and include the following:
○ In modified vegetation the grass sods should be removed and stored in areas of low sensitivity or other disturbed areas. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks.
○ Grasses that naturally occur in the area should be sown/ hydroseeded in the disturbed footprint.
• Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority.
• No activities should take place during rainy events and at least 2 days afterwards.
• Where topsoil needs to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation where applicable. Never mix topsoil with subsoils or other spoil materials.
• Maintain site demarcations in position until the cessation of construction work.
• After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
• Rehabilitation must take place immediately post construction and only use indigenous species naturally occurring in the area.</td><td></td></tr>
<tr><td>Nature of the Impact: Destruction or degradation of vegetation associated with the Phragmite australis wetland.

The construction activities might impact on the Phragmites wetland or at least cause some edge effects. Construction could also result in pollution of the watercourse.

<table><tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr><tr><td>Probability</td><td>Definite (5)</td><td>Probable (3)</td></tr><tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr><tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr></table></td><td>• No activities may proceed within or in proximity to watercourses without a Water Use License permitting the activity.
• No construction camps, roads or placement of machinery should take place within the wetland and cause edge effects.
• Fence construction footprint to prevent any human activity from encroaching into the Phragmites wetland area, other than that which is essential to the construction and removal of alien invasive plant species. Monitoring of the fences is important to ensure no infringement of the fences occurs, particularly as the area is being used by pedestrians</td><td>Medium</td></tr>
</table>

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED

Magnitude	High (8)	Moderate (6)
Significance	**60 (Medium)**	**27 (Low)**
Status (positive or negative)	Negative	Negative

- Activities that could impact on the wetland should preferably take place during the winter months
- Input of sediment during construction activities should be prevented at all cost. Mitigation for this potential impact includes establishment of vegetation as soon as possible after construction.
- Pollution of the surface and groundwater. Mitigation for this potential impact includes:
  - In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs must be informed immediately;
  - Store all litter carefully so it cannot be washed or blown into the watercourse;
  - Construction vehicles are to be maintained in good working order to reduce the probability of leakage of fuels and lubricants;
  - Storage of potentially hazardous materials should be above any 100-year flood line or the functional wetland boundary (and its associated buffer zone). These materials include fuel, oil, cement, bitumen etc.;
  - Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils;
  - Concrete is to be mixed on mixing trays only, not on exposed soil;
  - Concrete shall be mixed only in areas which have been specially demarcated for this purpose;
  - After all the concrete mixing is complete all waste concrete shall be removed from the batching area and disposed of at an approved dumpsite;
  - All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring; and

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>○ No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.
• Ensure that the vegetation disturbed during construction is rehabilitated with indigenous grass species naturally occurring in the area.</td><td></td></tr>
<tr><td>Nature of the Impact: Potential introduction and spread of alien vegetation.

The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>21 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Compile and implement an Alien Invasive Management Plan.
• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area and returning it where possible afterwards.
• Alien invasive species, in particular category 1b species that were identified on site must be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.
• All alien seedlings and saplings must be removed as they become evident for the duration of construction.
• All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.
• If filling material is to be used, this should be sourced from areas free of invasive species.
• No foreign plant matter or soil may be introduced into the area.
• Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.
• Rehabilitate or revegetate disturbed areas.</td><td>Medium</td></tr>
<tr><td>Nature of the Impact: Clearing of land for construction camps and</td><td>• Construction camps must be located outside of areas classified as</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>potential pollution of the soil and water.

These may be at one or several locations, area will be cleared and levelled where necessary, site offices may be temporary structures, machinery, building supplies and temporary staff facilities (excluding accommodation) will be housed here. The impacts could include:

• Removal of vegetation
• Levelling and compaction of soils
• Storage of machinery, supplies and staff facilities

This could lead to the loss of vegetation and/or species of conservation concern, alteration and loss of microhabitats, altered vegetation cover, increased erosion and contamination of soil and groundwater.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>14 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>medium and high sensitivity.
• Ensure there is a method statement in place to remedy any accidental spillages immediately.
• Prevent spillage of construction material and other pollutants, contain, and treat any spillages immediately, strictly prohibit any pollution/littering.
• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.
• No vehicles may be washed on site, except in suitably designed and protected areas.
• No vehicles may be serviced or repaired on the property, unless it is an emergency situation in which case adequate spillage containment must be implemented.</td><td></td></tr>
<tr><td>Nature of the Impact: Destruction or damage to indigenous trees.

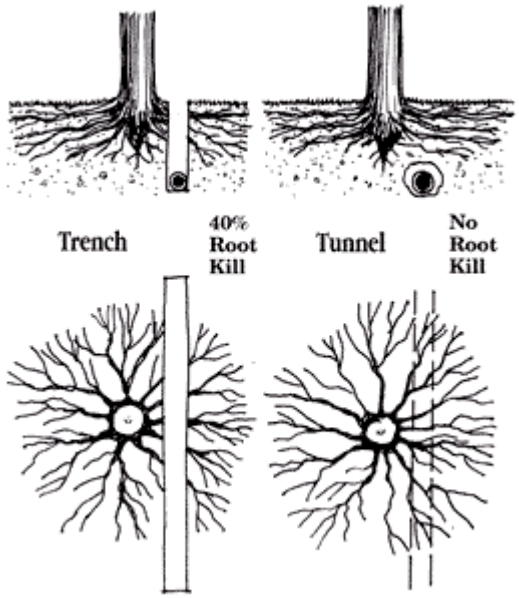
Pipe jacking is unlikely to have a significant impact on established trees. However, it may sever tree roots and destabilize large trees. Trees often fail when the structural roots have been compromised, either by cutting or infection, causing damage to property. If large</td><td>• Avoid removing large, established indigenous trees where possible. Where damage to the trees cannot be avoided, the trees can be removed and replaced with the same species or preferably an indigenous species post construction.
• Severed roots of street trees may be reduced with careful planning to avoid root damage. Trees could fall when the structural roots have been</td><td>Limited</td></tr>
</table>

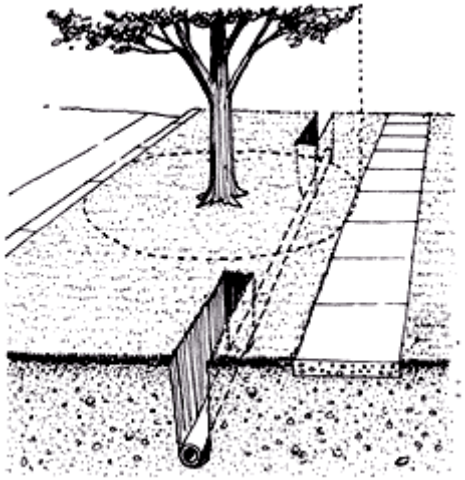
<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr>
<td>roots are removed or severed, the tree may not be able to get enough nutrients and water and could become unstable.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>27 (Low)</td><td>12 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>compromised causing damage to property.
• No person may prune or remove a tree planted on City land without prior authority from Johannesburg City Parks and Zoo.

If trenching takes places around trees:

• Prior to trenching and construction, consult the City horticulturist and / or tree specialist to determine the potential damage to street trees, as well as preferred method to trench through tree roots.
• Instead of trenching through roots, consider the option of boring under the roots.
• Trenches adjacent to a trunk could cut off about 40% of the tree roots (Figure 20) which could destabilise the tree in windy conditions. As per Airhart and Zimmerman (2003) trenches should ideally be dug outside of the drip line of trees where possible. The best route is to trench directly toward the tree trunk, but tunnel under the tree trunk. This will sever less roots. Alternatively, trench just one-third into the drip line from either side (Figure 21) then tunnel under the middle of drip line to connect the trenches.
• Pneumatic digging is a method that allows trenching through a tree's critical root zone without severing vital roots.</td>
<td></td>
</tr>
</table>

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
	 **Figure 20: Tunnel underneath roots where possible, instead of trenching through roots**	

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
	 **Figure 21: Tunnelling under drip line** • Avoid removing street trees where possible. • It is recommended that a City horticulturist or certified Arborist be present where tree roots needs to be cut. • Consider the option of boring under the roots as described above. • Tree roots damaged by digging trenches must be treated with an appropriate fungicide or sealant, in accordance with manufacturer's specifications. • Contractors must prevent root zone compaction, mechanical damage to trunks and branches and chemical spillage around tree roots. • Ensure that soil is replaced around tree roots to the same height as before. Roots may not remain exposed and neither should soil be heaped higher around the roots and trunk than prior to construction. • No topsoil should be store against tree trunks. • Damaged indigenous trees must be replaced with the same species.	

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr>
<td>Nature of the Impact: Loss and disturbance of heritage sites due to the development.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Very improbable (1)</td><td>Very improbable (1)</td></tr>
<tr><td>Duration</td><td>Permanent (4)</td><td>Permanent (4)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>7 (Low)</td><td>7 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>

As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.</td>
<td>• Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td>
<td>Low risk anticipated provided that the mitigation measures are implemented correctly.</td>
</tr>
<tr>
<td>Nature of Impact: Visual

Surface disturbances and the presence of a construction team are uncharacteristic events in the study area and may cause unsightly views as a result of the activity.

Introduction of construction equipment, ground staff, construction vehicles and equipment that is unfamiliar in the baseline environment.

Source of Impact:
• Construction vehicles.
• Construction material.
• Barricading and fencing.
• Rubble on site.</td>
<td>• Construction vehicles should only park in designated areas.
• Waste to be kept only at specific sites on site and to be removed weekly.
• Do not locate the construction camp or laydown yards within 1km from any residential area or tourist attraction, unless it can be completely screened from sensitive viewpoints. Preferably, construction camps should be in a dedicated construction camp in the industrial area, in an area that is already disturbed.
• Avoid the construction of additional access roads by keeping to existing roads where possible.
• Avoid removal of any large trees or shrubs that may open views to the construction site and compromise the natural screening capacity of the study area.
• Clearly demarcate the construction site to limit the area of disturbance.</td>
<td>The site will not be visually appealing during the construction phase.</td>
</tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
• Construction crew.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>60 (Medium)</td><td>36 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>
• Keep dust levels down by regularly wetting dirt roads and exposed soil areas.
• Remove rubble and other waste that is generated by the construction process as soon as possible and dispose at an appropriate dump site.
• Keep the construction camp neat and tidy at all times. Remove any waste from the site or contain it in an enclosed area out of sight from sensitive viewpoints.
• Enhance screening of the construction camps by erecting a temporary fence with a 3m high shade cloth to limit the intrusive nature of such a site.
</td><td></td></tr>
<tr><td>
Nature of Impact: <u>Dust Generation</u>

Construction machinery and heavy vehicles which are likely to make use of the existing gravel roads to transport equipment and material to the construction site, are likely to generate dust which is likely to be perceptible by adjacent residents. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of the activities.

Source of Impact:
• Clearing of vegetation.
• Construction vehicles.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>65 (High)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>
• Vegetation clearance should be kept to a minimum (only where necessary).
• Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods.
• Warning barricading should be placed around open trenches and should be suitable for high winds.
• Speed limits should be enforced to ensure that the generation of dust by construction vehicles are limited.
• Dust suppression at least twice a day; morning and before the end of the working day.
• A continuous dust monitoring process needs to be undertaken during construction.
• All vehicles transporting friable materials such a sand, rubble etc must be covered by a tarpaulin or wet down.
• Construction work to be undertaken during weekdays as far as practical.
</td><td>Medium risk (as the amount of dust emitted into the air will be of high volumes); unless mitigation measures are implemented.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>negative)</td><td></td><td></td></tr>
</table>
Nature of Impact: Crime, safety and security

Source of Impact:

Lack of security.
Easy access.
Construction area not enclosed.
Poorly trained personnel using equipment and vehicles.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>44 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Ensure that the construction vehicles as well as equipment are under the control of competent personnel and are in proper working order.
Ensure that the contact details of the police or security company and ambulance services are available on site.
Limit access to the construction camp to construction workers through access control.
Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements.
Ensure that the handling of equipment and materials is supervised and adequately instructed.
Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr.
The security fence around the development site must be completed before construction commences internally.

</td><td>If not mitigated, medium risk to personnel as well as the construction site if safety measures are not put in place before construction commences.</td></tr>
<tr><td>
Nature of Impact: Noise

Source of Impact:

Construction vehicles.
Equipment and machinery.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>65 (High)</td><td>50 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.
Institute noise control measures throughout the construction phase for all applicable activities, including the construction times.
Ensure that noise licensers are installed on the construction vehicles and machineries to reduce the noise level.
Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above.
No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance.
Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.

</td><td>High risk as construction vehicles and equipment causes noise pollution.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Nature of impact: Traffic and accessibility

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>55 (Medium)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>• Traffic accommodation for construction activities affecting the travelled way as well as the sidewalks of the travelled way.
• If one lane is expected to be closed, “Stop and Go” will be used for traffic accommodation.
• In the case of complete road closure, traffic diversion must be accommodated for.</td><td>High risk</td></tr>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:
• Job creation for local skilled labour, general labour and suppliers.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>24 (Low)</td><td>44 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>• General and skilled locals must be considered for employment during construction (contractor and construction crew).
• Local suppliers must be considered for the purchase of construction material.</td><td>Medium</td></tr>
</table>

Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve

Table 10: Construction Impacts

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr>
<td>Nature of Impact: Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.

Source: The source of this impact includes the compaction of soil and the clearing of vegetation parallel to the watercourse which is partly canalised.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>52 (Medium)</td><td>27 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>• A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.
• Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr. High energy stormwater input into the watercourses should be prevented at all cost.
• Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions.</td>
<td>Impacts to the flow characteristics of this watercourse are likely to be permanent unless mitigated and/ or rehabilitated.</td>
</tr>
<tr>
<td>Nature of Impact: Changes in sediment entering and exiting the system.

Source: Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount). Construction and maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation although this will be limited to the vertical shafts adjacent to watercourses. Trenching through watercourses will have an increased risk of sediment pollution. Possible sources of the impacts include:</td>
<td>• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.
• Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.
• Construction in and around watercourses must be restricted to the dryer winter months where possible.
• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the</td>
<td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td>
</tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Possible sources of the impacts include:

• Earthwork activities during construction and trenching adjacent to the watercourse.
• Clearing of surface vegetation will expose the soils, which in rainy events would wash through the watercourse, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil.
• Disturbance of soil surface.
• Disturbance of slopes through creation of roads and tracks adjacent to the watercourse.
• Erosion (e.g. gully formation, bank collapse).

<table><tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr><tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr><tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr><tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr><tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr><tr><td>Significance</td><td>60 (Medium)</td><td>33 (Medium)</td></tr><tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr></table></td><td>construction camp and work areas.
• Runoff from the construction area must be managed to avoid erosion and pollution problems.
• Implementation of best management practices.
• Maintain buffer zones to trap sediments.
• Monitoring should be done to ensure that sediment pollution is timeously dressed.</td><td></td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of watercourse habitat and fringe vegetation.

Source: Trenching parallel to the watercourse may affect remaining natural wetland habitat although this is unlikely since the habitat is largely transformed.</td><td>• Where construction occurs in the demarcated watercourse and buffer, extra precautions should be implemented to so as to minimise watercourse loss.
• Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones.
• Demarcate the watercourse areas and buffer zones to limit disturbance,</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>clearly mark these areas as no-go areas.
• Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.</td><td></td></tr>
<tr><td>Nature of the Impact: Changes in water quality due to foreign materials and increased nutrients.

Construction and operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>48 (Medium)</td><td>33 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.
• Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.
• The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.
• After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.
• Maintenance of construction vehicles/ equipment should not take place within the watercourse or watercourse buffer.
• Maintenance of buffer zones to trap sediments with associated toxins
• Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
• Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.
• Treatment of pollution identified should be prioritized accordingly.</td><td>Medium</td></tr>
<tr><td>Nature of the Impact: Destruction of vegetation of medium</td><td>• Construction camps can be placed within road verges or other areas of low sensitivity. Avoid placing construction camps within the vegetation</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr>
<td>sensitivity along the wetland.

All removal of vegetation, whether sensitive or not, could have an impact on soil stabilisation and water infiltration. Impacts on this vegetation will have an edge effect into the Phragmites wetland. Pipe jacking will minimise the impact, however, several machinery and movement along the pipeline will take place.

The sources of this impact could include:

• Clearing of and damage to vegetation in construction footprint, access roads, construction camps, vehicle/ machinery traffic and trampling by workers;
• Illegal disposal and dumping of construction material such as cement or oil, as well as maintenance materials during construction.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>60 (Medium)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>classified as medium or high.
• An independent Ecological Control Officer (ECO) should be appointed to oversee construction.
• A temporary fence or demarcation must be erected around the construction area to prevent access to adjacent Phragmites wetlands;
• Make provision for the current pedestrians along the wetland boundary to ensure that a footpath is not created within the wetland area to avoid the construction areas.
• Prohibit vehicular or pedestrian access beyond the demarcated boundary of the construction area.
• No open fires are permitted within naturally vegetated areas or open spaces.
• Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.
• Only remove vegetation where necessary and retain vegetation in place for as long as possible prior to removal.
• A vegetation rehabilitation plan should already be implemented during construction and include the following:
○ In modified vegetation the grass sods should be removed and stored in areas of low sensitivity or other disturbed areas. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each other. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks.
○ Grasses that naturally occur in the area should be sown/ hydroseeded in the disturbed footprint.</td>
<td></td>
</tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>• Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority.
• No activities should take place during rainy events and at least 2 days afterwards.
• Where topsoil needs to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation where applicable. Never mix topsoil with subsoils or other spoil materials.
• Maintain site demarcations in position until the cessation of construction work.
• After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
• Rehabilitation must take place immediately post construction and only use indigenous species naturally occurring in the area.</td><td></td></tr>
<tr><td>Nature of the Impact: Destruction or degradation of vegetation associated with the Phragmite australis wetland.

The construction activities might impact on the Phragmites wetland or at least cause some edge effects. Construction could also result in pollution of the watercourse.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>65 (High)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• No activities may proceed within or in proximity to watercourses without a Water Use License permitting the activity.
• No construction camps, roads or placement of machinery should take place within the wetland and cause edge effects.
• Fence construction footprint to prevent any human activity from encroaching into the Phragmites wetland area, other than that which is essential to the construction and removal of alien invasive plant species. Monitoring of the fences is important to ensure no infringement of the fences occurs, particularly as the area is being used by pedestrians
• Activities that could impact on the wetland should preferably take place during the winter months
• Input of sediment during construction activities should be prevented at all cost. Mitigation for this potential impact includes establishment of</td><td>Medium</td></tr>
</table>

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
	vegetation as soon as possible after construction. • Pollution of the surface and groundwater. Mitigation for this potential impact includes: o In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs must be informed immediately; o Store all litter carefully so it cannot be washed or blown into the watercourse; o Construction vehicles are to be maintained in good working order to reduce the probability of leakage of fuels and lubricants; o Storage of potentially hazardous materials should be above any 100-year flood line or the functional wetland boundary (and its associated buffer zone). These materials include fuel, oil, cement, bitumen etc.; o Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils; o Concrete is to be mixed on mixing trays only, not on exposed soil; o Concrete shall be mixed only in areas which have been specially demarcated for this purpose; o After all the concrete mixing is complete all waste concrete shall be removed from the batching area and disposed of at an approved dumpsite; o All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring; and o No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority. • Ensure that the vegetation disturbed during construction is rehabilitated	

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>with indigenous grass species naturally occurring in the area.</td><td></td></tr>
<tr><td>Nature of the Impact: Potential introduction and spread of alien vegetation.

The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Compile and implement an Alien Invasive Management Plan.
• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area and returning it where possible afterwards.
• Alien invasive species, in particular category 1b species that were identified on site must be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.
• All alien seedlings and saplings must be removed as they become evident for the duration of construction.
• All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.
• If filling material is to be used, this should be sourced from areas free of invasive species.
• No foreign plant matter or soil may be introduced into the area.
• Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.
• Rehabilitate or revegetate disturbed areas.</td><td>Medium</td></tr>
<tr><td>Nature of the Impact: Clearing of land for construction camps and potential pollution of the soil and water.

These may be at one or several locations, area will be cleared and levelled where necessary, site offices may be temporary structures,</td><td>• Construction camps must be located outside of areas classified as medium and high sensitivity.
• Ensure there is a method statement in place to remedy any accidental spillages immediately.
• Prevent spillage of construction material and other pollutants, contain,</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>machinery, building supplies and temporary staff facilities (excluding accommodation) will be housed here. The impacts could include:

• Removal of vegetation
• Levelling and compaction of soils
• Storage of machinery, supplies and staff facilities

This could lead to the loss of vegetation and/or species of conservation concern, alteration and loss of microhabitats, altered vegetation cover, increased erosion and contamination of soil and groundwater.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>48 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>and treat any spillages immediately, strictly prohibit any pollution/littering.
• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.
• No vehicles may be washed on site, except in suitably designed and protected areas.
• No vehicles may be serviced or repaired on the property, unless it is an emergency situation in which case adequate spillage containment must be implemented.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Destruction or damage to indigenous trees.</u>

Pipe jacking is unlikely to have a significant impact on established trees. However, it may sever tree roots and destabilize large trees. Trees often fail when the structural roots have been compromised, either by cutting or infection, causing damage to property. If large roots are removed or severed, the tree may not be able to get enough nutrients and water and could become unstable.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
</table>
</td><td>• Avoid removing large, established indigenous trees where possible. Where damage to the trees cannot be avoided, the trees can be removed and replaced with the same species or preferably an indigenous species post construction.
• Severed roots of street trees may be reduced with careful planning to avoid root damage. Trees could fall when the structural roots have been compromised causing damage to property.
• No person may prune or remove a tree planted on City land without prior authority from Johannesburg City Parks and Zoo.</td><td>Limited</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr>
<td>
<table>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>40 (Medium)</td><td>21 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>If trenching takes places around trees:

• Prior to trenching and construction, consult the City horticulturist and / or tree specialist to determine the potential damage to street trees, as well as preferred method to trench through tree roots.
• Instead of trenching through roots, consider the option of boring under the roots.
• Trenches adjacent to a trunk could cut off about 40% of the tree roots (Figure 20) which could destabilise the tree in windy conditions. As per Airhart and Zimmerman (2003) trenches should ideally be dug outside of the drip line of trees where possible. The best route is to trench directly toward the tree trunk, but tunnel under the tree trunk. This will sever less roots. Alternatively, trench just one-third into the drip line from either side (Figure 21) then tunnel under the middle of drip line to connect the trenches.
• Pneumatic digging is a method that allows trenching through a tree's critical root zone without severing vital roots.
• Avoid removing street trees where possible.
• It is recommended that a City horticulturist or certified Arborist be present where tree roots needs to be cut.
• Consider the option of boring under the roots as described above.
• Tree roots damaged by digging trenches must be treated with an appropriate fungicide or sealant, in accordance with manufacturer's specifications.
• Contractors must prevent root zone compaction, mechanical damage to trunks and branches and chemical spillage around tree roots.
• Ensure that soil is replaced around tree roots to the same height as before. Roots may not remain exposed and neither should soil be heaped higher around the roots and trunk than prior to construction.</td>
<td></td>
</tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>• No topsoil should be store against tree trunks.
• Damaged indigenous trees must be replaced with the same species.</td><td></td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage sites due to the development.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Very improbable (1)</td><td>Very improbable (1)</td></tr>
<tr><td>Duration</td><td>Permanent (4)</td><td>Permanent (4)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>7 (Low)</td><td>7 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>

As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.</td><td>• Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td><td>Low risk anticipated provided that the mitigation measures are implemented correctly.</td></tr>
<tr><td>Nature of Impact: Visual

Surface disturbances and the presence of a construction team are uncharacteristic events in the study area and may cause unsightly views as a result of the activity.

Introduction of construction equipment, ground staff, construction vehicles and equipment that is unfamiliar in the baseline environment.

Source of Impact:
• Construction vehicles.
• Construction material.</td><td>• Construction vehicles should only park in designated areas.
• Waste to be kept only at specific sites on site and to be removed weekly.
• Do not locate the construction camp or laydown yards within 1km from any residential area or tourist attraction, unless it can be completely screened from sensitive viewpoints. Preferably, construction camps should be in a dedicated construction camp in the industrial area, in an area that is already disturbed.
• Avoid the construction of additional access roads by keeping to existing roads where possible.
• Avoid removal of any large trees or shrubs that may open views to the construction site and compromise the natural screening capacity of the</td><td>The site will not be visually appealing during the construction phase.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>

Barricading and fencing.
Rubble on site.
Construction crew.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>65 (High)</td><td>40 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>study area.
• Clearly demarcate the construction site to limit the area of disturbance.
• Keep dust levels down by regularly wetting dirt roads and exposed soil areas.
• Remove rubble and other waste that is generated by the construction process as soon as possible and dispose at an appropriate dump site.
• Keep the construction camp neat and tidy at all times. Remove any waste from the site or contain it in an enclosed area out of sight from sensitive viewpoints.
• Enhance screening of the construction camps by erecting a temporary fence with a 3m high shade cloth to limit the intrusive nature of such a site.</td><td></td></tr>
<tr><td>Nature of Impact: <u>Dust Generation</u>

Construction machinery and heavy vehicles which are likely to make use of the existing gravel roads to transport equipment and material to the construction site, are likely to generate dust which is likely to be perceptible by adjacent residents. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of the activities.

Source of Impact:

Clearing of vegetation.
Construction vehicles.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
</table>
</td><td>• Vegetation clearance should be kept to a minimum (only where necessary).
• Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods.
• Warning barricading should be placed around open trenches and should be suitable for high winds.
• Speed limits should be enforced to ensure that the generation of dust by construction vehicles are limited.
• Dust suppression at least twice a day; morning and before the end of the working day.
• A continuous dust monitoring process needs to be undertaken during construction.
• All vehicles transporting friable materials such a sand, rubble etc must be covered by a tarpaulin or wet down.
• Construction work to be undertaken during weekdays as far as practical.</td><td>Medium risk (as the amount of dust emitted into the air will be of high volumes); unless mitigation measures are implemented.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Significance</td><td>70 (High)</td><td>33 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of Impact: Crime, safety and security

Source of Impact:

Lack of security.
Easy access.
Construction area not enclosed.
Poorly trained personnel using equipment and vehicles.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>48 (Medium)</td><td>27 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Ensure that the construction vehicles as well as equipment are under the control of competent personnel and are in proper working order.
Ensure that the contact details of the police or security company and ambulance services are available on site.
Limit access to the construction camp to construction workers through access control.
Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements.
Ensure that the handling of equipment and materials is supervised and adequately instructed.
Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr.
The security fence around the development site must be completed before construction commences internally.

</td><td>If not mitigated, medium risk to personnel as well as the construction site if safety measures are not put in place before construction commences.</td></tr>
<tr><td>
Nature of Impact: Noise

Source of Impact:

Construction vehicles.
Equipment and machinery.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>70 (High)</td><td>55 (Medium)</td></tr>
</table>
</td><td>

Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.
Institute noise control measures throughout the construction phase for all applicable activities, including the construction times.
Ensure that noise licensers are installed on the construction vehicles and machineries to reduce the noise level.
Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above.
No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance.
Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused

</td><td>High risk as construction vehicles and equipment causes noise pollution.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>by mechanical equipment.</td><td></td></tr>
<tr><td>Nature of impact: Traffic and accessibility
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Definite (5)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>60 (Medium)</td><td>44 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Traffic accommodation for construction activities affecting the travelled way as well as the sidewalks of the travelled way.
• If one lane is expected to be closed, “Stop and Go” will be used for traffic accommodation.
• In the case of complete road closure, traffic diversion must be accommodated for.</td><td>Medium risk</td></tr>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:
• Job creation for local skilled labour, general labour and suppliers.
<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>27 (Low)</td><td>48 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>• General and skilled locals must be considered for employment during construction (contractor and construction crew).
• Local suppliers must be considered for the purchase of construction material.</td><td>Medium</td></tr>
</table>

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 **operational phase** for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)

Table 11: Operational Impacts

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Nature of Impact: Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Possible (2)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>20 (Low)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) on the site above the river area resulting from the proposed stormwater upgrade should be taken into account.</td><td>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</td></tr>
<tr><td>Nature of Impact: Changes in sediment entering and exiting the system.

Maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
</table>
</td><td>• Monitoring should be done to ensure that sediment pollution is timeously dressed.</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Significance</td><td>30 (Low)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: Loss and disturbance of watercourse habitat and fringe vegetation.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Possible (2)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>20 (Low)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Weed control in buffer zone.
Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed.
Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.
Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas.
Operational activities should not impact on rehabilitated or naturally vegetated areas.

</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
<tr><td>
Nature of impact: Changes in water quality due to foreign materials and increased nutrients.

Operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>42 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
Regular independent water quality monitoring should form part of operational procedures in order to identify pollution
Treatment of pollution identified should be prioritized accordingly.
Regular clearing of debris.

</td><td>Medium risk</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>negative)</td><td></td><td></td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: Destruction of vegetation of medium sensitivity along the wetland.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</td><td>12 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>

Rehabilitate construction camps and any other grassland vegetation that was impacted on by the construction. Use grass sods that were removed prior to construction to rehabilitate the construction footprints. Sods must not be stored for lengthy periods and should not be stacked on top of each other or on top of grazed and moist grasslands. The sods should preferably be removed during the winter months and replanted by springtime latest.
Rehabilitation will be successful when the current status quo of the vegetation, without alien invasive plant species, are attained.
Only use indigenous plant species may be used for rehabilitation.
Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent the pedestrian access that are present along the boundary of the wetland.
Ensure that maintenance work does not take place haphazardly, but according to a fixed plan.
Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.
Address erosion as soon as it becomes evident.

</td><td>Low risk</td></tr>
<tr><td>
Nature of the Impact: Destruction or degradation of vegetation associated with the Phragmite australis wetland.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
</table>
</td><td>

After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
Ensure that maintenance work does not take place haphazardly, but according to a fixed plan and only within the dedicated road reserves.
Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be

</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>30 (Low)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>fenced off to prevent vehicular and pedestrian access until such time that rehabilitation was successful.
• Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.
• Address erosion donga crossings, applying soil erosion control and bank stabilisation procedures as specified by the ECO.
• Monitor rehabilitation for at least three years after construction is complete. If monitoring observed failed rehabilitation or erosion, corrective action should be taken immediately to determine the cause and correct the problem.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Bare soils post construction.</u>

Post construction of the rehabilitation measures, the soils could erode or be colonised by alien invasive plant species. The establishment of vegetation is likely the most important stage in the rehabilitation of moist grasslands and the dam wall. This will restore and enhance wetland functionality as well as provide suitable habitat to biodiversity on the site.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Site and downstream (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>14 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Limit the disturbance footprint and vegetation clearing, except for the clearing of alien invasive plant species.

Site preparation:
The following steps must form part of site preparation and the subsequent maintenance of the re-vegetated areas:

• Remove all building rubble, equipment and material;
• Ensure that all alien invasive plant species have been removed.
• Maintain site demarcations, erected prior to construction, in position until the cessation of all construction and rehabilitation work.
• Engage with the community to prevent pedestrian traffic through the rehabilitated areas.
• Rip and/ or scarify all disturbed areas
• Planting should preferably be done during the rainy season.
• Allow for a maintenance and monitoring period of at least two years following completion.</td><td>Low risk</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>Grassland

• Rehabilitate construction camps and any other vegetation that was impacted on by the construction.
• Grasses can be sown. Grass mix containing the following could be used are listed in the table below.
<table><tr><th>Species</th><th>Rate of application</th></tr><tr><td>Eragrotis tef (teff)</td><td>2kg/ha</td></tr><tr><td>Cenchrus ciliaris (buffalo grass)</td><td>5kg/ha</td></tr><tr><td>Cynodon dactylon (Kweek / couch grass)</td><td>4kg/ha</td></tr><tr><td>Digitaria eriantha (Smuts finger gras)</td><td>4kg/ha</td></tr><tr><td>Chloris gayana (Rhodes grass)</td><td>3kg/ha.</td></tr><tr><td>Eragrotis curvula</td><td>4kg/ha</td></tr></table>• The ratio of the seed mix used for re-vegetation is usually specified by the supplier and based on site conditions, however, an average of 3kg/ha is recommended per species
• Perennial species should form the basis of the grass mix, while at least one species used must provide rapid and dense ground cover during the establishment season. This is likely to include annual, fast growing species.
• Seeds must be thoroughly mixed before applying.
• The seeds must be applied according to the required rates.
• Application rates can be increased in areas that are unfavourable or steep, but no more than double the recommendations.
• Seeds can be mixed with a spreading agent such as river sand, bran or finely sifted kraal to ensure even distribution.
• Manure or agricultural lime and granular fertiliser mix can be applied prior to reseeding.
• Once complete, the seeded area must be watered and patted down</td><td></td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>gently.
• Establishment of the vegetation should be monitored for at least two years post relocation. If die back is noted, a specialist should be consulted, and corrective action taken as soon as possible.</td><td></td></tr>
<tr><td>Nature of the Impact: Potential increase in invasive vegetation.

<table><tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr><tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr><tr><td>Duration</td><td>Long term (4)</td><td>Short term (2)</td></tr><tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr><tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr><tr><td>Significance</td><td>30 (Low)</td><td>10 (Low)</td></tr><tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr></table></td><td>• Only use indigenous species, naturally occurring in the area, to rehabilitate the disturbance footprint.
• Monitor and control the rehabilitated areas and remove alien invasive species as soon as they become apparent.
• If maintenance activities are conducted in the area the above management measures are applicable.</td><td>Low</td></tr>
<tr><td>Nature of the Impact: Clearing of land for construction camps and potential pollution of the soil and water.

<table><tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr><tr><td>Probability</td><td>Probable (2)</td><td>Possible (2)</td></tr><tr><td>Duration</td><td>Short term (2)</td><td>Temporary (1)</td></tr><tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr><tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr><tr><td>Significance</td><td>20 (Low)</td><td>12 (Low)</td></tr><tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr></table></td><td>• Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. Monitoring should continue for at least two years after construction is complete.</td><td>Low</td></tr>
<tr><td>Nature of the Impact: Destruction or damage to indigenous trees.

<table><tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr><tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr><tr><td>Duration</td><td>Long term (4)</td><td>Short term (2)</td></tr></table></td><td>• Avoid damage to trees and tree roots.</td><td>Low</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>27 (Low)</td><td>10 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage sites due to the development

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Very improbable (1)</td><td>Very improbable (1)</td></tr>
<tr><td>Duration</td><td>Permanent (4)</td><td>Permanent (4)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>7 (Low)</td><td>7 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>

As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.</td><td>• Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td><td>Low risk anticipated provided that the mitigation measures are implemented correctly.</td></tr>
<tr><td>Nature of Impact: Dust Generation

Construction machinery and heavy vehicles during maintenance which will likely make use of the existing gravel roads to transport equipment and material to the site are likely to generate dust which is likely to be perceptible by adjacent residents and the watercourse. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of maintenance activities.</td><td>• Dust suppression and wet spraying should be implemented during maintenance works.
• Limit maintenance hours to daytime and weekdays.
• Speed limits should be enforced to ensure that the generation of dust by construction vehicles during maintenance are limited.</td><td>Low risk</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>

Source of Impact:

- Construction vehicles.
- Machinery used for maintenance.

Description	Without Mitigation	With Mitigation
Probability	Probable (3)	Improbable (2)
Duration	Temporary (1)	Temporary (1)
Extent	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)
Significance	**27 (Low)**	**14 (Low)**
Status (positive or negative)	Negative	Negative

</td><td></td><td></td></tr>
<tr><td>

Nature of Impact: Noise

Source of Impact:

- Construction vehicles during maintenance.
- Equipment and machinery during maintenance.

Description	Without Mitigation	With Mitigation
Probability	Probable (3)	Improbable (2)
Duration	Short term (2)	Temporary (1)
Extent	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)
Significance	**30 (Low)**	**14 (Low)**
Status (positive or negative)	Negative	Negative

</td><td>

- Inform residents of planned maintenance works.
- Maintenance and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.
- Institute noise control measures throughout maintenance periods.
- Maintenance activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.
- Speed limits must be adhered to.

</td><td>High risk unless mitigation measures are implemented correctly and effectively.</td></tr>
<tr><td>

Nature of Impact: Visual

Description	Without Enhancement	With Enhancement

</td><td>

- Regular maintenance.

</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Probability</td><td>Highly probable (4)</td><td>Definite (5)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>48 (Medium)</td><td>70 (High)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of Impact: Safety

No sewage leakages as a result of burst pipes.
<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>56 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>• Regular maintenance.</td><td>Medium</td></tr>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:
• Overall upliftment of the area.
<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>High (8)</td></tr>
</table>
</td><td>• Regular maintenance</td><td>Medium</td></tr>
</table>

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
Significance	**36 (Medium)**	**56 (Medium)**		
Status (positive or negative)	Positive	Positive		

Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve

Table 12: Operational Impacts

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Nature of Impact: Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medum)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>• Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) on the site above the river area resulting from the proposed stormwater upgrade should be taken into account.</td><td>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</td></tr>
<tr><td>Nature of Impact: Changes in sediment entering and exiting the system.

Maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>39 (Medium)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>• Monitoring should be done to ensure that sediment pollution is timeously dressed.</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of watercourse habitat and fringe vegetation.</td><td>• Weed control in buffer zone.
• Monitor rehabilitation and the occurrence of erosion twice during the</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>rainy season for at least two years and take immediate corrective action where needed.
• Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.
• Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas.
• Operational activities should not impact on rehabilitated or naturally vegetated areas.</td><td>effective rehabilitation of the site is undertaken where necessary.</td></tr>
<tr><td>Nature of impact: Changes in water quality due to foreign materials and increased nutrients.

Operational activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/rivers and a reduction in watercourse function.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Regional (3)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>60 (Medium)</td><td>33 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
• Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
• Regular independent water quality monitoring should form part of operational procedures in order to identify pollution
• Treatment of pollution identified should be prioritized accordingly.
• Regular clearing of debris.</td><td>Medium risk</td></tr>
<tr><td>Nature of the Impact: Destruction of vegetation of medium sensitivity along the wetland.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
</table>
</td><td>• Rehabilitate construction camps and any other grassland vegetation that was impacted on by the construction. Use grass sods that were removed prior to construction to rehabilitate the construction footprints. Sods must not be stored for lengthy periods and should not be stacked on top of each other or on top of grazed and moist grasslands. The</td><td>Low risk</td></tr>
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<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
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<table>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>14 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>sods should preferably be removed during the winter months and replanted by springtime latest.
• Rehabilitation will be successful when the current status quo of the vegetation, without alien invasive plant species, are attained.
• Only use indigenous plant species may be used for rehabilitation.
• Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent the pedestrian access that are present along the boundary of the wetland.
• Ensure that maintenance work does not take place haphazardly, but according to a fixed plan.
• Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.
• Address erosion as soon as it becomes evident.</td><td></td></tr>
<tr><td>Nature of the Impact: Destruction or degradation of vegetation associated with the Phragmite australis wetland.
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
• Ensure that maintenance work does not take place haphazardly, but according to a fixed plan and only within the dedicated road reserves.
• Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular and pedestrian access until such time that rehabilitation was successful.
• Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>• Address erosion donga crossings, applying soil erosion control and bank stabilisation procedures as specified by the ECO.
• Monitor rehabilitation for at least three years after construction is complete. If monitoring observed failed rehabilitation or erosion, corrective action should be taken immediately to determine the cause and correct the problem.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Bare soils post construction.</u>

Post construction of the rehabilitation measures, the soils could erode or be colonised by alien invasive plant species. The establishment of vegetation is likely the most important stage in the rehabilitation of moist grasslands and the dam wall. This will restore and enhance wetland functionality as well as provide suitable habitat to biodiversity on the site.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site and downstream (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Limit the disturbance footprint and vegetation clearing, except for the clearing of alien invasive plant species.

Site preparation:
The following steps must form part of site preparation and the subsequent maintenance of the re-vegetated areas:

• Remove all building rubble, equipment and material;
• Ensure that all alien invasive plant species have been removed.
• Maintain site demarcations, erected prior to construction, in position until the cessation of all construction and rehabilitation work.
• Engage with the community to prevent pedestrian traffic through the rehabilitated areas.
• Rip and/ or scarify all disturbed areas
• Planting should preferably be done during the rainy season.
• Allow for a maintenance and monitoring period of at least two years following completion.

Grassland

• Rehabilitate construction camps and any other vegetation that was impacted on by the construction.
• Grasses can be sown. Grass mix containing the following could be used are listed in the table below.</td><td>Low risk</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td></td><td>
<table>
<tr><th>Species</th><th>Rate of application</th></tr>
<tr><td>Eragrotis tef (teff)</td><td>2kg/ha</td></tr>
<tr><td>Cenchrus ciliaris (buffalo grass)</td><td>5kg/ha</td></tr>
<tr><td>Cynodon dactylon (Kweek / couch grass)</td><td>4kg/ha</td></tr>
<tr><td>Digitaria eriantha (Smuts finger gras)</td><td>4kg/ha</td></tr>
<tr><td>Chloris gayana (Rhodes grass)</td><td>3kg/ha.</td></tr>
<tr><td>Eragrotis curvula</td><td>4kg/ha</td></tr>
</table>

The ratio of the seed mix used for re-vegetation is usually specified by the supplier and based on site conditions, however, an average of 3kg/ha is recommended per species
Perennial species should form the basis of the grass mix, while at least one species used must provide rapid and dense ground cover during the establishment season. This is likely to include annual, fast growing species.
Seeds must be thoroughly mixed before applying.
The seeds must be applied according to the required rates.
Application rates can be increased in areas that are unfavourable or steep, but no more than double the recommendations.
Seeds can be mixed with a spreading agent such as river sand, bran or finely sifted kraal to ensure even distribution.
Manure or agricultural lime and granular fertiliser mix can be applied prior to reseeding.
Once complete, the seeded area must be watered and patted down gently.
Establishment of the vegetation should be monitored for at least two years post relocation. If die back is noted, a specialist should be consulted, and corrective action taken as soon as possible.

</td><td></td></tr>
<tr><td>Nature of the Impact: Potential increase in invasive vegetation.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
</table>
</td><td>

Only use indigenous species, naturally occurring in the area, to rehabilitate the disturbance footprint.
Monitor and control the rehabilitated areas and remove alien invasive

</td><td>Low</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>40 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>species as soon as they become apparent.
• If maintenance activities are conducted in the area the above management measures are applicable.</td><td></td></tr>
<tr><td>Nature of the Impact: Clearing of land for construction camps and potential pollution of the soil and water.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (2)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>22 (Low)</td><td>14 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. Monitoring should continue for at least two years after construction is complete.</td><td>Low</td></tr>
<tr><td>Nature of the Impact: Destruction or damage to indigenous trees.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>36 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Avoid damage to trees and tree roots.</td><td>Low</td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage sites due to the development</td><td>• Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found,</td><td>Low risk anticipated provided that the mitigation measures are implemented correctly.</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Very improbable (1)</td><td>Very improbable (1)</td></tr>
<tr><td>Duration</td><td>Permanent (4)</td><td>Permanent (4)</td></tr>
<tr><td>Extent</td><td>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>Minor (2)</td></tr>
<tr><td>Significance</td><td>7 (Low)</td><td>7 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.
</td><td>must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</td><td></td></tr>
<tr><td>Nature of Impact: Dust Generation

Construction machinery and heavy vehicles during maintenance which will likely make use of the existing gravel roads to transport equipment and material to the site are likely to generate dust which is likely to be perceptible by adjacent residents and the watercourse. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of maintenance activities.

Source of Impact:
• Construction vehicles.
• Machinery used for maintenance.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
</table>
</td><td>• Dust suppression and wet spraying should be implemented during maintenance works.
• Limit maintenance hours to daytime and weekdays.
• Speed limits should be enforced to ensure that the generation of dust by construction vehicles during maintenance are limited.</td><td>Low risk</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>
<table>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Nature of Impact: Noise

Source of Impact:
• Construction vehicles during maintenance.
• Equipment and machinery during maintenance.

<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Short term (2)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>16 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Inform residents of planned maintenance works.
• Maintenance and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.
• Institute noise control measures throughout maintenance periods.
• Maintenance activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.
• Speed limits must be adhered to.</td><td>High risk unless mitigation measures are implemented correctly and effectively.</td></tr>
<tr><td>Nature of Impact: Visual

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>48 (Medum)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table>
</td><td>• Regular maintenance.</td><td>Medium</td></tr>
</table>

<table>
<tr><th>POTENTIAL IMPACTS</th><th>PROPOSED MITIGATION</th><th>RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED</th></tr>
<tr><td>Nature of Impact: Safety

This alternative has a potential for sewer overflows.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>48 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>• Regular maintenance.</td><td>Medium</td></tr>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:
• Overall upliftment of the area.

<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Highly Probable (4)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Long term (4)</td></tr>
<tr><td>Extent</td><td>Local (2)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>48 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>• Regular maintenance</td><td>Medium</td></tr>
</table>

NO GO

No go Alternative (compulsory). This is the option of not upgrading and replacing the sewer pipeline in Stormill Ext 2. This option will result in limited impacts already occurring in the study area. However, should the infrastructure not be developed as proposed, the remaining useful life of the existing pipe have been exceeded and pipes will no longer have structural integrity which will pose serious health and occupational consequences. Overall community upliftment will also fail to occur. The no go alternative will render Johannesburg Water in contravention of NEMA, 1998 and the National Water Act, 1998 in terms of non-compliance by failing to stop the sewerage overflows and blockages. This is an undesirable option for the project as it will pose negative impacts on the social, economic as well as environmental perspectives and is not considered desirable. The negative impacts of the no go option alternative are considered to outweigh the positive impacts of this alternative. The no go option is therefore not preferred.

Table 13: Potential impacts should the Development not be Approved ("No-Go" Alternative)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Changes in sediment entering and exiting the system – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Loss and disturbance of watercourse habitat and fringe vegetation – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Changes in water quality due to foreign materials and increased nutrients – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Destruction of vegetation of medium sensitivity along the wetland – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk

Destruction or degradation of vegetation associated with the *Phragmite australis* wetland – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Bare soils post construction – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Potential introduction and spread of alien vegetation – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Clearing of land for construction camps and potential pollution of the soil and water – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Destruction or damage to indigenous trees – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Loss and disturbance of heritage sites – No-go would imply no heritage sites or artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk No heritage artefacts are expected to be in the study area in its current state.
Visual: during construction – No-go would imply that the study site will remain as is.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Visual: during operation – No-go would imply the study site will remain as is.	N – High	A fully operational sewer system will not allow for bursts and leaks and the resultant overflow especially at manholes.	N – High	High risk
Dust generation – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Crime, safety and security: during construction – No-go would imply that the area remains as is.	P – High	There are no mitigation measures	P – High	Low risk
Noise – No-go would imply no construction noise and no added noise during operation.	P – High	There are no mitigation measures	P – High	Low risk
Traffic and accessibility – No-go would imply that residents	P – High	There are no mitigation measures	P – High	Low risk

continue using the affected Streets without traffic hindrance.				
Socioeconomic impacts anticipated during the construction period – No-go would mean no local job opportunities for general and skilled labourers as well as no opportunities for local retailers.	N – High	Replacement and upgrading of the sewer pipeline will provide job opportunities for locals and for local retailers.	N – High	High risk
Socioeconomic impacts anticipated during the operational period – No-go would mean that overall community upliftment will not occur.	N – High	Replacement and upgrading of the sewer pipeline will allow for complete functioning of sewer system with a lowered risk of bursts and leaks.	N – High	High risk

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

- Appendix G1 – Wetland/Riparian Delineation and Functional Assessment
- Appendix G2 – Vegetation Assessment
- Appendix G3 – Heritage Impact Assessment

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

No gaps in knowledge have been identified at this stage.

The following assumptions are made:

- The information on which the report is based (i.e. project information) is correct.
- The construction, operation and management of this proposed development will be in line with the recommendations in this report, which will be enforced by the implementation of a detailed Environmental Management Programme (EMPr) and the Rehabilitation and Monitoring Plan attached within Appendix H. Much of the long-term success lies in the effective implementation of the measures prescribed in these documents.

3. IMPACTS THAT MAY RESULT FROM THE DECOMISSIONING 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.

Proposed

Potential impacts:	Significance rating of impacts(positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Decommissioning and closure phase has not been considered as part of this application as the end use of the site and required decommissioning activities are not known at this time. It is therefore not possible to predict the potential environmental impacts. In addition, it is unlikely that decommissioning will be contemplated due to the nature of the development. If decommissioning phase is considered in future, the developer will undertake the required actions as prescribed by the legislation at the time and comply with all relevant requirements administered by any relevant authority and competent authority at that time.				

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.

Specialist studies for decommissioning and closure phase will be undertaken at the time when decommissioning is contemplated by the developer.

4. 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:

Cumulative impacts can result from actions which may not be significant on their own but which are significant when added to the impact of other similar actions. The anticipated cumulative impacts of this development (for all alternatives) includes the following:

- **Impacts on the Wetland**

Impacts associated with construction could increase the significance of this impact already present as a result of other activities in the area such as dumping; erosion and pollution input and infilling are amongst the most significant impact. Some changes in the hydrology of the wetlands could occur due to ineffective sediment control and rehabilitation. It is imperative that effective protective measures should be put into place and monitored. A rehabilitation plan should be put into action should any degradation be observed as a result of stormwater or sediment input. Increases in stormwater flows will definitely cause permanent degradation downstream unless mitigated at the design level.

- **Destruction or degradation of vegetation associated with watercourses, protected plants and plants of conservation concern**

Loss of functionality of the vegetation within the watercourse, as well as erosion due to edge effects. If mitigation measures are adequately implemented, no cumulative impacts are expected.

- **Exposure to erosion and subsequent sedimentation or pollution of proximate watercourses**

Erosion within the Honeydew area will degrade the vegetation and lead to the colonisation by alien invasive plant species. Possible contamination of wetlands and/or groundwater reserves due to hydrocarbon or other spillage and an increase of modified areas (together with surrounding developments) that will affect flora population dynamics and runoff patterns.

- **Direct impact on species richness and loss of habitat (fauna)**

Construction and operational activities may result in cumulative impact to the traditional migration routes of mammals, reptiles and especially frogs on the study site and on adjacent properties. Altered population dynamics of natural indigenous species could cause significant impact on overall faunal community structure and alter

natural food-chains. It is imperative that effective protective measures should be put into place to protect wetlands and their buffer areas. The increased roads and traffic will definitely cause permanent disruption of migration routes unless mitigation takes place.

- **Potential increase/Removal in invasive vegetation**

If mitigation measures to limit and prevent the spread of alien species are not implemented, the cumulative impact could lead to remaining natural vegetation transformed by alien plant species. The removal and sustained low or no infestation with alien invasive species will have a positive cumulative impact as the seed source of these species within the area will be reduced.

- **Cumulative Impacts on traffic congestion**

Traffic accommodation is required for construction activities affecting the travelled way as well as the sidewalks of the travelled way. If any road closure is expected, "Stop and Go" will be used for traffic accommodation. In the case of complete road closure, traffic diversion must be accommodated for.

- **Increased socio-economic upliftment as a result of the proposed development**

Constructing the proposed development will result in direct jobs being created during the proposed upgrade and replacement of the pipeline. The sewer pipeline in the area will be more resistant and long lasting with lowered risk of bursts.

Responsible environmental management will be required during the entire project life cycle. These management measures should be guided by the Environmental Management Programme (EMPr) and the Rehabilitation and Monitoring Plan attached within **Appendix H**.

5. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impacts 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.

Proposal (preferred alternative)

The proposed activities assessed within this Basic Assessment Report are required to provide essential information associated with the proposed replacement and upgrade that may impact on the environment. In summary, the Basic Assessment has assessed potential impacts and identified appropriate management and mitigation measures. No environmental fatal flaws and no significant negative impacts have been identified to be associated with the proposed activities. The Impact Assessment section of this report indicates that the identified environmental impacts associated can be effectively mitigated to have a low significance impact rating provided

the recommended mitigation and management measures are implemented.

Environmental cost that can be expected to arise as a result of the project proceeding for all alternatives include:

Disturbance of the wetland

- Riparian areas may be disrupted during the construction phase.

Benefits of the project include the following:

- The proposed development will negate the problem of sewer pipe bursts and leaks and resultant overflow especially at manholes.
- The proposed development will result in important economic benefits at the local and regional scale through job creation, procurement of materials for construction and provision of services and other associated economic development at local and regional scale. These will extend beyond the site and would be experienced at local and regional scale.
- Overall community upliftment will occur as a required service will be fully functional in operation.

The benefits of the project are expected to outweigh the costs.

A number of mitigation and monitoring measures have been identified which would allow for the minimisation and management of potential environmental impacts associated with the proposed development, which have been included in the EMPr and the Rehabilitation and Monitoring Plan attached within **Appendix H** for the project, which will be further developed during the detailed planning and construction phase of the project.

It is the opinion of Envirolution Consulting (Pty) Ltd that the proposed project will not have a significant environmental impact and is therefore preferred as it is considered to be sustainable from an environmental perspective.

No-go (compulsory)

This is the option of not replacing and upgrading the sewer pipe and associated infrastructure. This option will result in limited impacts already occurring in the study area. However, should the infrastructure not be replaced and upgraded as proposed, the social benefits (JW's objectives) associated with the proposed activities will not be addressed. This is an undesirable option for the project as it will not only pose negative impacts on the social perspective, but on the economic perspective as well. The no go option is therefore not preferred.

6. IMPACT SUMMARY OF THE PROPOSAL OR PREFERRED ALTERNATIVE

Table 14: Impact Summary table

Construction Phase				
Negative Environmental Impacts	**Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)**		**Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.	**Medium**	**Low**	**Medium**	**Low**
Changes in sediment entering and exiting the system.	**Medium**	**Low**	**Medium**	**Medium**
Loss and disturbance of watercourse habitat and fringe vegetation.	**Low**	**Low**	**Medium**	**Low**
Changes in water quality due to foreign materials and increased nutrients.	**Medium**	**Low**	**Medium**	**Medium**
Destruction of vegetation of medium sensitivity along the wetland.	**Medium**	**Low**	**Medium**	**Low**
Destruction or degradation of vegetation associated with the *Phragmite australis* wetland.	**Medium**	**Low**	**High**	**Medium**
Potential introduction and spread of alien vegetation.	**Medium**	**Low**	**Medium**	**Low**
Clearing of land for construction camps and potential pollution of the soil and water.	**Medium**	**Low**	**Medium**	**Low**
Destruction or damage to indigenous trees.	**Low**	**Low**	**Medium**	**Low**
Loss and disturbance of heritage sites due to the	**Low**	**Low**	**Low**	**Low**

development.				
Visual	**Medium**	**Medium**	**High**	**Medium**
Dust generation.	**High**	**Low**	**High**	**Medium**
Crime, safety and security.	**Medium**	**Low**	**Medium**	**Low**
Noise	**High**	**Medium**	**High**	**Medium**
Traffic and accessibility.	**Medium**	**Medium**	**Medium**	**Medium**
Operation Phase				
Nature of Impact	**Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)**		**Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**Without Mitigation**
Changing the quantity and fluctuation properties of the watercourse by for example diverting or obstructing flow.	**Low**	**Low**	**Medium**	**Low**
Changes in sediment entering and exiting the system.	**Low**	**Low**	**Medium**	**Low**
Loss and disturbance of watercourse habitat and fringe vegetation.	**Low**	**Low**	**Medium**	**Low**
Changes in water quality due to foreign materials and increased nutrients.	**Medium**	**Low**	**Medium**	**Medium**
Destruction of vegetation of medium sensitivity along the wetland.	**Low**	**Low**	**Medium**	**Low**
Destruction or degradation of vegetation associated with the *Phragmite australis* wetland.	**Low**	**Low**	**Medium**	**Low**
Bare soils post construction	**Medium**	**Low**	**Medium**	**Low**
Potential introduction and spread of alien	**Low**	**Low**	**Medium**	**Low**

vegetation.				
Clearing of land for construction camps and potential pollution of the soil and water.	Low	Low	Low	Low
Destruction or damage to indigenous trees.	Low	Low	Medium	Low
Loss and disturbance of heritage sites due to the development.	Low	Low	Low	Low
Dust generation.	Low	Low	Medium	Low
Noise	Low	Low	Medium	Low
Positive Environmental Impacts	**Method Alternative 1: Pipe Cracking of existing sewer line (Preferred)**		**Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve**	
	Without Enhancement	**With Enhancement**	**Without Enhancement**	**With Enhancement**
Socioeconomic impacts anticipated during construction phase	Low	Medium	Low	Medium
Socioeconomic impacts anticipated during operational phase	Medium	Medium	Medium	Medium
Visual impacts anticipated during operational phase	Medium	High	Medium	Medium
Safety during operational phase	Medium	Medium	Medium	Medium

7. SPATIAL DEVELOPMENT TOOLS

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

Arc GIS was used as a spatial development tool to determine the presence of:

- Rivers and wetlands (and associated buffers);
- CBA Areas (ecological support areas and protected areas);
- Ridges;
- Geology and Soils; and
- Land Use cover

8. 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

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:

A number of mitigation and monitoring measures have been identified which would allow for the minimisation and management of potential environmental impacts associated with the proposed development. These have been included in the EMPr and the Rehabilitation and Monitoring Plan attached within **Appendix H**.

This Report has identified and assessed the potential impacts on the environment associated with the proposed replacement and upgrade of the sewer pipe and associated infrastructure in Stormill. It is therefore proposed that authorisation is granted.

The project will result in some unavoidable environmental impacts during construction but this is not a fatal flaw. The nature of the project has been planned in such a way that there are minimal negative environmental impacts. None of these adverse impacts are considered unacceptably significant and all can be managed to acceptable levels through the effective implementation of the recommended mitigation measures. In addition, the project will provide benefits to the local community in terms of service provision and safety.

Envirolution is in favour of Method Alternative 1: Pipe Cracking of existing sewer line (Preferred) in relation to Method Alternative 2: Replacing sewer lines and moving all the mid blocks to the road reserve.

Alternative 1 is most suitable wh where there are services underneath and within stand boundaries as well as

road crossings. This method has minimal disruption to the existing services and man-made features during construction which results in fewer environmental impacts in comparison to Alternative 2. Alternative 1 is best to minimize the destruction of movement of Human and vehicle traffic. Alternative 2 gives access to the pipeline and manholes for maintenance purposes in case of blockages since it has been found that it is not easy for operations to access the midblock pipeline. However, this alternative will require long connections which may not have the required slopes thereby compromising on standards and pose potential sewer overflows in the properties. In some areas there are also services and big trees on the road reserve which limits the space to relocate the pipelines to the road reserves. Alternative 2 will result in major disruption to the existing services and man-made features during construction which results in more environmental impacts in comparison to Alternative 1.

The impacts are expected to be medium, however with mitigation, it can be lowered to medium-low. Both alternatives allow for local labour as well as supplies. Both alternatives require works along the affected streets and may cause traffic disturbance during the construction phase, more so Alternative 2. In terms of operational impacts, for Alternative 1, these are expected to be low. Alternative 2 is expected to have medium impacts during the operational phase as a result of the long connections which may not have the required slopes thereby compromising on standards and pose potential sewer overflows in the properties. This alternative will require more maintenance in comparison to Alternative 1.

Based on the assumption Envirolution believes through effective implementation of the stipulated mitigation measures, the adverse impacts can be reduced. With the proposed mitigation measures, GDARD may agree that the project's benefits outweigh the potential negative impacts.

General Recommendations

Envirolution Consulting (Pty) Ltd recommends that Method Alternative 1: Pipe Cracking of existing sewer line (Preferred) be considered for approval subject to the following general recommendations:

1. Implementing the EMPr and the Rehabilitation and Monitoring Plan to guide construction and operational activities to provide a framework for the on-going assessment of environmental performance.
2. Water Use License: The relevant authorisations and water use licenses must be obtained from the Department of Water and Sanitation prior to the commencement of construction activities.
3. No development other than the authorized activities will be allowed within a watercourse or 30m buffer of the watercourse measured from the edge of the watercourse.
4. An independent ECO must be appointed/ designated to ensure that regular inspections are performed during the construction phase and to ensure the implementation of mitigation measures. Furthermore, an ECO must monitor compliance with all the conditions of the EMPr, Rehabilitation and Monitoring Plan, specialist reports, Environmental Authorisation (once issued) and the Water Use License (once issued).

5. There is continued consultation with relevant stakeholders through an appointed community liaison officer during construction.
6. Reports on the status of construction and legal compliance are submitted to GDARD at stipulated intervals.
7. Clearance of the area should be as minimal as possible and construction activities be confined to areas where construction will take place (development footprint) to prevent negative impacts onto the surrounding environment.
8. Avoid, as far as reasonably possible, disturbing the wetlands. Similarly, restore wetlands that will remain intact if they have been affected by construction activity.
9. Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and soil, thus preventing surface and groundwater pollution.
10. Servicing/maintenance/washing of vehicles must not be carried on the construction site and only emergency repairs can be done on site.
11. In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of NEMA.
12. Construction noise on site must not exceed 85 decibels (DB) as stipulated in the Occupation Health and Safety Act.
13. All relevant legislation and requirements of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
14. Compliance with all legal requirements in relation to environmental management and conditions of the authorisation issued by GDARD.
15. Maximise the employment of local people and the procurement of local resources during the construction and maintenance phases to ensure maximum benefit to the provincial/local economy.
16. Implement the recommendations made in the specialist studies and EMPr.
17. The EMPr, Rehabilitation and Monitoring Plan, specialist reports, Environmental Authorisation (once issued) and the Water Use License (once issued) should form part of the contractor's tender documentation.

On completion of the project, the site must be rehabilitated, all litter and construction debris must be removed from the site immediately. All waste must be disposed of at a registered or permitted waste disposal site for the type of waste produced.

From the impact assessment, it is evident that prior to mitigation, impacts associated with the proposed rehabilitation and upgrade are generally moderate. Thus, based on the specialist recommendations, it is the opinion that the project be considered favourably and environmental authorisation granted for the proposed activities, provided the essential and recommended mitigation measures as defined in this report are strictly

adhered to.

9. THE NEEDS AND DESIREBILITY OF THE PROPOSED DEVELOPMENT (as per notice 792 of 2012, or the updated version of this guideline)

The existing pipes have either reached or surpassed their useful life span thus Johannesburg Water has decided to replace the pipes with a more suitable pipe material as part of their city-wide pipe replacement programme. The primary benefit of the replacement would ensure a reliable sewer system as well as improve future operational efforts to provide adequate accessibility for maintenance of the system. This would in turn allow for the overall upliftment of the community. The project will also create jobs which will provide an extent of relief to the problem of unemployment being faced within the city.

10. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED *(CONSIDER WHEN THE ACITIVTY IS EXPECTED TO BE CONCLUDED*

Duration and Validity: The environmental authorisation is required for a period of 10 years from the date of issue. Should a longer period be required, the applicant/ EAP will be required to provide a detailed motivation on what the period of validity should be.

11. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) (must include post construction monitoring requirements and when these will be concluded.)

If the EAP answers "Yes" to Point 7 above then an EMPr is to be attached to this report as an Appendix

EMPr attached	YES

SECTION F: APPENDICES

The following appendices must be attached as appropriate (this list is inclusive, but not exhaustive):
It is required that if more than one item is enclosed that a table of contents is included in the appendix

Appendix A: Site plan(s) – *(must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)*

- A1: Locality Map
- A2: C-Plan Map
- A3: Hydrology Map
- A4: Wetland Delineation Map
- A5: Soil Map
- A6: Broad Vegetation Map
- A7: Vegetation Sensitivity Map

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Route Position Information – N/A

Appendix E: Public participation information

- E1: Proof of Site Notices
- E2: Notification
- E3: Proof of Advertisement
- E4: Correspondence – **N/A**
- E5: Meeting Minutes – **N/A at this stage**
- E6: Comments and Response Report – **N/A**
- E7: Comments from I&APs on Basic Assessment (BA) Report – **N/A at this stage**
- E8: Comments from I&APs on amendments to the BA Report – **N/A**
- E9: IAP Database

Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

Appendix G: Specialist Reports

- G1: Wetland/Riparian Delineation and Functional Assessment

- G2: Vegetation Assessment
- G3: Heritage Impact Assessment

Appendix H: EMPr

- H1: Environmental Management Programme
- H1(i): General Wetland Rehabilitation and Monitoring Plan

Appendix I: Other information

- I1: EAP Declaration and Expertise
- I2: Specialist Declaration and Expertise
- I3: Screening Report

CHECKLIST

To ensure that all information that the Department needs to be able to process this application, please check that:

- Where requested, supporting documentation has been attached;
- All relevant sections of the form have been completed.