DRAFT BASIC ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF A BULK SEWER PIPELINE IN ZANDSPRUIT, GAUTENG PROVINCE

GDARD NEW REFERENCE NO.: GAUT 002/22-23/E3481
GDARD OLD REFERENCE NUMBER: GAUT 002/22-23/E3313

DATE: JANUARY 2023

COMPILED BY:
Envirolution Consulting (Pty) Ltd
PO Box 1898, Sunninghill, 2157
Tel: (0878) 985 000
Fax: (0861) 62 62 22
E-mail: info@envirolution.co.za
Website: www.envirolution.co.za

PREPARED FOR:
CityDev (Pty) Ltd
96 Jorissen Street
Braamfontein
2017

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 1/2022)

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.
2. This template is current as of April 2022. It is the responsibility of the EAP to ascertain whether subsequent versions of the template 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 must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority (uploaded to the EIA online system) empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application. The EIA online system can be accessed at https://eia.gauteng.gov.za.**
5.
6. **A copy (PDF) of the final report and attachments must be uploaded to the EIA online system. The EIA online system can be accessed at https://eia.gauteng.gov.za.**
7. **Draft and final reports submitted in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) must be emailed to environmentsue@gauteng.gov.za.**
8. 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.
9. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
10. An incomplete report may lead to an application for environmental authorisation or Waste Management License being refused.
11. 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 authorization or Waste Management License being refused.
12. 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 or Waste Management License being refused.
13. The applicant must fill in all relevant sections of this form. Incomplete applications will not be processed. The applicant will be notified of the missing information in the acknowledgement letter that will be sent within 10 days of receipt of the application.
14. 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.
15. 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 Sustainable Utilisation of the Environment (SUE) Branch
P.O. Box 8769
Johannesburg
2000

Ground floor, Umnotho House, 56 Eloff Street, Johannesburg

Administrative Unit telephone number: (011) 240 3051/3052
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?

This Report is still in a draft stage and is being released to the public and state departments for review and comments.

I. PROJECT DETAILS

Report Title	:	Basic Assessment Report
Report Status	:	Draft
Review Period	:	19 January 2023 – 20 February 2023
Project Title	:	The Proposed Development of a Bulk Sewer Pipeline in Zandspruit, Gauteng Province
Applicant	:	CityDev (Pty) Ltd
Environmental Consultant	:	Envirolution Consulting (Pty) Ltd
GDARD Reference No.:	:	GAUT 002/22-23/E3481
GDARD Old Reference number	:	GAUT 002/22-23/E3313

II. DOCUMENT CONTROL

PREPARED BY:

Nirvasha Rajdeo
(*BSc Hons Environmental Science)*
(Cert.Sci.Nat No : 125582)

REVIEWED BY:

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

III. DECLARATION

Envirolution Consulting (Pty) Ltd was contracted by CityDev (Pty) Ltd 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 CityDev (Pty) Ltd. 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:	CityDev (Pty) Ltd
Applicant representative:	Bernard Andre Stegmann
Position:	Director
Postal address:	96 Jorissen Street Braamfontein 2017

V. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)'s DETAILS

Environmental Assessment Practitioner (EAP):	Karthigesan Govender		
Contact person:	Nirvasha Rajdeo		
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 20 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.

Nirvasha Rajdeo – The editor of this Basic Assessment Report, holds a BSc Honours Environmental Modelling and Monitoring degree from the University of South Africa. She has over 2 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. Nirvasha is currently an 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
Bokamoso Landscape Architects and Environmental Consultants CC	Wetland Assessment	July 2022
	Terrestrial Biodiversity Assessment	July 2022
Apelser Archaeological Consulting	Heritage Impact Assessment Phase 1	April 2022
Johhny van Schalkwyk	HIA Specialist Opinion Letter	July 2022

ABBREVIATIONS

BAR	Basic Assessment Report
CoJ	City of Johannesburg
DBAR	Draft Basic Assessment Report
DWS	Department of Water and Sanitation
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
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No. 36 of 1998)
RDF	Recommended Design Flood
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEF	Safety Evaluation Flood
SMP	Stormwater Management Plan
WULA	Water Use License Application

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES:

SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

1.1 Project Title

The Proposed Development of a Bulk Sewer Pipeline in Zandspruit, Gauteng Province.

1.2 Background

This Project was initially started with the following GDARD reference number: **GAUT 002/22-23/E3313** and has now ben initiated via a new reference number **GAUT 002/22-23/E3479**.

CityDev (Pty) Ltd is proposing the construction of a bulk sewer pipeline within Zandspruit located in Region C of the City of Johannesburg, Gauteng Province. Zandspruit has been the scene of potential opportunities with regards to development by private and public entities over the last few years. CityDev (Pty) Ltd has identified the requirement for a bulk sewer line to be implemented for the proposed Zandspruit X93 to 96 Residential Development over Portions 92 to 95, and to subsequently cater for future earmarked housing developments in the area.

1.3 Proposed Scope

The proposal entails the development of a 250mmØ (provisional) bulk sewer pipeline. The last 700m from the connection ZSXX to ZS12 will likely be a 315mmØ pipe to prevent excessively deep trenches. The total pipe length is 2285.70m. An 8m wide development footprint should be allowed for the installation length. PVC pipes will be used. The development also includes 36 new manholes. The ultimate design flow for the sewer catchment calculated using a density of 120 units/ha for the undeveloped areas is 95 l/s peak flow. The initial flow for the residential development of X93 to 96 is 9.93 l/s. A servitude of 3m wide will be registered in favour of the City of Johannesburg as applicable

The sewer pipe will be constructed below ground. As per advice from the client (CityDev), CoJ and GDARD, it has been agreed that the underground pipeline will be preferred and accompanied with wetland offsets such as rehabilitation in the open area above the pipeline as per CoJ Catchment Policy, from a functionality perspective. This rehabilitation plan can be found under **Appendix I4 - General Wetland Rehabilitation and Monitoring Plan**.

The current approved townships, upstream of the wetlands, that will benefit from the below ground pipeline is Zandspruit x32 (767 units), X 93 (361 units), X94 (105 units) and x95 (114 units) i.e. total of 1,347 units. The applicant is the developer of x94 & X95 which only comprise 229 units of the total 1347 units and X96 which

comprises of 112 residential stands.

1.4 Locality of study site

The proposed sewer line connects from X96 over Portion 95 of the residential development to an existing sewer line that is situated along Constantia Street, west of the Jackal Creek Golf Estate. The proposed sewer line connects from X93 to 95 over Portions 92 to 94 to an existing sewer line north west of Jackal Creek Golf Estate, Johannesburg, Gauteng Province. The sewer line runs along the eastern side of the Sandspruit tributary. The geographic co-ordinates are included within **Appendix D – Route Position Information**. Refer to Figure 1 below for the locality map.

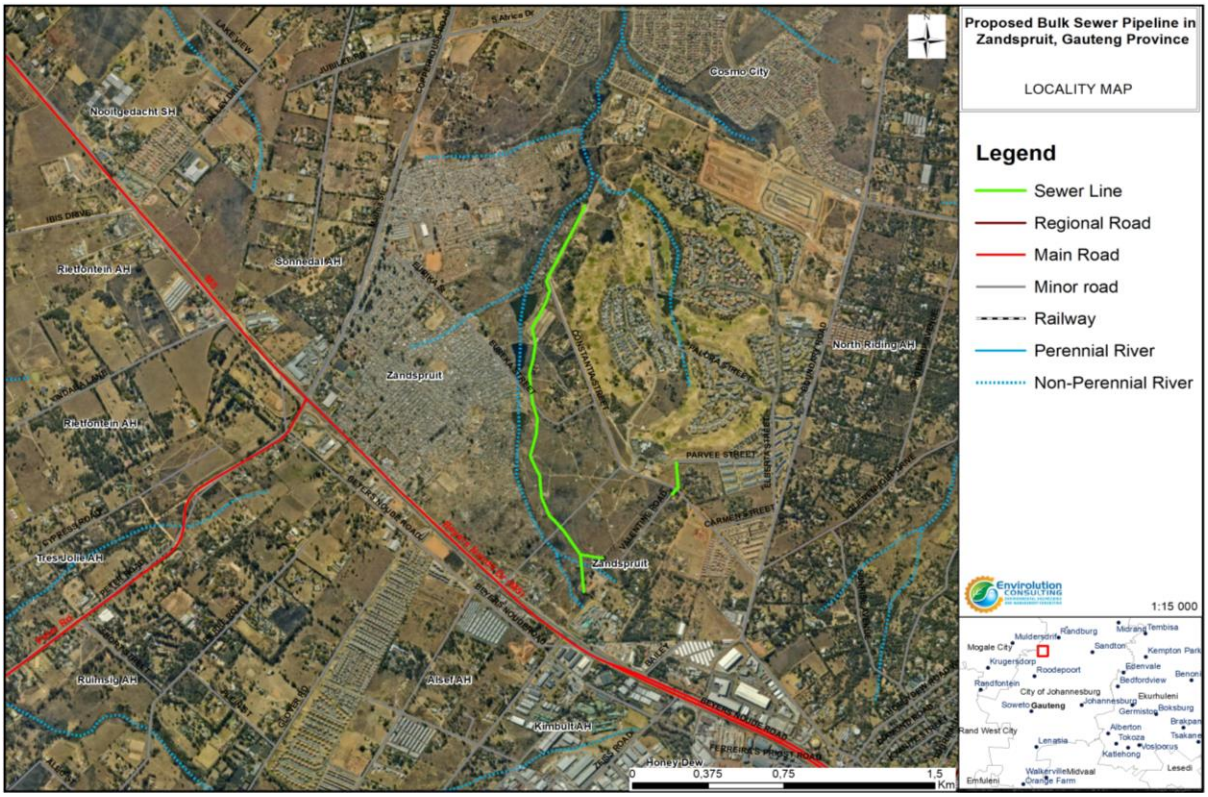


Figure 1: Locality Map

Select the appropriate box

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

Water Use License Application as per the National Water Act (Act No. 36 of 1998) from the Department of Water

and Sanitation.

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 (via **Appendix G1** – Wetland Assessment). The following reports/ studies as outlined below will be required to be uploaded with the Water Use License Application:

- Basic Assessment Report;
- Wetland Assessment; and
- Risk Assessment.

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

2.1 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 1: 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: o Development must be socially, environmentally, and economically sustainable. o Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. o A 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 Forestry, Fisheries and Environment (DFFE) 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 Act, 2008 (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	National Department of Forestry, Fisheries and Environment (DFFE)	While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	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.	Gauteng Department of Agriculture and Rural Development (GDARD)	found application in the EIA Phase. 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. 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	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 works taking place within close proximity to wetland areas. 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
	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 Act107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.	National Department of Forestry, Fisheries and Environment (DFFE)	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 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.	National Department of Forestry, Fisheries and Environment (DFFE) National Department of Forestry, Fisheries and Environment (DFFE) – lead authority for regulating hazardous waste. Provincial Environmental Department – for regulating general waste	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.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	S18, S19 and S20 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.	National Department of Forestry, Fisheries and Environment (DFFE)	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

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
			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 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.	South African Heritage Resources Association (SAHRA) The Provincial Heritage Resources Authority Gauteng (PHRAG)	Should any heritage sites be unearthed during excavations, a permit would be required to be obtained from SAHRA.
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.	National Department of Forestry, Fisheries and Environment (DFFE)	No permitting is required. The act finds applicability during the public participation process phase of the Basic Assessment process.
Occupational Health and Safety (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.

2.2 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 2: 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, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse". *The proposed project will result in infilling and depositing of more than 10m³ into a watercourse as sections of the pipeline crosses the watercourse and wetland areas. In addition the excavation and removal of soil materials of more than 10m³ from a watercourse is likely to take place.*
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 as a result of the wetland area. The clearance of vegetation of approximately 300 square metres may occur within the wetland and buffer area. The entire alignment of the bulk sewer line is situated within Ecological Support Areas and Important Areas.*
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*

		within a wetland area, an area identified as sensitive area, and as within Ecological Support Areas and Important Areas as per the Gauteng Conservation Plan.

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.

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

The following fundamental design goals have been considered:

- Capacity
- Durability, Serviceability and Sustainability
- Economy
- Constructability
- Aesthetics

Provide a description of the alternatives considered

Table 3: Alternatives

No.	Alternative type, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
1.	**Alternatives**	**Alternative 1 – Plasticized Polyvinyl Chloride (PVC) Underground Pipes (Preferred)** PVC is a low maintenance and low-cost material that is widely used in buildings such as water and sewer pipelines. **Advantages** • Strength and Durability – PVC pipes have high tensile and impact strength which make them a long-lasting solution for all types of plumbing needs. They are flexible and have excellent bendability which makes them ideally suited for handling during construction and also during events like earthquakes. PVC pipes are also rustproof and UV resistant, which, along with their flexibility, makes them incredibly long-lasting. • Non-toxic – the PVC material is entirely stable and non-reactive and can withstand temperature up to 60°C. This makes it an ideal medium for carrying potable and other types of water. • Easy to install and lightweight – PVC pipes weigh a fraction of the weight of metal pipes. This lightweight feature makes it easy to handle, transport and install. • Cost-effective – Its weight makes it cheaper to handle, transport, and reduces labour costs during installation. Also, the material itself is much more affordable to produce as compared to metal. • Leak-resistant – PVC pipes come in varying lengths which make it easier for construction workers to minimise the number of joints. This keeps chances of leakage to the minimum. It requires no welding or metalwork as joint fittings

		are attached and sealed with solvent cement. • Maximum Flow – PVC pipes have a smooth inside surface which minimises friction inside the pipe and guarantees free and fast flow of water. **Disadvantages** • Poor heat resistance is one of its major defects. Its tensile strength decreases when the temperature exceeds 60°C (applicable to continuous discharge temperature does not exceed 40°C, the instantaneous discharge temperature does not exceed the 80°C day of sewage). Therefore, PVC pipes are not suitable for use in high temperature places, which also limits its application to a certain extent. • PVC is also fragile, especially if installed outdoors. Therefore, it is necessary to have backfill sand around the PVC pipes required during construction to avoid leakage of PVC pipes. • The resistance to mechanical shock is poor. • The expansion coefficient is large • The pressure bearing capacity is weak. • The PVC pipe pressure bearing capacity lacks 0.4Mpa. • The drainage noise is large. Because the inner wall of the PVC pipe is relatively lubricated, the water flow is not easy to form a water film flowing along the pipe wall, and the pipe wall is in a chaotic state. **<u>Underground</u>** This will be a gravity pipeline following the contours and will be laid at a depth of ±2.5m to invert level. Backfill will be controlled. The bedding and fill blanket up to 300mm above the pipe will be compacted as per normal specifications. The general backfills to be done to a density that is similar to the surrounding soils. DCP testing can be done to

		assist with determining compaction. Sagging will be monitored and backfilled during the 12 months following completion. As the pipeline follows the contours and with the controlled backfill, it is very probable that water will still seep across the pipe scar. One could also fully compact a small section every 20/30m to further intermittently divert any flow within the pipe scar. Pipe material selected to be HDPE with electrofusion joints. This will prevent water infiltration as joints are omitted and HDPE is a durable pipe with a thick wall. Johannesburg Water will be requested to allow increased manhole spacing to 150m (normal maximum spacing is 80m). With this, offsets are being considered such as rehabilitation in the open area just above the pipeline as per CoJ Catchment Policy, from a functionality perspective. The wetland specialist has assisted with the offset suggestions. This rehabilitation plan can be found under **Appendix I4 - General Wetland Rehabilitation and Monitoring Plan.**
		Alternative 2 – High Density Polyethylene above ground Piping (HDPE) Pipes HDPE pipe is a type of flexible plastic pipe used for fluid and gas transfer and is often used to replace ageing concrete or steel mains pipelines. Made from the thermoplastic HDPE, its high level of impermeability and strong molecular bond makes it suitable for high pressure pipeline. The pipe material selected is to be HDPE with electrofusion joints. This will prevent water infiltration as joints are omitted and HDPE is a durable pipe with a thick wall. **Advantages** • Good low-temperature impact resistance. • Excellent chemical resistance. • Safety of potable water and long-term reliability.

		• Resistance to corrosion, tuberculation, deposits. • Flexibility to speed installations. • Freeze-break resistance. • Lightweight, easy to transport. • Low scrap value, avoiding Jobsite theft. • Durability and toughness to survive Jobsite installations. • No flame used for joining, with many fitting and joining options. • Recyclable, eco-friendly material. • Heat fusible for virtually leak-free performance. **Disadvantages** • High thermal expansion. • Poor weathering resistance. • Subject to stress cracking. • Difficult to bond. • Flammable. • Poor temperature capability. • Low strength/stiffness. **<u>Above Ground</u>** It is technically possible to lay the pipe above ground for the section trough the wetland. In this case, reinforced concrete plinths will be placed at 6m intervals to support the pipe. Pipe material may be ductile iron (or steel with cement mortal lining).

		The adjacent informal settlement increase the possibility of theft of plinth steel rebar and/or the steel/iron pipes even. The above ground will impact very negatively on the aesthetic view of the households towards the three pans. It is expected that the public open spaces will be landscaped (in future) to improve access to the dams areas for recreation. The above ground pipe will create an unnecessary barrier. Above ground is expected to require maintenance to be carried out by CoJ. Maintenance may include repairs to damaged pipe coatings and plinths as pipes will be exposed to the public and elements.

Comparison

	Alternative 1 – PVC Pipe (Preferred)	**Alternative 2 – HDPE Pipe**
Pipe Manufacturing Material	Plasticized Polyvinyl Chloride — Thermoplastic Polymer.	High Density Polyethylene — Thermoplastic Polymer.
Rigidity	Very stiff, bendable but rigid.	Extremely flexible.
Length / Storage	Lengths are restricted to transport limitations and application requirements — Stacked straight by full length.	Potentially available in great lengths — Can be coiled.
Sizing	Limited to standard pipe diameters that max out around 24" inches.	Can be moulded to potentially very wide pipe diameters.
Pipe Joining / Joints	Require cement or other gluing compound to join pipe.	Require to be heat fused together to create a single piece.
Chemical Compatibility	Is compatible with many common industry chemicals.	
Mechanical Strength	PVC is very rigid and retains a tensile strength and max working pressure that is very effective for PVC's applications.	Some consider HDPE to be mechanically stronger and more durable than PVC pipe. Some characteristics such as tensile strength and stiffness increase with HDPE crystalline content and density.
Cost and Time	Installation of PVC pipes is much faster. They can be installed in any weather conditions, require no specific machinery and are installed quickly. These factors reduce the overall installation costs.	Fusing together HDPE pipes can be expensive and electrical generators are required.

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 (Total environmental (landscaping, parking, etc.) and the operation footprint including storage area)	+/- 18 285.6 m²
Alternatives:	
Alternative 1 (if any)	[redacted]
Alternative 2 (if any)	

Ha/ m²

or, for linear activities:

Length of the activity:

Proposed activity Alternative 1
Alternative 2
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
Alternative

[redacted]
Ha/m^2

A 3m wide servitude will be registered in favour of the City of Johannesburg as applicable.

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 and properties 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 Maps, C-Plan Map, Hydrology Map, Wetland Delineation Map, Vegetation Map and Geology Map 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 layouts are 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)

Please note that the alternatives proposed have the same receiving environment and will therefore be assessed together. It is for this reason that this section will not be duplicated.

1. PROPERTY DESCRIPTION

Property description:
(Including Physical Address and Farm name, portion etc.)

- RE Ptn 232, Farm 191 Zandspruit IQ
- Holding 42, Sonnedal AH
- Zandspruit Ext 32, Zandspruit 191 IQ
- Holding 45, Sonnedal AH
- Holding 46, Sonnerdal AH
- Holding 48, Sonnedal AH
- Ptn 92 (Ptn 21-LG188/964) Farm 191 Zandspruit IQ
- Ptn 93 (Ptn 21-LG188/964) Farm 191 Zandspruit IQ
- Ptn 94 (Ptn 21-LG188/964) Farm 191 Zandspruit IQ
- Ptn 95 (Ptn 21-LG188/964) Farm 191 Zandspruit IQ
- Zandspruit Ext 53
- Ptn 23, Zandspruit 191 IQ
- Portion 44, Sonnedal AH
- Portion 47, Sonnedal AH

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.

	Latitude (S):	Longitude (E):
Proposed Activity (central coordinates): Alternative:	[redacted]	

In the case of linear activities:

Both Alternatives:	Latitude (S):	Longitude (E):
Starting point of the activity Middle point of the activity End point of the activity	[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.

The activity is a linear activity over 500m in length. Please find attached in **Appendix D**.

Addendum of route alternatives attached **YES**

The 21 digit Surveyor General code of each cadastral land parcel

Proposal	• T0IQ00000000019100232 • T0IQ03740000004200000 • NA • T0IQ03740000004500000 • T0IQ03740000004600000 • T0IQ03740000004800000 • T0IQ00000000019100092 • T0IQ00000000019100093 • T0IQ00000000019100094 • T0IQ00000000019100095 • NA • T0IQ00000000019100023 • T0IQ03740000004400000 • T0IQ03740000004700000

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	
Dolomite, sinkhole or doline areas		NO
Seasonally wet soils (often close to water bodies)	YES	
Unstable rocky slopes or steep slopes with loose soil	YES	
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

As per the Screening Report attached as **Appendix I3**, Aquatic Biodiversity holds a very high sensitivity as the sections of the proposed bulk sewer pipeline are to take place within the wetlands and estuaries demarcation. This is depicted in Figure 2 below.

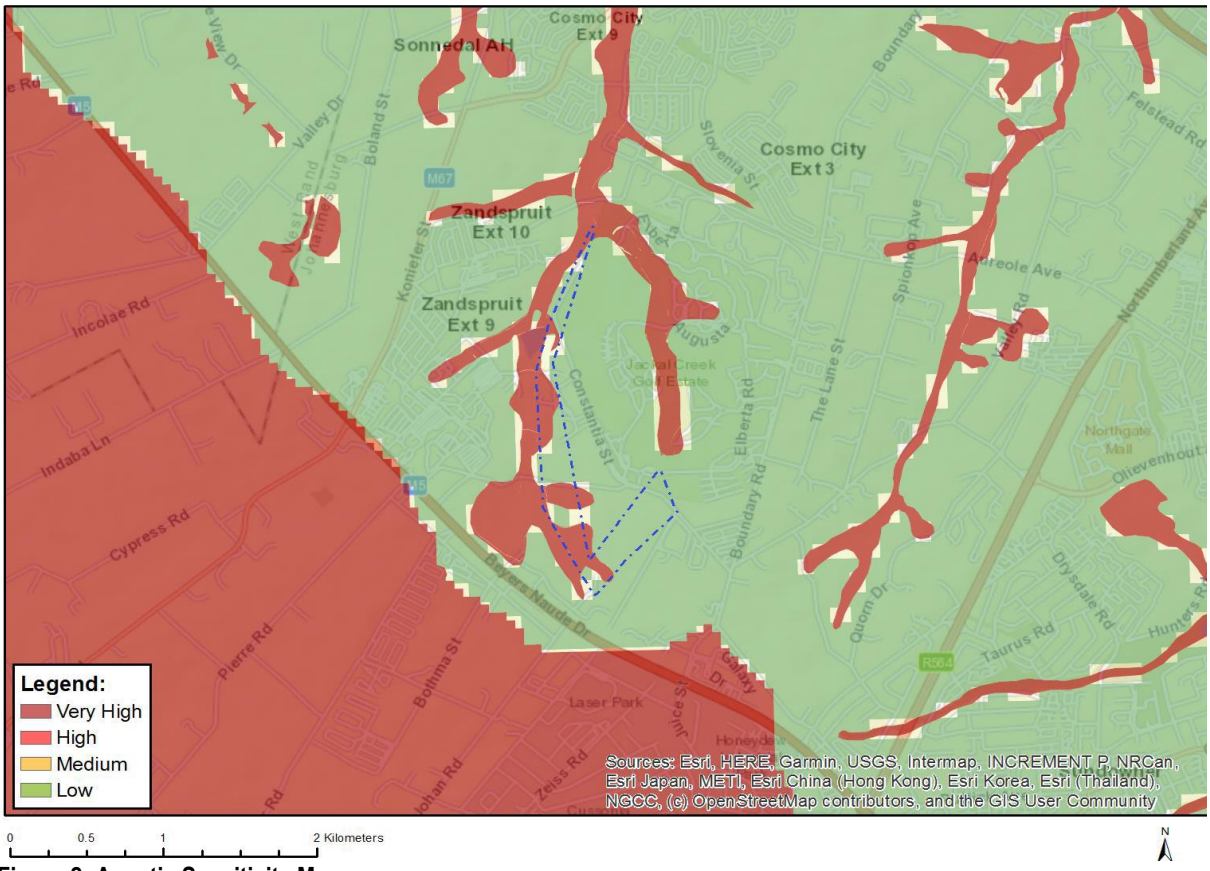


Figure 2: Aquatic Sensitivity Map

The site is situated in quaternary catchment A21C of the Limpopo Water Management Area (WMA). The Sandspruit River runs from south to north from the proposed Zandspruit X93-96 development towards Cosmo City. Multiple dams and wetlands are indicated on the Hydrology Map below.

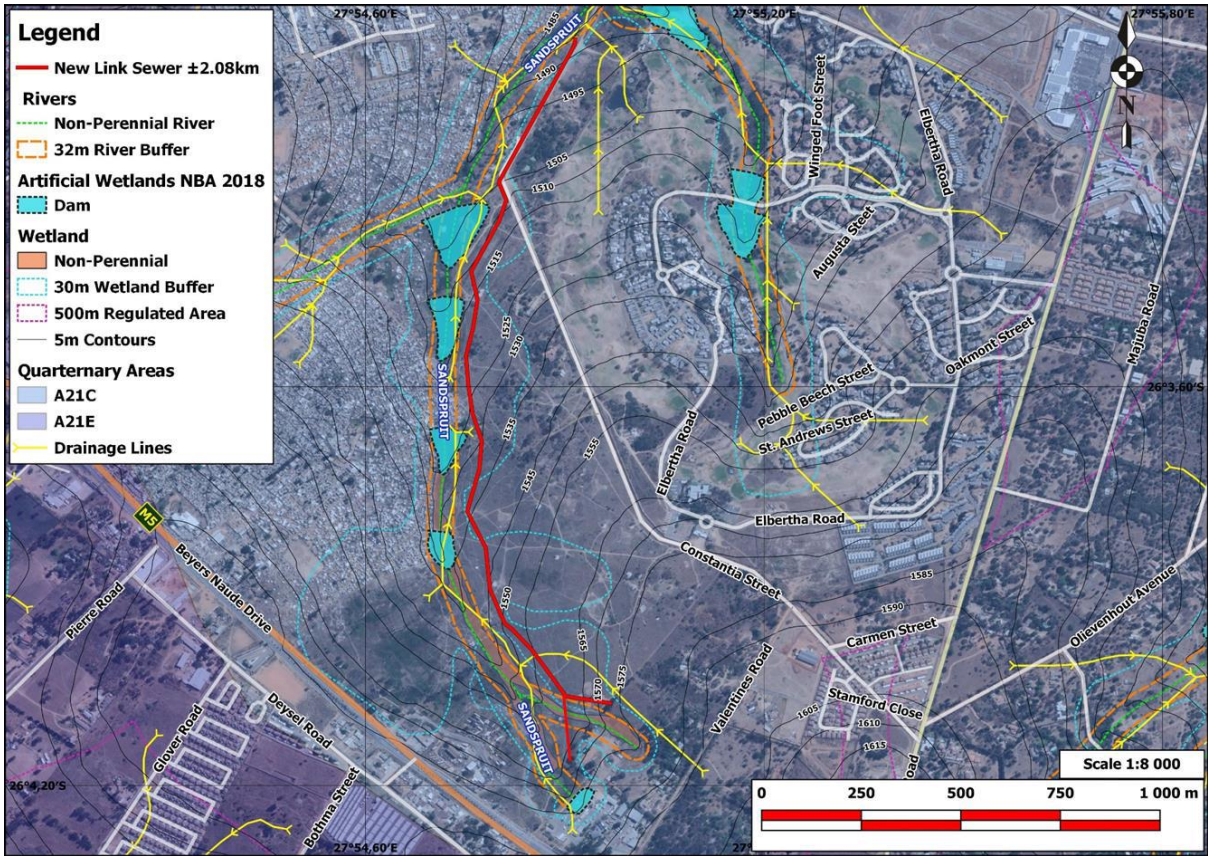


Figure 3: Hydrology Map

Watercourse Classification and Delineation

Two wetland HGM units occur within 500m of the study site, namely a Channelled Valley Bottom wetland associated with the Sandspruit, and extensive Hillslope Seeps. The seep wetlands cover an estimated total area of 29ha. It is not possible to determine the full historic extent of the seeps, as the informal settlement and other developments have replaced large portions of the hillslopes surrounding the river.

Soil Characteristics

The soils of the seep show the loss of iron due to the presence of gley soil colouring and mottles at less than 40cm depth. Subsurface water is present from 30-40cm at most sampling sites within the seep wetland, with most auger holes reaching rock at less than 60cm depth. The wetland soils indicate temporary wetland conditions, with shallow sub-surface lateral water flow from the hills towards the Sandspruit.

Vegetation Characteristics

Within the shallow river areas are various species of Cyperaceae (sedges), *Typha capensis*, and other rush species.

Invasive species are prominent within the wet areas such as the stream and dam edges, and include *Arundo donax*, *Persicaria lapathifolia*, *Seriphium plumosum* (bankruptbush) and Poplar trees. Terrestrial invasive species include black jack, *Tagetus minuta* and *Verbena bonariensis* but are more concentrated in areas affected by the informal township.

Hillslope vegetation is uniform with low species diversity, although ground cover is generally good. The main species are *Hyphenia hirta*, *Themeda triandra*, and *Eragrostis chloromelas*. Small scattered patches of *Imperata cylindrica* are present near the river.

The Wetland Delineation Map below indicates the proposed bulk sewer pipeline location in relation to the 32m river buffer, the 30m watercourse buffer and the 500m regulated buffer. It also depicts the relation between the pipeline and the channelled valley bottom wetland, non-perennial river and the seep.

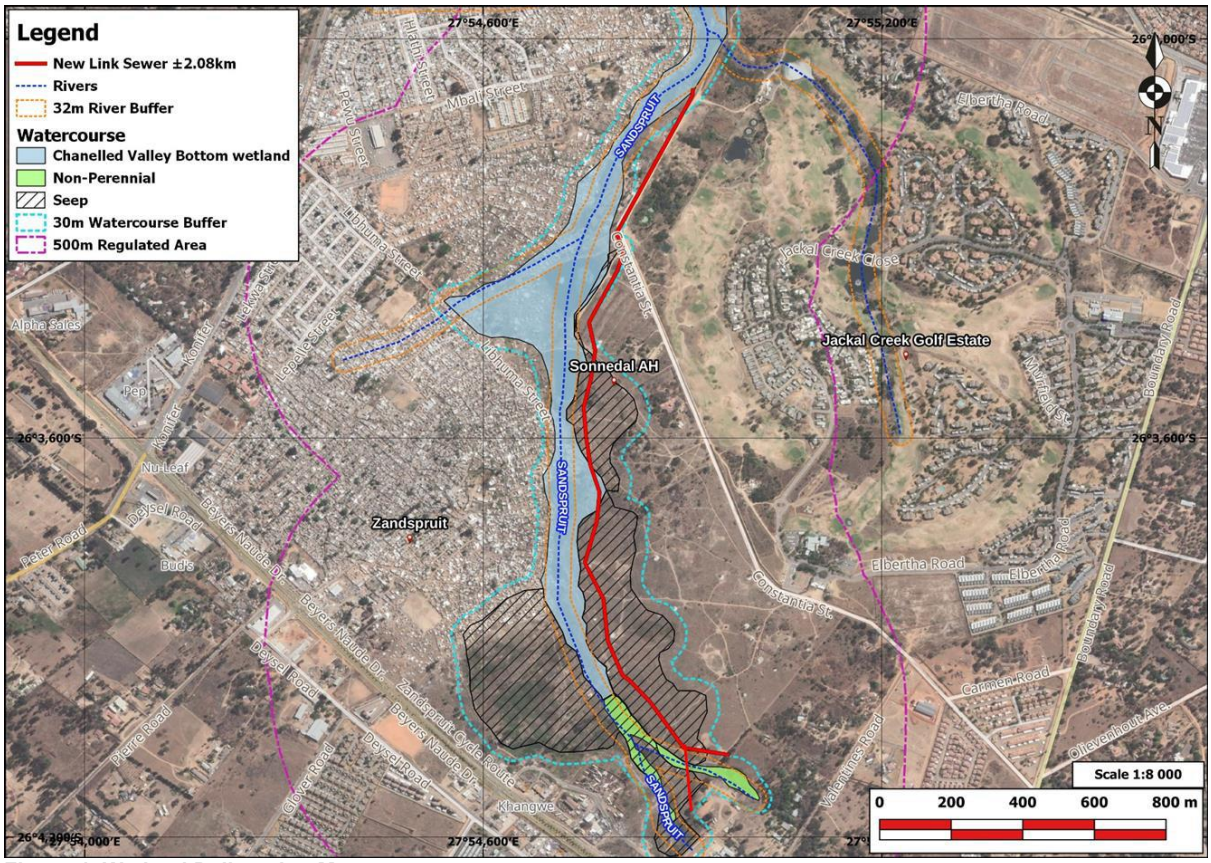


Figure 4: Wetland Delineation Map

Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS)

The PES and EIS scores were calculated for the wetlands that occur within 500m of the proposed bulk sewer

pipeline.

The combined PES score for the Channelled Valley Bottom wetland area is **4.7 and D – Largely Modified**. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural features are still evident. Wetland conditions are expected to deteriorate due to the expanding informal settlement and further planned development in the surrounding areas. The table below shows the estimated PES of the wetlands.

Table 4: The estimated PES of the wetlands

	Hydrology		Geomorphology		Vegetation	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Channelled Valley Bottom						
Area weighted impact scores	4.0	↓↓	4.7	↓↓	5.3	↓↓
PES Category	**D**		**D**		**D**	
Hillslope Seeps						
Area weighted impact scores	7.0	↓↓	4.7	↓↓	6.6	↓↓
PES Category	**E**		**D**		**E**	

The combined PES score for the Hillslope Seep wetland area is **3.8 and C – Moderately Modified**. The change in ecosystem processes and loss of natural habitat and biota is moderate and loss of natural habitat and biota has occurred. Wetland conditions are expected to deteriorate. Development is planned to increase significantly in the area, which will change flow patterns, increase runoff from hard surfaces and change catchment characteristics. The table below depicts the EIS of the Channelled Valley Bottom

Table 5: The EIS of the Channelled Valley Bottom

RIVER IMPORTANCE AND SENSITIVITY		
	Importance	***Confidence***
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.7	*4.6*
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.4	*4.5*
DIRECT HUMAN BENEFITS	1.2	*5.0*

Table 6: The EIS of the Hillslope Seep

RIVER IMPORTANCE AND SENSITIVITY		
	Importance	***Confidence***
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.0	*4.0*
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.4	*4.5*
DIRECT HUMAN BENEFITS	0.0	*4.5*

The EIS scores indicate that both wetlands are classed as **C – Moderate**. The wetlands are ecologically important and sensitive on a local scale. The wetlands play a part in moderating downstream quantity and quality of the Sandspruit. Impacts from development and the expanding informal settlement are a threat to the wetland habitat and ecosystem functions.

The sewer pipe will be constructed below ground. As per advice from the client (CityDev), CoJ and GDARD, it has been agreed that the underground pipeline will be preferred and accompanied with wetland offsets such as rehabilitation in the open area above the pipeline as per CoJ Catchment Policy, from a functionality perspective. This rehabilitation plan can be found under **Appendix I4 - General Wetland Rehabilitation and Monitoring Plan.**

The current approved townships, upstream of the wetlands, that will benefit from the below ground pipeline is Zandspruit x32 (767 units), X 93 (361 units), X94 (105 units) and x95 (114 units) i.e. total of 1,347 units. The applicant is the developer of x94 & X95 which only comprise 229 units of the total 1347 units and X96 which comprises of 112 residential stands.

Geology and Soils

According to available geological maps, the study site is underlain by the Halfway House Granite Dome, with a line of De Banken Gneiss transecting the site along Constantia Street. This is depicted in the figure below. Soils have a limited depth.

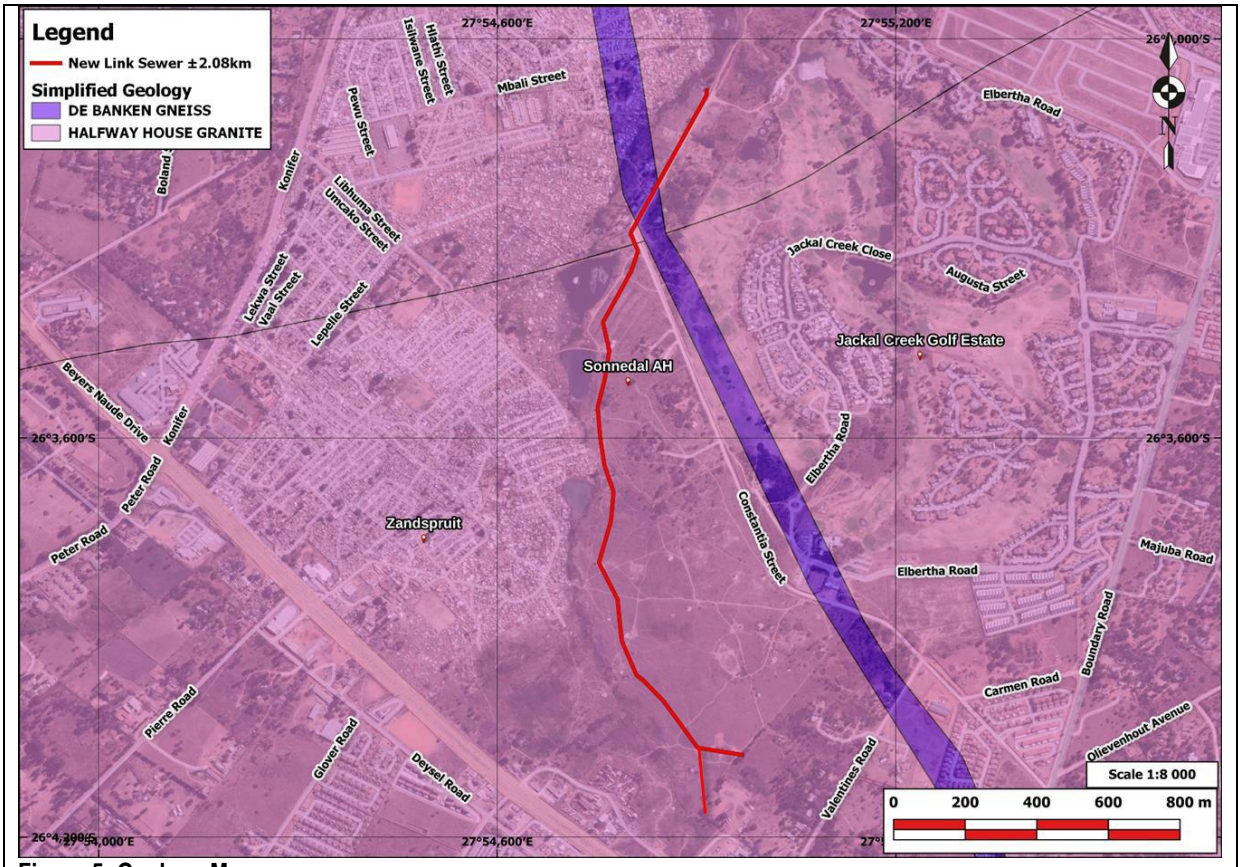


Figure 5: Geology Map

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.

Agriculture

According to the Screening Report, with regards to Agriculture in the development area, the sensitivity is considered High as sections of the sewer line falls in the site falls within Land capability;09. Moderate-High/10. Moderate-High. Sections of the line also fall within the Medium sensitivity as it falls within Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate. And sections also fall within the Low sensitivity as it falls within Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low. This is depicted in Figure 6 below. In terms of land cover, the site is classified as residential, commercial and Agricultural Holdings. But the area is earmarked for residential development. Thus, the site has a very low risk to agriculture potential.

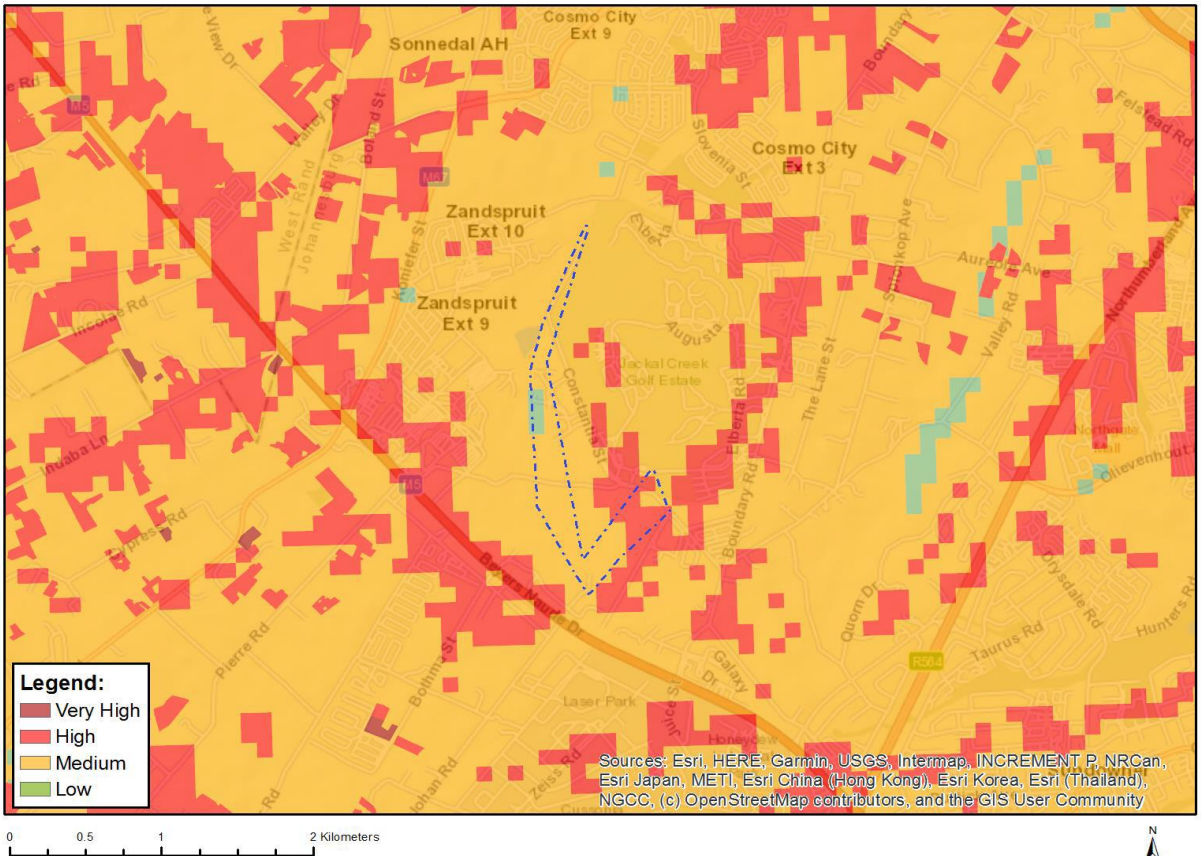


Figure 6: Agriculture Sensitivity Map

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 % = 50%	**Natural veld with scattered aliens % = 30%**	Natural veld with heavy alien infestation % =	Veld dominated by alien species % =	Landscaped (vegetation) % =
Sport field % =	Cultivated land % =	Paved surface (hard landscaping) % =	**Building or other structure % = 20%**	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.

Regional Vegetation

According to the Screening Report, with regards to Plant Species in the development area, the sensitivity is considered Medium as a result of *Melolobium subspicatum* and Sensitive species 1248. SANBI has withheld the name of the species as it may be prone to illegal harvesting and must be protected. This is depicted in Figure 7

below.

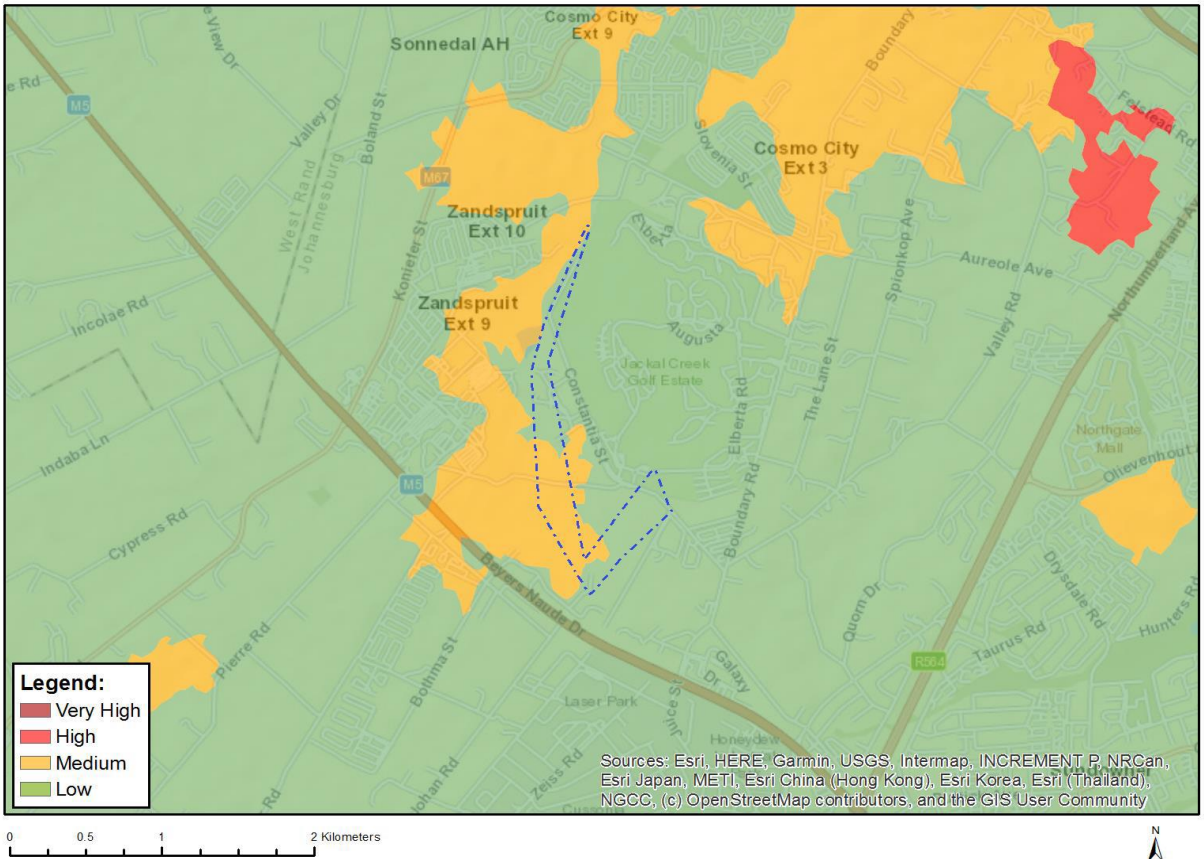


Figure 7: Plant Species Sensitivity Map

The site is situated in the Egoli Granite Grassland vegetation unit of the Mesic Highveld Grassland Bioregion in the Grassland Biome.

Egoli Granite Grassland vegetation is characterised by moderately undulating plains and low hills. Main vegetation includes tall grasslands dominated by *Hyparrhenia hirta*, and woody vegetation in rocky outcrops. Other dominant grass species include *Aristida canescens* and *A. congesta*, *Cynodon dactylon*, *Eragrostis capensis*, *E. chloromelas*, *E. racemose*, *Heteropogon contortis* and *Melinis repens*. The vegetation unit is classified as endangered with only 3% conserved out of a target of 24%. More than 60% has been transformed by urbanisation, cultivation and roads. The unit consists of primary vegetation but is heavily impacted and degraded by urban development.

According to Mucina & Rutherford (2011), the following species are listed as important taxa in the Egoli Granite Grassland vegetation type:

- **Trees:** *Senegalia caffra, Diospyros lycioides* subsp. *lycioides* and *Celtis africana*.
- **Shrubs:** *Asparagus laricinus, Asparagus suaveolens* and *Teucrium trifidum*.
- **Grasses:** *Eragrostis curvula, Hyparrhenia hirta, Setaria sphacelata, Themeda triandra, Cymbopogon*

pospischilii, Digitaria eriantha, Elionurus muticus, Eragrostis racemosa, Eragrostis superba and *Panicum maximum*.

- **Herbs:** *Commelina africana, Vernonia galpinii, Hilliardiella oligocephala* and *Aloe greatheadii* var. *davyana*.

This is depicted in Figure 8 below.

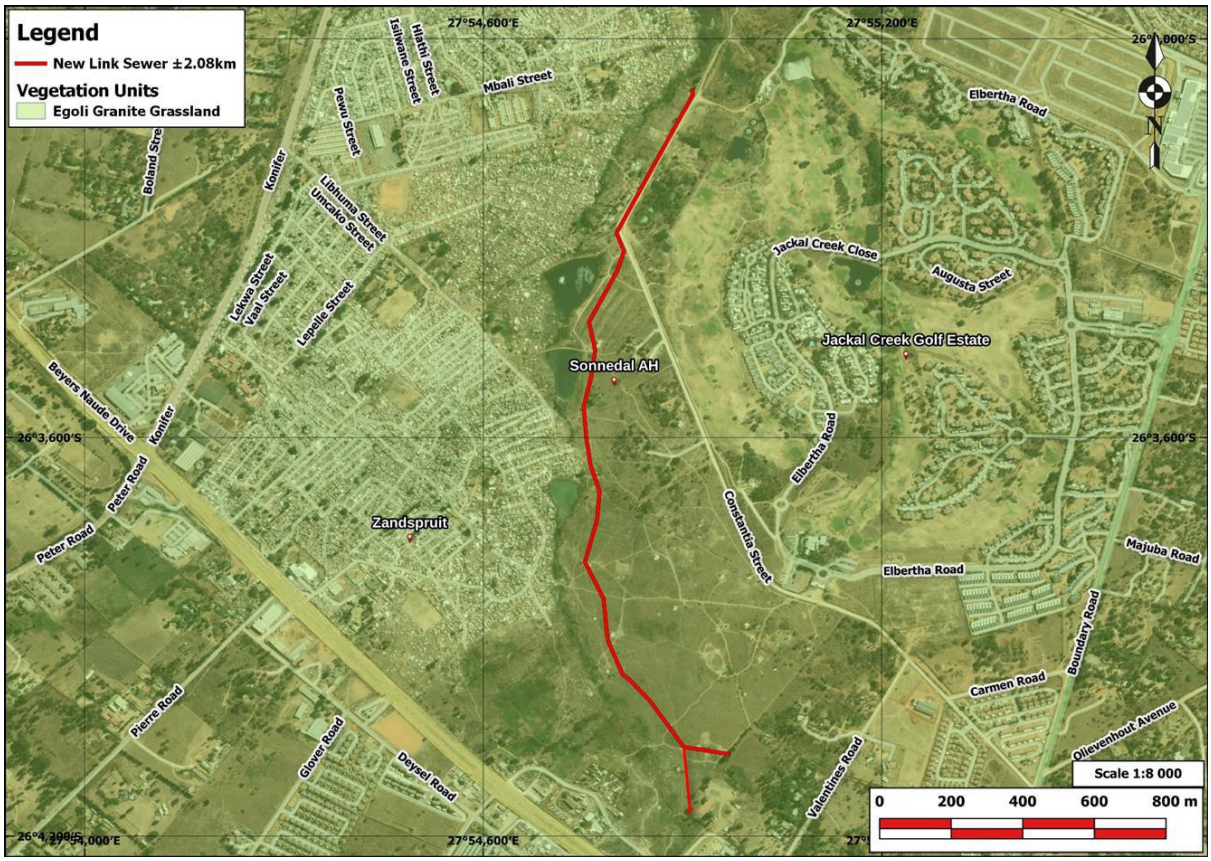


Figure 8: Vegetation of the study area

The study site is located in the Endangered Egoli Granite Grassland Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) as depicted in Figure 9 below.

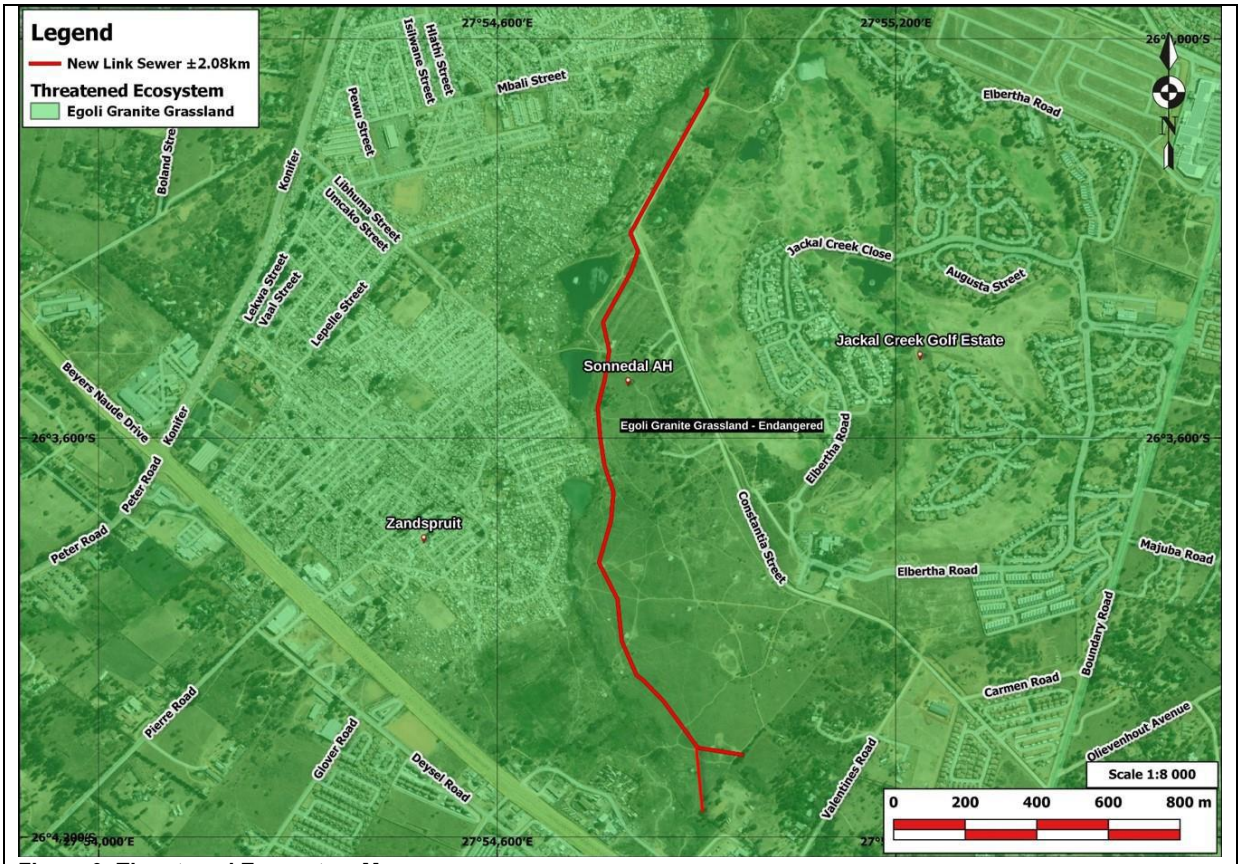


Figure 9: Threatened Ecosystem Map

Terrestrial Biodiversity

According to the Screening Report, Animal Species Sensitivity on the proposed site is considered High based on *Aves-Tyto capensis.* The rest is considered low for *Insecta-Aloeides dentatis dentatis*, *Mammalia-Chrysospalax villosus*, *Mammalia-Crocidura maquassiensis, Mammalia-Dasymys robertsii, Mammalia-Hydrictis maculicollis, Mammalia-Ourebia ourebi ourebi* and *Invertebrate-Clonia uvarovi* species. Refer to Figure 10 below.

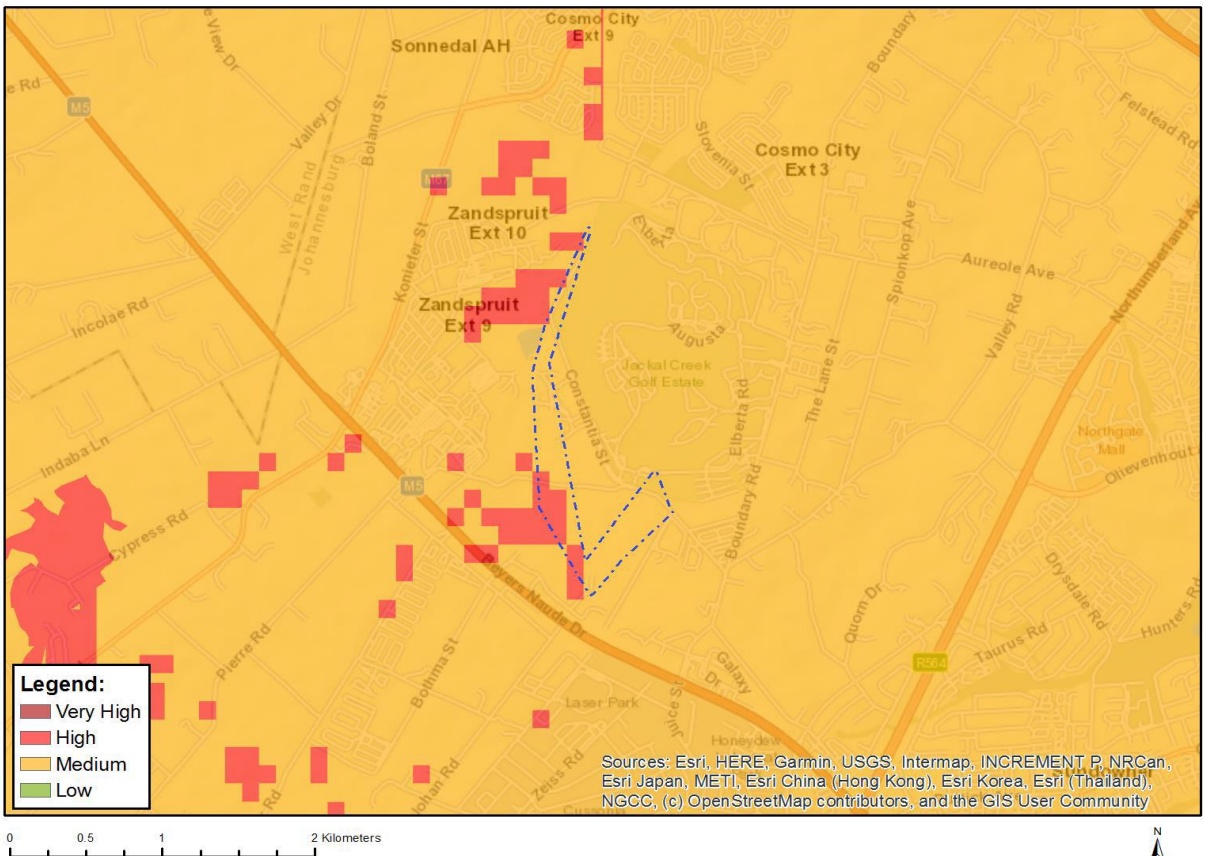


Figure 10: Animal Species Sensitivity

The Screening Report identifies the area as Very High Sensitivity in terms of Terrestrial Biodiversity as the area falls within a Critical Biodiversity Area 2, Ecological Support Area, Protected Areas Expansion Strategy and an Endangered ecosystem as depicted in Figure 11 below.

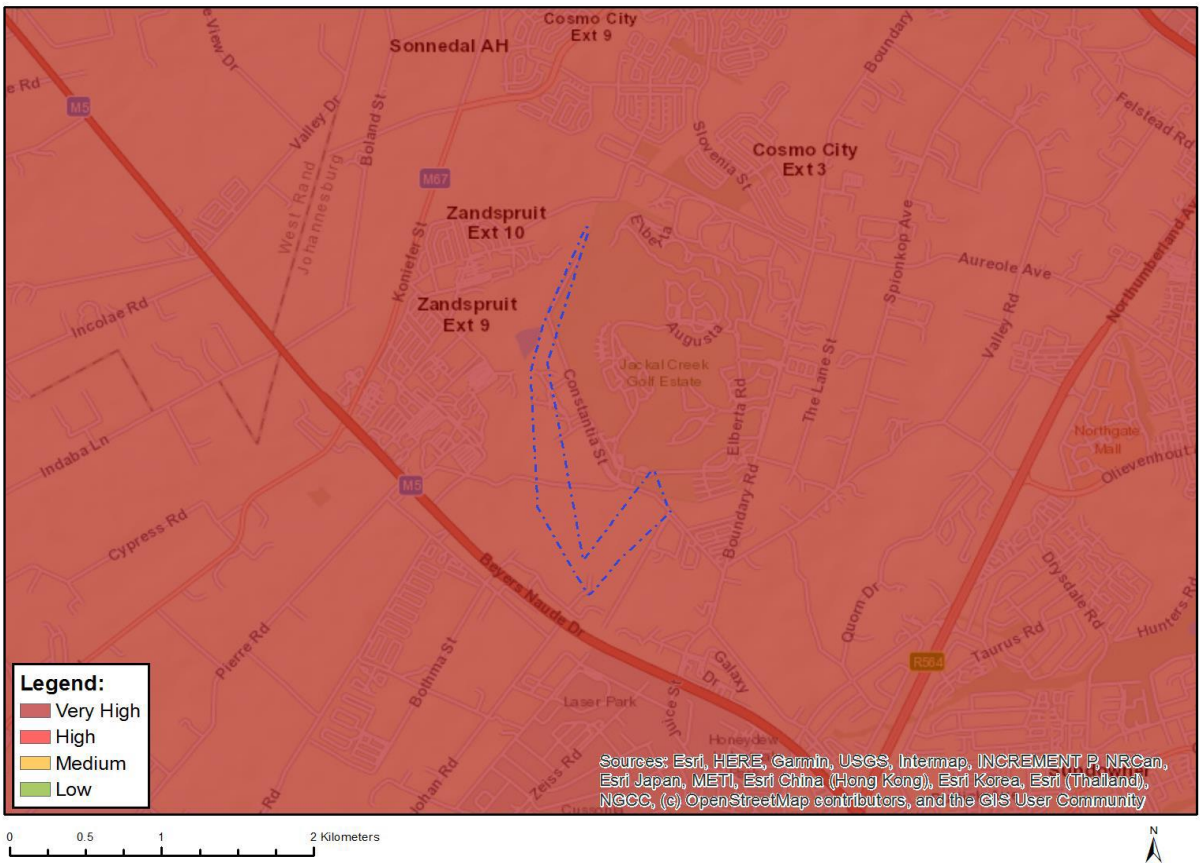


Figure 11: Terrestrial Biodiversity Sensitivity

Important Bird and Biodiversity Areas

The Important Bird and Biodiversity Areas (IBAs) identify and work to conserve a network of sites critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types. The proposed Sewer Line does not occur on any of the protected IBAs. According to Birdlife International (2022), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels. In 2002, the world's governments made a commitment to reduce the rate of biodiversity loss by 2010. State of the world's birds provides a progress report, based on birds. The Birdlife Partnership strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources. BirdLife already supports and coordinates work by several Asian Partners to protect the Helmeted Hornbill, Asian songbirds and parrots threatened by the pet trade.

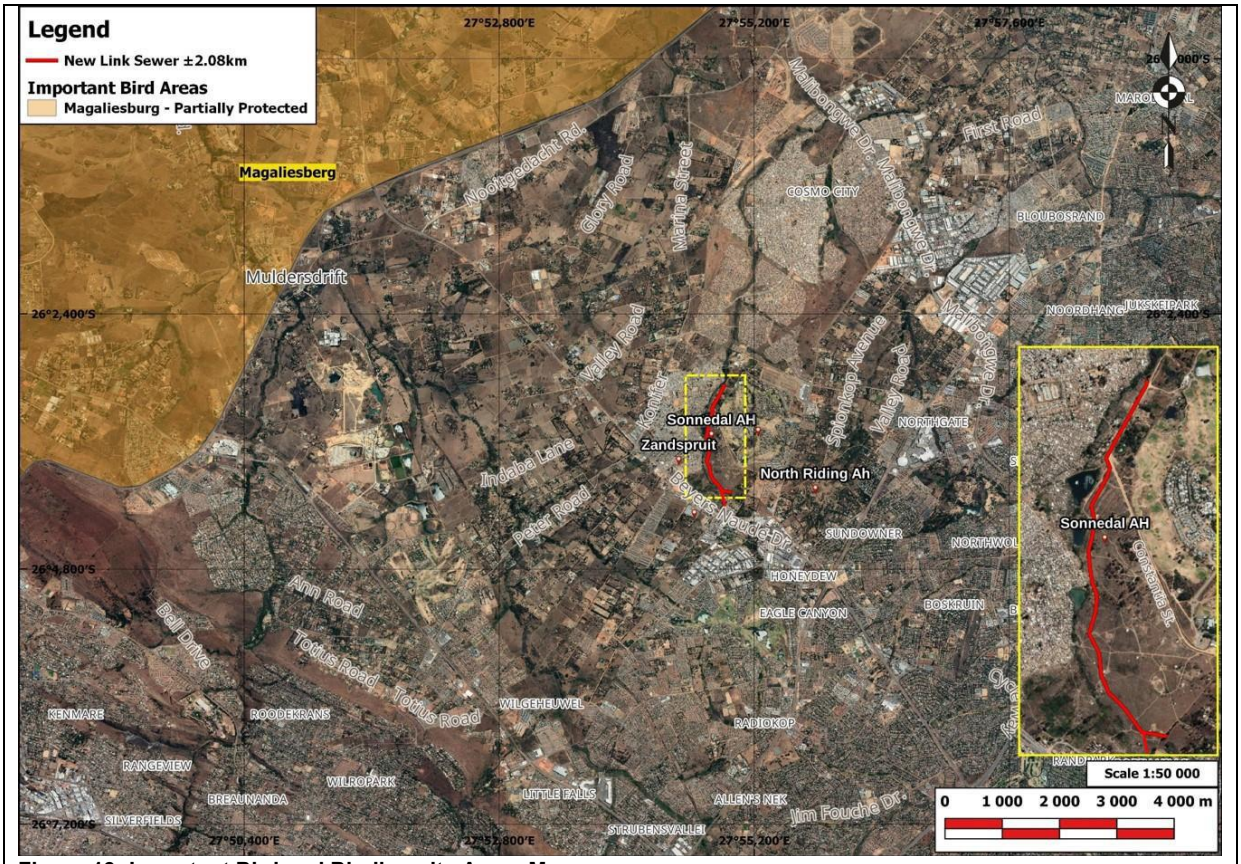


Figure 12: Important Bird and Biodiversity Areas Map

Four study units were identified on the study site (Figure 13), namely:

- Alien species study unit;
- Built up area;
- Degraded grassland study unit; and
- Watercourse study unit.

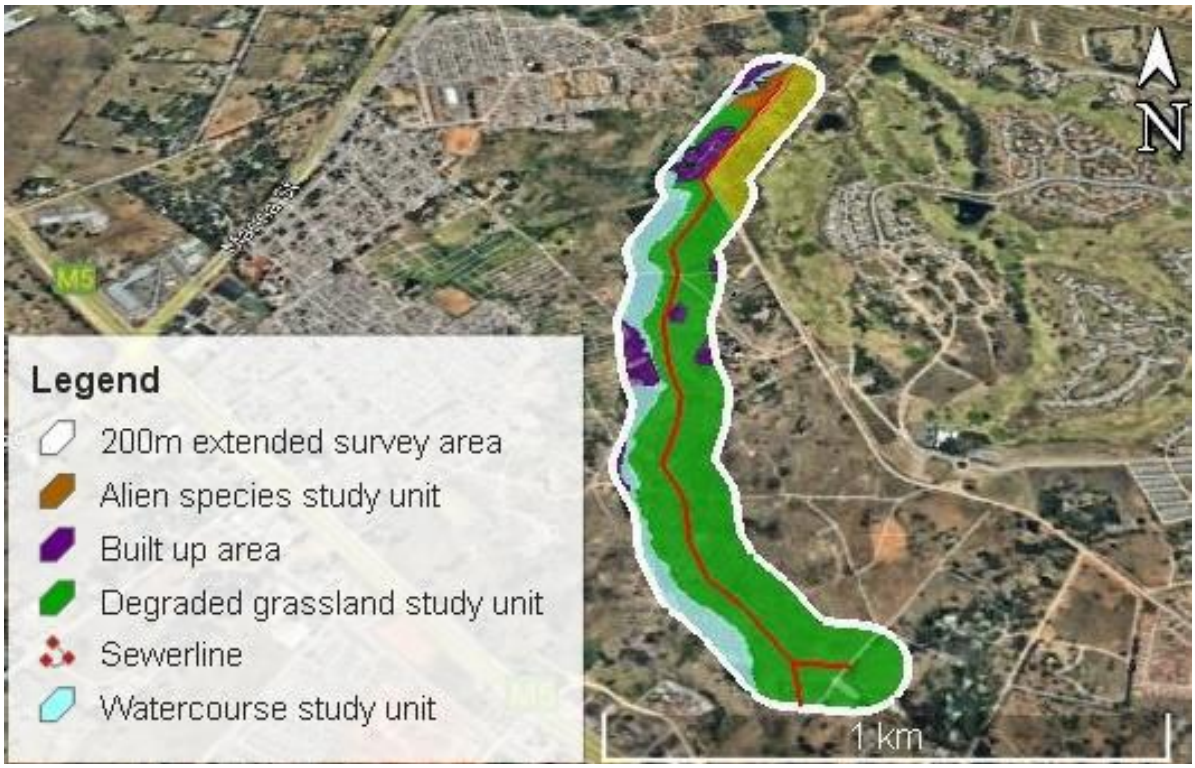


Figure 13: Study units on site

Medicinal and Alien Plant Species

The total number of plant species, medicinal species and alien species recorded per study unit are listed in Table 7 below.

Table 7: Total number of plant species, medicinal species and alien species recorded in study units

Study unit	Total number of species	Number of medicinal Species	Number of alien species
Alien study unit	50	5	24
Built up area	Species list not compiled		
Degraded grassland study unit	46	5	17
Lever Creek Golf Estate	No plant species on this unit		
Wetland Area	41	5	18

The number of alien species and their categories in each study unit are indicated in Table 8 below.

Table 8: Number of alien plant species in study units

Study unit	CAT 1a	CAT 1b	CAT 2	CAT 3	Not declared invasive
Alien study unit	0	18	1	1	4
Built up area	Species list not compiled				
Degraded grassland study unit	0	11	1	1	4
Lever Creek Golf Estate	No plant species on this unit				
Wetland Area	0	11	1	1	5

Threatened Species and Species of Conservation Concern

Fourteen Red and Orange List species are known to occur in the 2627BB QDS (Annexure A of Appendix G2). No Red and Orange List species were found during these surveys.

Mammals

A total of 70 species are expected to occur or have been recorded in the 2627BB QDS. Species on the list with incomplete naming (only genus) were removed from the expected species list. No mammal species was observed on site. The list of potential SCC includes:

- One (1) that is listed as Vulnerable (VU) on a regional basis;
- One (1) that is listed as Endangered (E) on a regional basis; and
- Eight (8) that are listed as Near Threatened (NT) on a regional scale.

All of the species are expected to have a low moderate/medium of occurrence due to availability of their habitat on study site.

It is Important to note that the mammal list is based on VMUS data and that the distribution data for mammals, although useful, is incomplete in that many QDSs simply have not been surveyed very well and many species that do occur are still lacking from the VMUS records due to sampling inadequacy. Reference is made to Table 3 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 18 and 19). Species highlighted in blue in this table, indicate that they are not likely to be found naturally on site but rather as game animals.

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), A. frontalis populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and

therefore not often seen, there is suitable habitat in the project area and therefore the likelihood of occurrence is rated as moderate/medium.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna, long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. With the presence of the wetlands and grassland areas, there is a moderate likelihood of occurrence.

Crocidura mariquensis (Swamp Musk Shrew) has a wide distribution across the assessment region and occurs in many protected areas, but is restricted to wetlands and waterlogged areas. With the presence of the wetlands, there is a moderate/medium likelihood of occurrence.

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water. Based on the presence of a perennial river within the project area which provides suitable habitat but the presence of nearby urban development, the likelihood of occurrence of this species occurring in the project area is considered to be moderate/medium.

Otomys auratus (Southern African Vlei Rat) is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, occurring in dense vegetation in close proximity to water. The likelihood of occurrence of this species occurring in the project area is considered to be moderate/medium.

Poecilogale albinucha (African Striped Weasel) is a specialist predator of small mammals and has a high metabolic rate, which means it can only exist in habitats containing adequate numbers of prey. Because of its secretive nature it has probably been overlooked in many areas, especially in light of records from sites that were previously considered unsuitable. The likelihood of occurrence of this species occurring in the project area is considered to be moderate/medium.

Crocidura maquassiensis – (Maquassie Musk Shrew) are rare species endemic to South Africa, Swaziland and Zimbabwe, existing in moist grassland habitats in the Savannah and Grassland biomes. The likelihood of occurrence of this species occurring in the project area is considered to be moderate/medium.

Rhinolophus blasii – (Peak-saddle Horseshoe Bat) occur in savannah woodlands and are dependent on the availability of daylight roosting sites such as caves, mine adits or boulder piles. The likelihood of occurrence of this species occurring in the project area is considered to be low.

Cloeotis percivali – (Short-eared Trident Bat) Occurs in savannah and woodland areas where there is sufficient cover in the form of caves and mine tunnels for day roosting. It feeds exclusively on moths, and appears to be

very sensitive to disturbance. The likelihood of occurrence of this species occurring in the project area is considered to be low.

Reptiles

Fifty reptile species have been previously recorded in the 2627BB QDS. Under Gauteng C-plan version 3.3, no specialist studies for any species of reptile are requested for consideration in the review of a development application. A Common Variable Skink was observed on the study site. The Near Threatened Coppery Grass Lizard, Vulnerable Nile Crocodile and Cape Sand Snake have been recorded in the 2627BB QDS.

Reference is made to Table 4 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 21 and 23).

The Coppery Grass Lizard (*Chamaesaura aenea*) is restricted to the Grassland biome. It is found on grassy slopes and plateau of the eastern escarpment and Highveld. Based on the unsuitable habitat, it has a low likelihood to occur on the study site.

Nile crocodile has low likelihood to occur on site. *Psammophis leightoni* (Cape Sand Snake) is restricted to the Western Cape. Its favoured habitats are *Renosterveld* and fynbos and the study site does not provide suitable habitat for this species, hence it has a low to non-likelihood to occur on site.

Psammophis leightoni (Cape Sand Snake) can be identified by its slender body, large eyes and strictly diurnal lifestyle. It grows to an average length of 75 cm and a maximum length of 1m. This snake species is restricted to the Western Cape. Its favoured habitats are renosterveld and fynbos. Based on the unsuitable habitat, it has a low likelihood to occur on the study site.

Amphibians

Fourteen amphibian species have previously been recorded in the QDS 2627BB. Under the Gauteng C-plan Version 3.3, no specialist studies for any species of amphibians are requested for consideration in the review of a development application. No Red Listed amphibians were observed on site but Common Caco (Cacosternum boettgeri) and Guttural Toad (*Sclerophrys gutturalis*) were observed. Refer to Table 5 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 23 and 24).

Avifauna

Bird species were observed on site. Threatened List species for avifauna recorded in the pentad 2600_2750 are listed in Table 6 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 24 and 25). There are micro-habitats on site which consisted of secondary grasses and patches of alien trees which are not suitable for these species and not all would be expected to be found there. A total of nine SCC have been recorded during

SABAP2 surveys within the pentad 2600_2750 (SABAP2, 2022). However, none of these species are considered likely to occur within the focus area. Only one SCC has medium chances to occasionally occur on site for foraging purposes but not residents. African Grass-Owl has medium chance to forage along the proposed alignment although extremely limited suitable roosting and foraging habitat occurs along the proposed sewer line. Half-collared Kingfisher will not occur within the focus area due to a lack of clear riverine habitat surrounded by dense riparian vegetation.

Alien study unit

- ***Compositional aspects***

The vegetation in this unit comprises of alien invasive trees and graminoids. The soil is clay and whitish in colour. Dominant indigenous plant species include *Hyparrhenia hirta*, *Berkheya radula* and *Themeda triandra*. Dominant exotic species include *Populus x canescens*, *Melia azedarach* and *Robinia pseudoacacia*. A total of 49 species have been recorded and grouped according to their growth form. Refer to Table 7 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 26 to 28).

- ***Medicinal and Alien Plant Species***

Five medicinal and 24 alien plant species have been recorded in the study unit. Eighteen of the alien plant species have been listed as Category 1b, one species as Category 2 and one species as Category 3 invasive species.

- ***Red List, Orange List and Protected Tree Species***

The study unit has no suitable habitat for Red and Orange List species, protected trees and provincial protected plants.

- ***Sensitivity and Connectivity***

The vegetation in this unit has low sensitivity because it is highly disturbed. Connectivity does not exist.

- ***Mammals***

No mammals were spotted in the study unit.

- ***Reptiles***

No reptile species were spotted in the study unit.

- ***Amphibians***

No amphibians were spotted in the study unit.

- ***Avifauna***

The study unit provides suitable habitat for bird species and there were a lot of Southern Masked Weaver (*Ploceus velatus*) nests found on the study unit. Bird species that were observed such as the House Sparrow (*Passer domesticus*), Laughing Dove (*Streptopelia senegalensis),* Red-chested Cuckoo (*Cuculus solitarius*), Pied Crow (*Corvus albus*), Red Bishop (*Euplectes orix*), Common Fiscal (*Lanius collaris*), Rufous Naped-lark (*Mirafra africana*), Willow Warbler (*Phylloscopus trochilus*), Southern Masked Weaver (*Ploceus velatus*), Dark-capped Bulbul (*Pycnonotus tricolor*).

Built up areas

This unit has been modified and cultivated with maize and squatter camps. Because the unit is built up, cultivated and devoid of indigenous vegetation, a list of plants occurring in the study unit was not compiled.

Degraded grassland study unit

- ***Compositional aspects***

The area comprises open grassland with loamy to clayey soil and the soil surface is gravelly while some termite mounds are present in some areas. The vegetation is characterized by the presence of a variety of natural grass species of which Hyparrhenia hirta and Themeda triandra are the most prominent. Dominant exotic species include Acacia mearnsii. Various foot paths and informal roads are present on the site. A total of 46 species has been recorded and grouped according to their growth form. Refer to Table 8 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 32 and 33).

- ***Medicinal and Alien Plant Species***

Five medicinal and 17 alien plant species have been recorded in the study unit. Eleven of the alien plant species has been listed as a Category 1b, one as a Category 2 and one as a Category 3 invasive species.

- ***Red List, Orange List and Protected Tree Species***

The study unit has suitable habitat for Red and Orange List species, protected trees and provincial protected plants. During the survey, high numbers of Orange List species (*Hypoxis hemerocallidea*) was found.

- ***Sensitivity and Connectivity***

The vegetation in this unit has low-medium sensitivity because of the presence of Orange List species. Connectivity is limited to all directions as the study site is surrounded by built up areas and farms.

- ***Mammals***

No mammal species were observed in the study unit.

- ***Reptiles***

No reptile species were observed in the study unit.

- ***Amphibians***

No amphibian species were observed in the study unit.

- ***Avifauna***

The study unit provides suitable habitat for bird species and there were a lot of Southern Masked Weaver (*Ploceus velatus*) nests found on the study unit. Bird species that were observed such as the House Sparrow (*Passer domesticus*), Laughing Dove (*Streptopelia senegalensis*), Red-chested Cuckoo (*Cuculus solitarius*), Pied Crow (*Corvus albus*), Red Bishop (*Euplectes orix*), Common Fiscal (*Lanius collaris*), Rufous Naped-lark (*Mirafra africana*), Willow Warbler (*Phylloscopus trochilus*), Southern Masked Weaver (*Ploceus velatus*), Dark-capped Bulbul (*Pycnonotus tricolor*).

Wetland study unit

- ***Compositional aspects***

The vegetation in this study unit is transformed and it comprises of *Typha capensis*. The wetland feature has been impacted due to the surrounding residential developments and associated edge effects such as subsistence agriculture and illegal refuse dumping. These impacts have led to transformation of the overall wetland floral community integrity. The slope of the study unit dips to the north and the soil is sandy, brownish to whitish. Dominant species include *Hyparrhenia hirta*, *Phragmites australis* and *Typha capensis*. Dominant exotic species include *Amaranthus hybridus subsp. hybridus* and *Populus x canescens*. A total of 36 species have been recorded and grouped according to their growth form. Refer to Table 9 within the Terrestrial Biodiversity Report attached as Appendix G2 (pages 38 and 39).

- ***Medicinal and Alien Plant Species***

Five medicinal and 18 alien plant species have been recorded on the study site. Eleven of the alien plant species have been listed as Category 1b, one species has been listed as Category 2, and one species has been listed as Category 3 invasive species.

- ***Red List, Orange List and Protected Tree Species***

The study unit has suitable habitat for Red List, Orange List or protected tree species.

- ***Sensitivity and Connectivity***

The study unit is considered to be of high sensitivity because it is a watercourse. Connectivity to the north-east and south-east exist.

- ***Mammals***

No mammal species were observed in the study unit.

- ***Reptiles***

No reptile species were observed in the study unit.

- ***Amphibians***

Common Caco and Common Platanna were observed in the study unit.

- ***Avifauna***

Bird species that were observed are the House Sparrow (*Passer domesticus*), Laughing Dove (*Streptopelia senegalensis*), Red-chested Cuckoo (*Cuculus solitarius*), Pied Crow (*Corvus albus*), Red bishop (*Euplectes orix*), Southern Masked Weaver (*Ploceus velatus*), Dark-capped Bulbul (*Pycnonotus tricolor*).

The Terrestrial biodiversity theme sensitivity as indicated in the screening report was derived to be very high. The completion of this assessment disagrees with the very high sensitivity of the screening report as the habitat has been infested by alien invasive species and no Red Listed species were found. However, where the wetland area is regarded as high sensitive area. As per the terms of reference for the project, GIS sensitivity maps are required in order to identify sensitive features within the study area. The sensitivity scores identified during the field survey for terrestrial habitat are mapped.

The dominance of the stand of Poplar trees negatively impacts on the wetland's ability to enhance water quality. The wetland is impacted upon by invasion of alien trees, resulting in significant loss of habitat and biodiversity.

The study site is located within an Endangered ecosystem – Egoli Granite Grassland meaning, it falls under those systems whose structure, function and composition are at extreme risk of irreversible loss and damage. The greater part of the vegetation on the study site is highly disturbed, comprises of alien invasive species and ornamental species. High levels of grazing on the study site were noticed hence, the study site is highly

transformed. The sensitivity varies from high on the wetland vegetation, low-medium due to the presence of Orange List species and the rest of the site is of low sensitivity. This is depicted in the figure below.

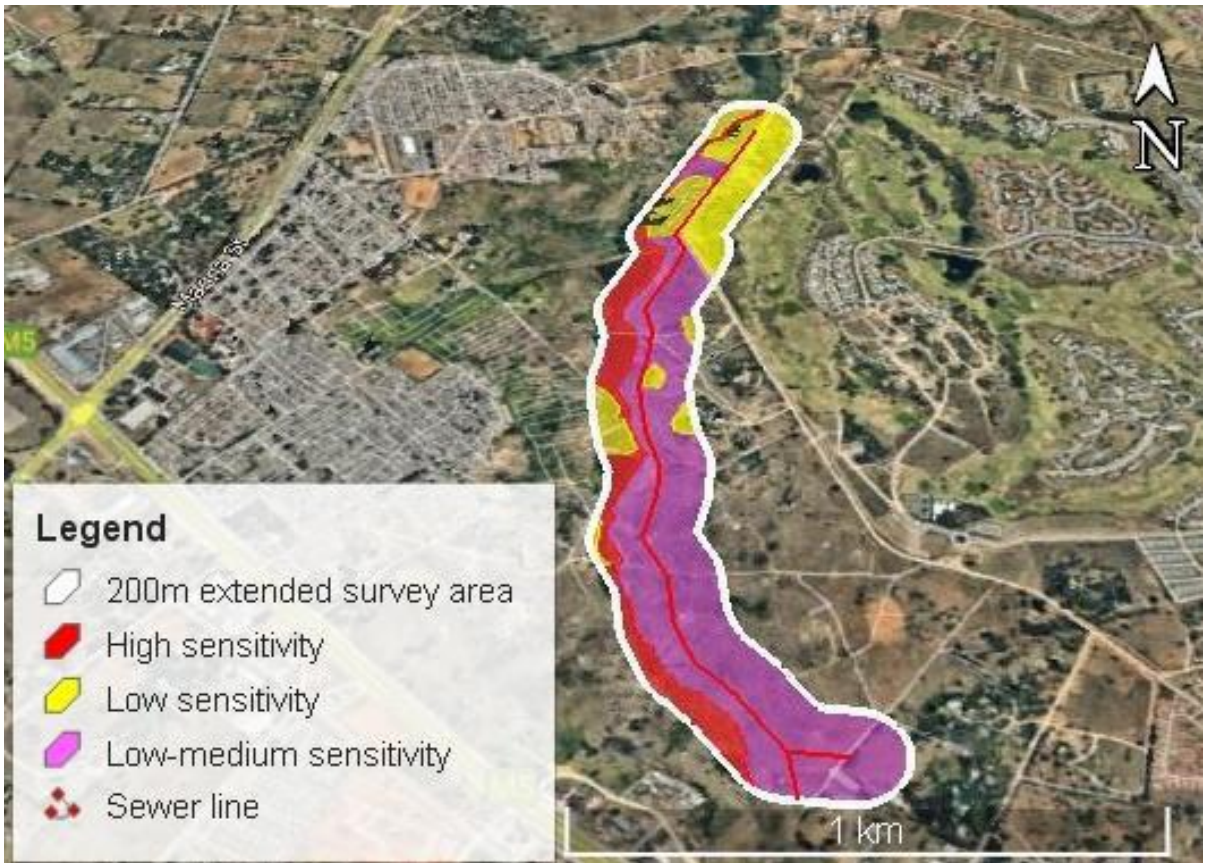


Figure 14: Sensitivity Map of the Study Site

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:

Gauteng Conservation Plan

The Gauteng Conservation Plan (Version 3.3) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. Critical Biodiversity Areas (CBAs) contain irreplaceable, important and protected areas (terms used in C-Plan 2) and are areas needed to reach the conservation targets of the Province. In addition, 'Ecological Support Areas' (ESAs), mainly around riparian areas and other

movement corridors were also classified to ensure sustainability in the long term. Landscape features associated with ESAs is essential for the maintenance and generation of biodiversity in sensitive areas and requires sensitive management where incorporated into C-Plan 3.

The entire alignment of the bulk sewer line is situated within Ecological Support Areas and Important Areas (all associated with the Sandspruit) as depicted in Figure 15 below.

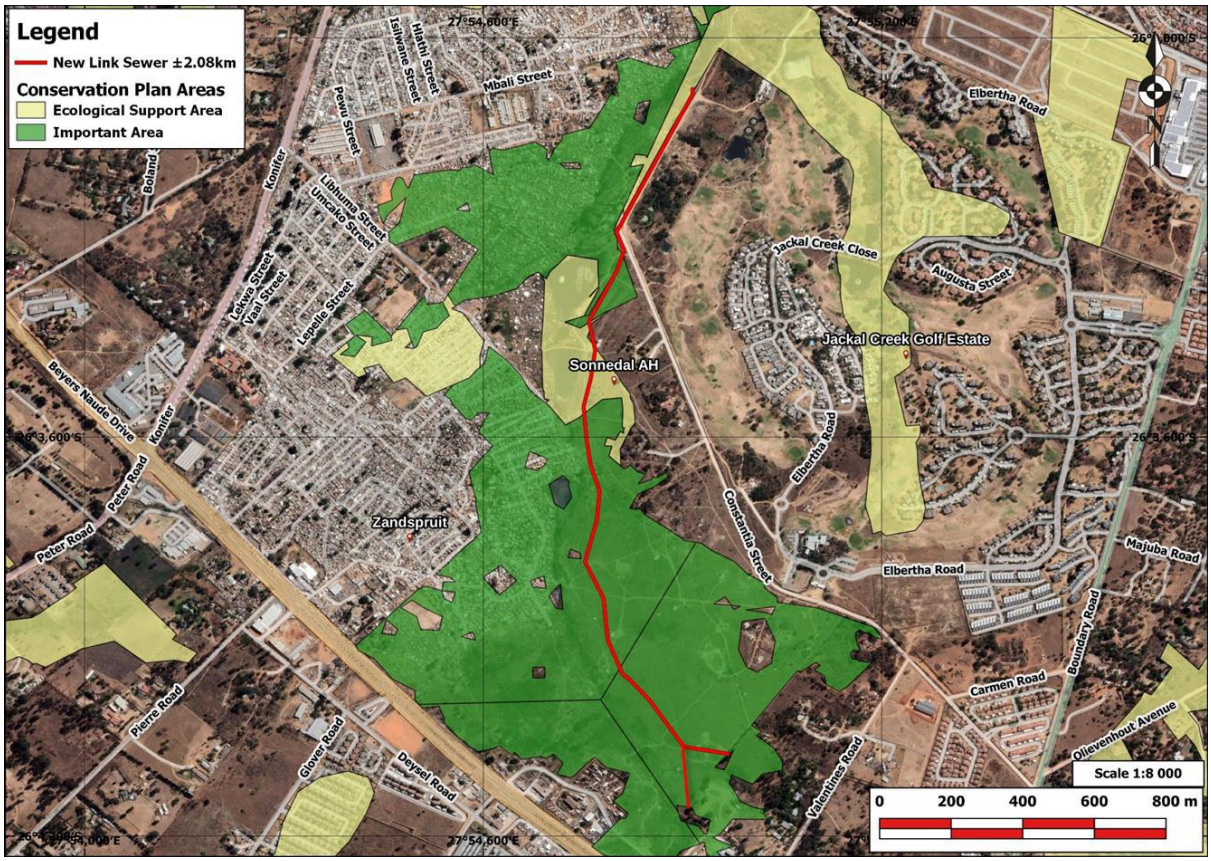


Figure 15: C-Plan Map

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

1) Wetland Specialist

Name of the specialist:	Lizette Venter		
Qualification(s) of the specialist:	MSc (Aquatic Health) BSc Hons (Environmental Management) Environmental Scientist / Wetland Specialist SACNASP Reg. No. 013713		
Postal address:	PO Box 11375 Maroelana		
Postal code:	0161		
Telephone:	(012) 346 3810	Cell:	[redacted]
E-mail:	reception@bokamoso.net	Fax:	086 570 5659

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:	July 2022

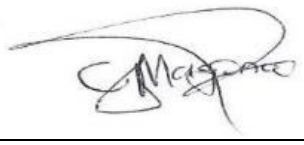
Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

2) Terrestrial Biodiversity Specialist

Name of the specialist:	Nkoliso Magona		
Qualification(s) of the specialist:	MSc Botany (SU). BSc (Hons) Zoology (WSU), BSc Biological Sciences (WSU) SACNASP Cand.Sci. Nat Reg. No. 123830		
Postal address:	PO Box 11375 Maroelana		
Postal code:	0161		
Telephone:	(012) 346 3810	Cell:	[redacted]
E-mail:	reception@bokamoso.net	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:	July 2022

3) Heritage Specialist

Name of the specialist:	Anton J. Pelser		
Qualification(s) of the specialist:	BA (UNISA) BA (Hons) (Archaeology) MA (Archaeology) [WITS]		
Postal address:	P.O. Box 73703 Lynnwood Ridge		
Postal code:	0040		
Telephone:	[redacted]	Cell:	083 459 3091
E-mail:	apac.heritage@gmail.com	Fax:	086 695 7247

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:	April 2022

4) 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]

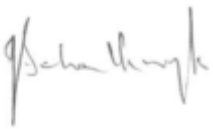
Are any further specialist studies recommended by the specialist? [redacted] **NO**

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:	July 2022

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

9	2	1	9	9
9	2	1	9	9
9	2		1	9
9	2	1	1	9
9	2	1	1	9

WEST **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 Assessment
Appendix G2 – Terrestrial Biodiversity Report
Appendix G3 – Heritage Impact Assessment Phase 1

Appendix G4 – HIA Specialist Opinion Letter

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%).

Zandspruit has a total population of approximately 31 716 inhabitants within 9 408 households. In terms of gender, 58% of the population is male and 42% is female. Majority of the population are black (99.12%). The predominant languages are Pedi, Zulu, Venda and Tswana.

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.

There are a number of shopping centres surrounding the Zandspruit 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).

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.

There are a few schools within Zandpsruit which includes Zandspruit Primary School, Masakhane Tswelopele Primary School and Golang PreSchool and Aftercare Centre amongst others.

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?	[redacted] NO
If YES, explain:	[redacted]

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:

As per the Screening Report, the Archaeological and Cultural Heritage Sensitivity on the proposed development area is considered high because a few sections are within 100m of a Grade IIIb Heritage site as depicted in Figure 16 below.

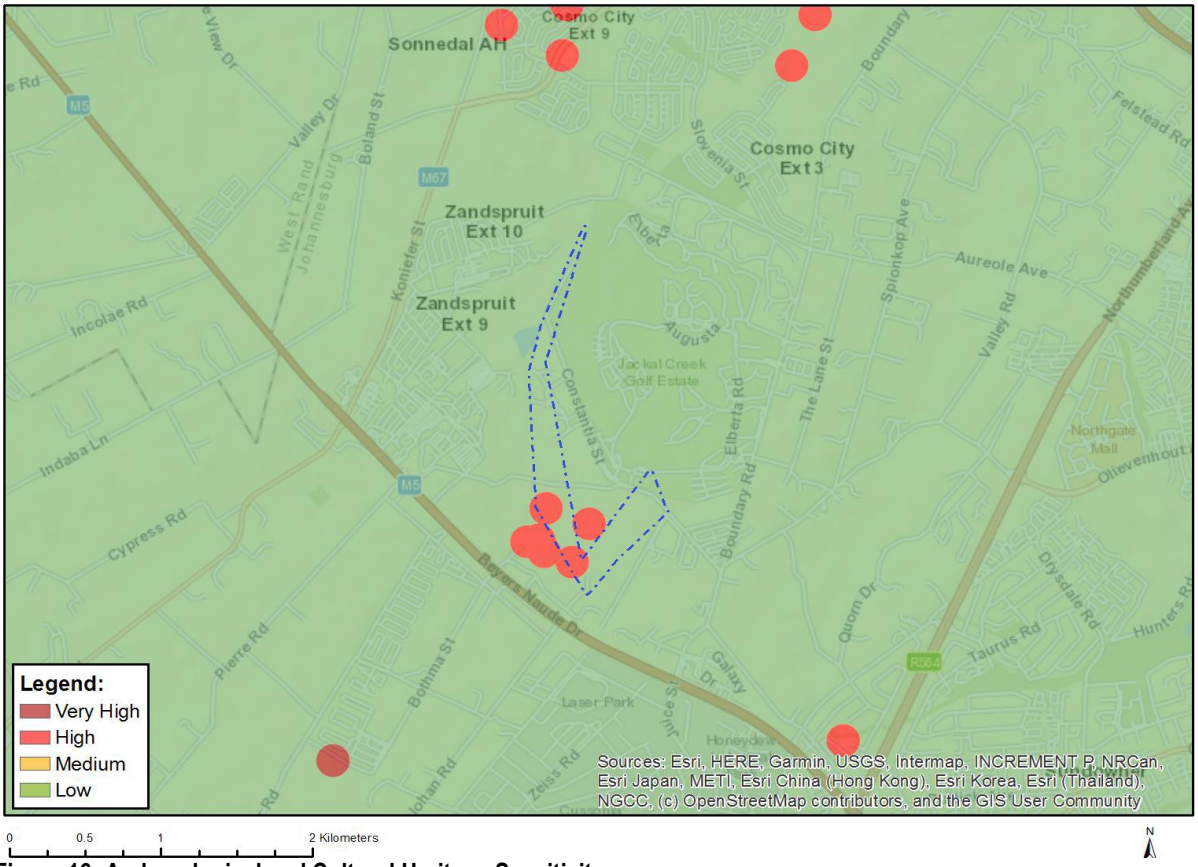


Figure 16: Archaeological and Cultural Heritage Sensitivity

As per the HIA, there are no sites, features or objects of cultural significance in the proposed alignment or its immediate vicinity. The area has been subjected to illegal dumping of rubbish and that excessive plant growth obscured ground visibility.

The area originally served as agricultural fields, located close to the Sandspruit where the alluvial soils could be exploited. These activities would have altered or destroyed any pre-colonial sites and objects that might have been located here in the past.

No formal structures can be seen on the early photograph. Later topographic maps indicated what is commonly referred to as farm labourer homesteads in the region. However, over time these disappear from the maps, an action that is probably the result of a more formal urban development, as well as the implementation of separated development, as instituted by the previous government. These features normally have a very low footprint as they were normally, although not always, built from organic such as mud bricks and wood.

What remain are seemingly an empty landscape in which the main land use is one of the installation of various pipeline routes, some informal soccer pitches and, lately some informal settlement by homeless people.

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. From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the condition proposed 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.

Refer to **Appendix G3 and G3i** for the comprehensive Heritage Impact Assessment Phase 1 and the HIA Specialist Opinion Letter, and **Appendix I3** for the Screening 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):

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

The report is at a draft stage and is being released for the 30 days legislated public review period. Comments are also anticipated during the 30-day review period.

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.

Throughout the BA process, public participation receives high priority. Public participation is one of the most important elements of the development process; therefore, Interested and Affected Parties (I&APs) were identified as part of the Public Participation Process, including occupiers of the property, owners and occupiers of land adjacent to the site, municipal officials and relevant State Departments. All respondents were then registered on the project database. This database was supplemented by I&APs that contacted our Public Participation consultant during the initial notification period to be included on the database. The database will be used throughout the process to inform all I&APs of the project and is attached within **Appendix E9**.

In order to canvass the issues and concerns of the broader public and to ensure that all I&APs are afforded the opportunity to comment on the proposed development, the proposed project was announced as follows initially:

- Site notices (size A2) advertising the proposed development and displaying the contact details of the EAP were prepared and displayed on site. The site notices served the purpose of informing potential I&APs of the project and therefore afforded them the opportunity to comment. Refer to **Appendix E1** for site notice wording. **Proof will be included in the FBAR.**
- Distribution of the notification letter with a Registration and Comment Sheet, and the locality map to state departments and other potential stakeholders through emails. Refer to **Appendix E2** for proof of written notification and email. **Proof of distribution via delivery notes to the library and to the municipality will be included in the FBAR.**
- Hand-delivered the notification letter with Registration and Comment Sheet to the landowners in close proximity of the boundary of the property. Proof of knock and drop register will be included in the FBAR
- Published an advertisement in the local newspaper (**Randburg Sun – Thursday, 19 January 2023**). Refer to **Appendix E3** for the wording of the newspaper advertisement. **Since the release of the DBAR coincided with the release of the advert publishing date proof of the newspaper advert will be included in the FBAR.**
- Communication with local authorities and stakeholders.

The Draft BAR is currently out for a 30-day public review period and is available at the **Boskruin Library at Kelly Avenue, Boskruin, Johannesburg, 2154, from 19 January 2023 until 20 February 2023**. During this period, meetings will be scheduled. **All correspondence during this period will be included in the Final BAR**.

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/ Wording Attached as **Appendix E1**

Appendix 2 – Written notices issued as required in terms of the regulations/ wording attached as **Appendix**

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

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

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 H1**.

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)?

As the proposed development falls under the City of Johannesburg Local Municipality, the council will collect the waste on a regular basis and dispose of at a registered landfill.

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)?

As above.

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.

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 system? NO
If yes, what estimated quantity will be produced per month? Unknown at this stage

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity (ies)?	NO
Will the activity produce any effluent that will be treated and/or disposed of on site?	NO

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

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?	

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 stormwater upgrade and development also requires a Water Use License from the Department of Water and Sanitation in terms of National Water Act (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 has been uploaded onto the DWS eWULAAS portal. Refer to **Appendix F** for proof thereof. The DBAR has also been made available to the Department of Water and Sanitation for comment during the DBAR review period.

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.

Please note that the following has been received during the initial period.

Issue/ Comment/ Concern	Response
The report is at a draft stage and is being released for the 30 days legislated public review period. Comments are anticipated during the 30-day review period.	

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 report is at a draft stage and is being released for the 30 days legislated public review period. Comments are anticipated during the 30-day review period. Comments that will be received during the DBAR review period will be included in the Final BAR that will be submitted to the authorising authority (GDARD).

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),
- **31-60 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.

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: Impacts to hydrological function at a landscape level

Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes) as well as the extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary, seasonal or permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). Changes to base flow and hydroperiod.

Source of Impact: The sources of this impact include the compaction of soil, the removal of vegetation, surface water redirection including temporary diversion during construction, changes to water flow.

Alternative 1
<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>Moderate (6)</td><td>Low (4)</td></tr>
</table>
</td>
<td>

Designs should consider regional hydrological dynamics.
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 both construction and operational phase. This should be monitored as part of the EMPr. High energy stormwater input from the site into the watercourses should be prevented at all cost.
Removal and storage of hydrophytes- these plants can be reused in the rehabilitation effort of the area.
Stabilise erosion where required.
Implement a long-term monitoring plan to highlight unintended negative affected of altered hydrology.

</td>
<td>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</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>55 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>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>65 (High)</td><td>44 (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: Changes in sediment regime

Changes in sediment regimes of the aquatic ecosystem and its sub - catchment by, for example, sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns

Source of Impact: Construction and maintenance activities will result in earthworks and soil disturbance as well as the disturbance of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water. Possible sources of the impacts include.

• Earthwork activities during construction
• 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</td><td>• Effective design is key to preventing scouring and erosion downstream;
• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.
• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area.
• Where sedimentation has been observed, effective rehabilitation with a focus on the long-term control of alien invasive plants should be done.
• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
• Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction. This plan must be implemented immediately upon completion of construction.
• Cordon off areas that are not under works as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent pedestrian access.</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>
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).

Alternative 1
<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>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>Low (4)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>27 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>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>75 (High)</td><td>44 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>
• During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.
• 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.
• Monitoring should be done to ensure that sediment pollution is timeously addressed.
</td><td></td></tr>
<tr><td>Nature of impact: <u>Introduction and spread of alien vegetation</u>

Source of Impact: The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed</td><td>
• Undertake an Alien Plant Control Plan which specifies actions and measurable targets.
• Retain vegetation and soil in position for as long as possible, removing</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is</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>in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompeting natural vegetation, thus 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.

Alternative 1
<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>Long term (4)</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>39 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>52 (Medium)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>it immediately ahead of construction/earthworks in that area and returning it where possible afterwards.
• Long-term monitoring for the establishment of alien invasive species within the areas affected by the construction and maintenance and taking immediate corrective action where invasive species are observed to establish, as specified in the Alien Vegetation Management Plan.
• Rehabilitate or revegetate disturbed areas.</td><td>undertaken where necessary.</td></tr>
<tr><td>Nature of the Impact: <u>Loss and disturbance of specialised habitat</u>

Loss and disturbance of watercourse habitat and fringe vegetation including impact on fixed and dynamic ecological processes and</td><td>• Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones.</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is</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>impact on key ecosystem regulating and supporting services.

Source of impact: Loss and disturbance of watercourse habitat and fringe vegetation due to direct development on the watercourse as well as changes in management, fire regime and habitat fragmentation.

Alternative 1
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Highly Probable (4)</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>Local (2)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>32 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</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>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>44 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>• Demarcate areas not essential to the development footprint as no-go areas and prevent access.
• Where sedimentation has been observed, effective rehabilitation with a focus on the long-term control of alien invasive plants should be done.
• 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.
• Implement a rehabilitation plan.</td><td>undertaken where necessary.</td></tr>
<tr><td>Nature of the Impact: <u>Changes in water quality due to input of foreign materials.</u>

Source: Construction and operational activities may result in the</td><td>• Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent sediment contaminated runoff into the watercourse.</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>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.

Alternative 1
<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>Medium 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>48 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</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>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>44 (Medium)</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 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.
• Any spills should be cleared by effective methods to ensure no release occurs into the watercourse.
• Maintenance activities should follow best practice.
• A detailed rehabilitation plan should be drawn up with the input from a water quality, soil contamination assessment and ecologist should any spills occur.</td><td>effective rehabilitation of the site is undertaken where necessary.</td></tr>
<tr><td>Nature of the Impact: <u>Loss of aquatic biota</u>

Loss of instream habitat, deposition of wind-blown sand, loss of fringing vegetation and erosion. Loss of non-marginal and marginal vegetation in combination with nutrient regime alteration. Increase in invasive species due to disturbance. Change in water quality. Changes in flow. Increase in sediment regime with emphasis on</td><td>• Ensure that no vegetation is removed unless essential for the development.
• Avoid unnecessary aquatic ecosystem crossing - limit work within the stream.
• Other than approved and authorized structure, no other development or</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>increased sediment releases from the site.

Source: Loss and disturbance of biota due to direct development in the watercourse as well as changes in habitat including water quality, the water column, increased sediment, increased alien and habitat fragmentation.

Alternative 1
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Possible (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium 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 (5)</td></tr>
<tr><td>Significance</td><td>44 (Medium)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>maintenance infrastructure is allowed within the delineated riparian areas or their associated buffer zones.
• Mark all areas which do not form part of the proposed development within the riparian area as no-go areas.
• Weed control in aquatic ecosystem and buffer zone.
• Management of sediment regime during construction.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Clearing / degradation of vegetation</u>

The rehabilitation activities will require the removal or vegetation on the silt and could impact on surrounding vegetation, including indigenous trees. This could destabilise soils and could result in an increase in alien invasive plant species that colonise the disturbed</td><td>• Do not place construction camps or site camps within areas of medium sensitivity and respect the buffers as recommended by the wetland specialist.
• Plan to use manual labour and limit the use of heavy machinery through</td><td>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is</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>area.

Source: Clearing of and damage to vegetation in the activity footprint, access roads, construction camps, vehicle / machinery traffic and trampling by workers. Removal of vegetation from silt and impacts to vegetation. Illegal disposal and dumping of construction material such as cement or oil, as well as maintenance materials during construction.

Alternative 1
<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>Short term (2)</td></tr>
<tr><td>Extent</td><td>Site and surrounds (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>50 (Medium)</td><td>35 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Positive</td></tr>
</table>
Alternative 2
<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>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site and surrounds (2)</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>50 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table></td><td>the watercourse vegetation.
• Removal of alien invasive plant species should take place.
• Limit the removal of indigenous trees to the absolute minimum.
• 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 watercourse.
• Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area or any natural areas outside of the construction footprint.
• Maintain site demarcations in position until the cessation of construction / rehabilitation work.
• After construction of the intervention, 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.</td><td>undertaken where necessary.</td></tr>
<tr><td>Nature of the Impact: Pollution of the watercourse and subsequent die-back of watercourse vegetation</td><td>• No activities may proceed within or in proximity to watercourses without a Water Use License permitting the activity.</td><td>Expected to be limited provided that the mitigation measures are</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>The construction could result in pollution of the watercourse. Desilting could result in a lower streamflow downstream and desiccation of species adapted to the elevated soil moisture.

Alternative 1
<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>Site (1)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>30 (Medium)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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 (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>52 (Medium)</td><td>20 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>

Vegetation that will not be directly impacted on by the activity must be fenced during the construction phase to prevent any human activity from encroaching into these areas, 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 might be grazed.
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 water course;
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;

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

All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring; and
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.
Monitor downstream vegetation to ensure that alien invasive species do not colonize the drier soils (due to reduced streamflow).

</td><td></td></tr>
<tr><td>
Nature of the Impact: Bare soils post construction

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

Alternative 1
<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>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>Positive</td></tr>
</table>
Alternative 2
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
</table>
</td><td>

Limit the disturbance footprint and vegetation clearing, except for the clearing of alien invasive plant species.
Other than natural occurring reeds and grasses no plant species that are on the site should be used for rehabilitation due to the infestation with alien and invasive plant species.
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.
Rip and / or scarify all disturbed areas
Do not rip and / or scarify areas under wet conditions, as the soil will not break up and it could result in further compaction.
Planting should preferably be done during the rainy season.
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 any access.
Allow for a maintenance and monitoring period of at least two years following completion.
Rehabilitate construction camps and any other vegetation that was

</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>Probability</td><td>Highly Probable (4)</td><td>Probable (2)</td></tr>
<tr><td>Duration</td><td>Medium term (3)</td><td>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Site (2)</td><td>Site (1)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>52 (Medium)</td><td>20 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td>
<td>impacted on by the construction. Due to the high degree of alien invasive plant species, re-using grass sods that was removed during construction is not recommended.
• 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
• 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 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.
• After planting and reseeding, no soil compaction (vehicles, pedestrians, and animals) should be allowed until such time that re-vegetation as successful.</td>
<td></td>
</tr>
<tr>
<td>Nature of the Impact: <u>Potential increase in invasive vegetation</u>

The seed of alien invasive plant species that occur on and in the vicinity of the activity areas could spread into the disturbed and stockpiled soil. Also, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site

Alternative 1
<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>
</table>
</td>
<td>• An alien invasive plant species management and control plan must be written for the site. This plan must include a follow-up visit to the site in summer, to document herbaceous species that may have been dormant at the time of this assessment.
• Alien invasive 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</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>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>
Alternative 2
<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>Moderate (6)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>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.</td><td></td></tr>
<tr><td>Nature of the Impact: <u>Clearing of land for construction camps and potential pollution of the soil and water</u>

The seed of alien invasive plant species that occur on and in the vicinity of the activity areas could spread into the disturbed and stockpiled soil. Also, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site

Alternative 1
<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>
</table>
</td><td>• Staff and equipment camps must not be located within the buffer to the watercourse. Follow the recommendations of the wetland assessment for this project.
• Prevent spillage of construction material and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering. Ensure there is a method statement in place to remedy any accidental spillages immediately.
• 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 in which case adequate spillage containment must be</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>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>
Alternative 2
<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>Moderate (6)</td></tr>
<tr><td>Significance</td><td>56 (Medium)</td><td>30 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>implemented.</td><td></td></tr>
<tr><td>Nature of the Impact: Loss and disturbance of heritage sites due to the development.

All Alternatives
<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>
</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</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.</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>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.
• Construction crew.

Alternative 1
<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>Short term (2)</td><td>Temporary (1)</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>40 (Medium)</td><td>27 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>High (8)</td><td>Moderate (6)</td></tr>
</table>
</td>
<td>• 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.
• 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>
</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>52 (Medium)</td><td>30 (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: Dust Generation

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.

Alternative 1
<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>Short term (2)</td><td>Temporary (1)</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>40 (Medium)</td><td>27 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>
</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>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>52 (Medium)</td><td>30 (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: Crime, safety and security

Source of Impact:

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

Alternative 1
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Possible (2)</td><td>Unlikely (1)</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>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (2)</td></tr>
<tr><td>Significance</td><td>16 (Low)</td><td>5 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Possible (2)</td><td>Unlikely (1)</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 (2)</td></tr>
<tr><td>Significance</td><td>18 (Low)</td><td>6 (Low)</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>
</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></td><td></td></tr>
<tr><td>
Nature of Impact: Noise

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

Alternative 1
<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>Short term (2)</td><td>Temporary (1)</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>50 (Medium)</td><td>28 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
Alternative 2
<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>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Significance</td><td>52 (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 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>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:</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</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>

- Job creation for local skilled labour, general labour and suppliers.

Alternative 1

Description	Without Enhancement	With Enhancement
Probability	Probable (3)	Highly Probable (4)
Duration	Temporary (1)	Short term (2)
Extent	Local (2)	Local (2)
Magnitude	Low (4)	Moderate (6)
Significance	**21 (Low)**	**40 (Medium)**
Status (positive or negative)	Positive	Positive

Alternative 2

Description	Without Mitigation	With Mitigation
Probability	Probable (3)	Highly Probable (4)
Duration	Short term (2)	Medium term (3)
Extent	Local (2)	Local (2)
Magnitude	Low (4)	Moderate (6)
Significance	**22 (Low)**	**44 (Medium)**
Status (positive or negative)	Positive	Positive

</td><td>material.</td><td></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.

Table 10: Operation 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: Impacts to hydrological function at a landscape level

All Alternatives
<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>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</td><td>18 (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) should be taken into account.
• Ensure that the activity does not result in downstream erosion or sedimentation.</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 regime

All Alternative
<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>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</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 target the culverts and with outlets in the riparian zone to ensure that no habitat degradation results from these structures during the operational phase.
• Monitoring should target the culverts and with outlets in the riparian zone to ensure that no habitat degradation results from these structures during the operational phase.</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>Nature of impact: Introduction and spread of alien vegetation

All Alternatives
<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>Medium term (3)</td></tr>
<tr><td>Extent</td><td>Regional (4)</td><td>Local (2)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</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>• Weed control in buffer zone.
• 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 the Impact: Loss and disturbance of specialised habitat

All Alternatives
<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>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</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 target the two minor culverts with outlets in the riparian zone to ensure that no habitat degradation results from these structures during the operational phase.
• 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 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 the Impact: Changes in water quality due to input of foreign materials

All Alternatives
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
</table>
</td>
<td>• 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>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>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>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</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: Loss of aquatic biota

All Alternatives
<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>Regional (3)</td></tr>
<tr><td>Magnitude</td><td>Low (4)</td><td>Low (4)</td></tr>
<tr><td>Significance</td><td>30 (Low)</td><td>18 (Low)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
</table>
</td><td>• Weed control in aquatic ecosystem and buffer zone.
• Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance of the proposed infrastructure and take immediate corrective action where invasive species are observed to establish.</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: Clearing / degradation of vegetation

All Alternatives
<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>Very short (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>Positive, replacement of non-indigenous vegetation with</td></tr>
</table>
</td><td>• Rehabilitate staff and equipment camps (if any) and any other vegetation that was impacted on by the construction. Sow an indigenous grass mix containing species naturally occurring in the area.
• 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 pedestrian access.</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></td><td></td><td>indigenous vegetation, stabilisation of soils and limiting erosion</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: Pollution of the watercourse and subsequent die-back of watercourse vegetation

All Alternatives
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (3)</td></tr>
<tr><td>Duration</td><td>Short term (3)</td><td>Very short term (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>Moderate (6)</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>Positive – re-establish indigenous vegetation</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 pedestrian access until such time that rehabilitation was successful.
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>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: Bare soils post construction

All Alternatives
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (3)</td></tr>
<tr><td>Duration</td><td>Short term (3)</td><td>Very short term (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>Moderate (6)</td></tr>
<tr><td>Significance</td><td>33 (Medium)</td><td>24 (Low)</td></tr>
<tr><td>Status (positive or</td><td>Negative</td><td>-</td></tr>
</table>
</td><td>

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>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>negative)</td><td></td><td></td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>
Nature of the Impact: Potential increase in invasive vegetation

All Alternatives
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (3)</td></tr>
<tr><td>Duration</td><td>Short term (3)</td><td>Very short term (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>Moderate (6)</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>
• Only use indigenous species within the rehabilitation of vegetation.
• Monitor regularly and remove alien invasive species as soon as they become apparent.
</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: Clearing of land for construction camps and potential pollution of the soil and water

All Alternatives
<table>
<tr><th>Description</th><th>Without Mitigation</th><th>With Mitigation</th></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (3)</td></tr>
<tr><td>Duration</td><td>Short term (3)</td><td>Very short term (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>Moderate (6)</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>
• 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>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 heritage sites due to the development

All Alternatives
<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>
</table>
</td><td>
• Should graves, fossils or any archaeological artefacts be identified during maintenance, 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>
</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>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>
</td><td></td><td></td></tr>
<tr><td>Nature of Impact: Dust Generation

All Alternatives
<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>• 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>Medium risk (as the amount of dust emitted into the air will be of high volumes); unless mitigation measures are implemented.</td></tr>
<tr><td>Nature of Impact: Noise

All Alternatives
<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>Short term (2)</td><td>Temporary (1)</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>24 (Low)</td><td>14 (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 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: Visual

All Alternatives
<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>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>33 (Medium)</td><td>44 (Medium)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>• Regular clearing of debris from watercourse.
• Maintenance of bridge/ road.</td><td>The site will not be visually appealing during the construction phase.</td></tr>
<tr><td>Nature of impact: Socioeconomic

Source of Impact:
• Safer usage of adjacent roads.
• Overall upliftment of the area.

All Alternatives
<table>
<tr><th>Description</th><th>Without Enhancement</th><th>With Enhancement</th></tr>
<tr><td>Probability</td><td>Highly Probable (4)</td><td>Definite (5)</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>High (8)</td></tr>
<tr><td>Significance</td><td>44 (Medium)</td><td>70 (High)</td></tr>
<tr><td>Status (positive or negative)</td><td>Positive</td><td>Positive</td></tr>
</table></td><td>• Maintenance of the sewer line.
• Maintenance must comply with safety regulations.
• Regular clearing of debris to prevent clogging and overtop flooding.</td><td>Medium</td></tr>
</table>

NO GO

No go Alternative (compulsory). This is the alternative of not constructing the bulk sewer pipeline. This alternative will result in no construction impacts already occurring in the study area. However, should the infrastructure not be constructed as proposed, the earmarked Zandspruit residential developments will not be catered for in terms of sewer which is a basic need and service, which will pose a heavy threat to the environment, the surroundings as well as the community. This is an undesirable alternative for the project as it will pose negative impacts on the environmental, social and economic perspective and is not considered desirable. The negative impacts of the no go alternative are considered to outweigh the positive impacts of this alternative. **The no go alternative is therefore not preferred.**

Table 11: 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
Impacts to hydrological function at a landscape level – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Changes in sediment regime – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Introduction and spread of alien vegetation – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	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 input of foreign materials – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Loss of aquatic biota – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Clearing / degradation of vegetation – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Pollution of the watercourse and subsequent die-back of	P – Low	There are no mitigation measures	P – Low	Low risk

watercourse vegetation – No-go would mean study site status quo is maintained.				
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 increase in invasive 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
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
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.	P – High	There are no mitigation measures	P – High	Low risk
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	The sewer line 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	The sewer line will cater for a basic need and service in the area.	N – High	High risk
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 – Low	There are no mitigation measures	N – Low	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 – Aquatic Biodiversity Assessment
- Appendix G2 – Vegetation Compliance Statement
- Appendix G3 – Fauna Compliance Statement
- Appendix G3i – 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. Much of the long-term success lies in the effective implementation of the measures prescribed in the EMPr.

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. This wetland rehabilitation plan can be found under **Appendix I4 - General Wetland Rehabilitation and Monitoring Plan.**

- **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 Zandspruit 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.

- **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 construction of the sewer pipeline.

Responsible environmental management will be required during the entire project life cycle. These management measures should be guided by the Environmental Management Programme (EMPr) attached as **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 rehabilitation 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.

Benefits of the project include the following:

- The proposed development provide a basic need and service to the future community within the area.
- 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 incorporated into the EMPr (**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 alternative of not constructing the sewer pipeline. This alternative will result in limited impacts already occurring in the study area. However, should the infrastructure not be constructed as proposed, the social benefits associated with the proposed activities will not be addressed. This is an undesirable alternative 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

The construction impacts associated with Alternative 1 is less significant in comparison to Alternative 2. Installing Alternative 1 is much faster than Alternative 2. Alternative 1 can be installed in any weather conditions, require no specific machinery and are installed quickly. These factors reduce the overall installation costs associated with Alternative 1. This also means that the environment will be impacted for a less time than Alternative 2. Alternative 2 requires fusing together HDPE pipes which can be expensive and electrical generators are required. This is also more time consuming. The operational output of either alternative will be similar as it will both provide the same outcome of providing sewer capacity for the earmarked housing development. Alternative 2 may require more maintenance than Alternative 1. Both alternatives will allow for local employment opportunities.

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 bulk sewer pipeline development. These have been incorporated into the EMPr (**Appendix H**).

This Report has identified and assessed the potential impacts on the environment associated with the proposed development of the Zandspruit bulk sewer pipeline. 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 **Alternative 1 (Preferred)** in relation to Alternative 2. This alternative is cost effective and takes less time which means a lower impact to the environment. The operational output of either alternative will be similar as it will both provide the same outcome of providing sewer capacity for the earmarked housing development. Alternative 2 may require more maintenance than Alternative 1. Both alternatives will allow for local

employment opportunities.

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 will agree that the project's benefits outweigh the potential negative impacts.

General Recommendations

Envirolution Consulting (Pty) Ltd recommends that **Alternative 1** be considered for approval subject to the following general recommendations:

1. Implementing the EMPr 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 and the environmental authorization 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 – this project constitutes rehabilitation and upgrade activities within a watercourse.
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. Implement the planned stilling basin and erosion control measures downstream of the bridge so as to satisfy the ROD requirements from GDARD of the downstream watercourse
18. The EMPr 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 repair 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, the EMPr, and the Environmental Authorisation 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)

CityDev (Pty) Ltd is proposing the construction of a bulk sewer within Zandspruit located in Region C of the City of Johannesburg, Gauteng Province. Zandspruit has been the scene of potential opportunities with regards to development by private and public entities over the last few years. CityDev (Pty) Ltd has identified the requirement for a bulk sewer line to be implemented for the proposed Zandspruit X93 to 96 Residential Development over Portions 92 to 95, and to subsequently cater for future earmarked housing developments in the area.

The bulk sewer line will be to serve the local community who require housing within the area.

The sewer pipeline is to accommodate the sewer which is anticipated from the proposed housing development which aims to alleviate the housing shortage within the City. The pipeline is an ancillary aspect to the housing development and is a needed service delivery.

Locals will be housed and basic services such as sewer and will be catered for.

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)

- A1: Locality Map
- A1i: Topographic Locality Map
- A1ii: Google Earth Map
- A2: C-Plan Map
- A3: Hydrology Map
- A4: Wetland Delineation Map
- A5: Vegetation Map
- A6: Geology Map

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Route Position Information

Appendix E: Public participation information

- E1: Site Notice Wording
- E2: Proof of Written Notification
- E3: Proof of Newspaper Advertisement
- 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 Assessment
- G2: Terrestrial Biodiversity Report
- G3: Heritage Impact Assessment Phase 1
- G3i: HIA Specialist Opinion Letter

Appendix H: Environmental Management Programme

Appendix I: Other information

- I1: EAP Declaration and Expertise
- I2: Specialist Declaration and Expertise
- I3: DFFE Screening Report
- I4 - General Wetland Rehabilitation and Monitoring Plan

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.