



**DRAFT BASIC ASSESSMENT FOR
THE PROPOSED REHABILITATION
AND UPGRADE OF THE SEDER
STREET BRIDGE IN RANDPARK
RIDGE, GAUTENG PROVINCE**

GDARD REFERENCE NO.: New Application

DATE: MARCH 2020

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

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.
2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
3. **A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.**
4. **A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.**
5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.
6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
8. An incomplete report may lead to an application for environmental authorisation being refused.
9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**
10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.
11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.
12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.
13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

DEPARTMENTAL DETAILS

Gauteng Department of Agriculture and Rural Development
Attention: Administrative Unit of the of the Environmental Affairs Branch
P.O. Box 8769
Johannesburg
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Administrative Unit of the of the Environmental Affairs Branch
Ground floor Diamond Building
11 Diagonal Street, Johannesburg

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

(For official use only)

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

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

N/A – This is a Draft Basic Assessment Report

Is a closure plan applicable for this application and has it been included in this report?

NO

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

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

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

YES

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

YES

If no, state reasons for not attaching the list.

[Redacted]

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 : 10 March 2020 – 09 April 2020

Project Title : The proposed rehabilitation and upgrade of the Seder Street Bridge in Randpark Ridge, Gauteng Province.

Applicant : Johannesburg Roads Agency

Environmental Consultant : Envirolution Consulting (Pty) Ltd

GDARD Reference No.: : New Application

II. DOCUMENT CONTROL

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Sameera Ismail

(MA Environmental Management)

REVIEWED BY:



Karthigesan Govender

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

III. DECLARATION

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

I. APPLICANT DETAILS

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II. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)'s DETAILS

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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 Envirovolution 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 18 years of experience within the field of environmental management. His key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management

solutions and mitigation/risk minimising measures; and strategy and guideline development. He is currently responsible for the project management of EIAs for several diverse projects across the country.

Sameera Ismail – The principle author of this Basic Assessment Report, holds a MA Environmental Management degree from the University of Johannesburg. She has 3 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; the identification of environmental management solutions and mitigation/risk minimising measures; and Water Use License processes. Sameera is currently a Project Manager and Environmental Consultant at Envirolution Consulting (Pty) Ltd.

III. SPECIALIST'S DETAILS

Name of Specialist	Title of specialist report/ s as attached in Appendix G	Date issued
Limosella Consulting	Wetland/Riparian Delineation and Functional Assessment	May 2018
	General Wetland Rehabilitation and Monitoring Plan	May 2018
CTS Heritage	Heritage Assessment	May 2018

ABBREVIATIONS

BAR	Basic Assessment Report
CoJ	City of Johannesburg
DBAR	Draft Basic Assessment Report
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
FBAR	Final Basic Assessment Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
JRA	Johannesburg Roads Agency
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)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SMP	Stormwater Management Plan
WULA	Water Use License Application

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SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

1.1 Project Title

The proposed rehabilitation and upgrade of the Seder Street Bridge in Randpark Ridge, Gauteng Province.

1.2 Background

According to the City of Johannesburg IDP 2014/2015, the upgrade of roads and bridge infrastructure was identified by Johannesburg Road Agency SOC Limited (hereafter referred to as JRA) amongst the infrastructure that requires attention. The IDP further highlights bridge and stormwater management and associated river catchments as one of the serious constraints in improving the City's infrastructure.

As a result of flooding caused by heavy rainfall, many of the city's bridges and associated infrastructure have been severely damaged. The JRA has identified the Seder Street Bridge amongst the infrastructure affected after functional deficiencies were noted as the structure stands presently. The spruit that meanders through the Hymany Park, has in the past caused damage to residential properties e.g. by undermining foundations to residential boundary walls, etc. Erosion damage of the water channel and embankments have now exposed sewer pipeline and manhole services alongside the water channel. These are in danger of collapse and which will cause subsequent contamination of the watercourse itself. The bridge structure is hydraulically inadequate to cater for high flood levels during severe thunderstorms and this has led to the overtopping of the structure and even flooding of some properties in the area on occasion. The purpose of the rehabilitation and upgrade is thus to improve the current structure to allow for a safe crossing for pedestrians, motorists, and cyclists over the river.

1.3 Project Description

1.3.1 Existing Structure Details

Seder Street is a 2-lane bi-directional road over river district collector. The bridge crosses a spruit which lies downstream of the Hymany Dam and feeds into the Klein Jukskei River. The existing structure is located on a straight horizontal road alignment, and closer to the bottom of a vertical sag curve along the vertical alignment. The current road design speed is 60km/hr. The overall width of the roadway is 7.4m and is made up of 2 trafficked lanes of 3.7m each.

The structure consists of 5 precast 1.060m diameter concrete pipe barrels crossing Seder Street. Visual inspection on site revealed concrete apron slabs with cut off walls and cast in-situ wing walls at both the inlet and outlet structures. The outlet is currently elevated above the scoured level of the watercourse downstream of the structure. The overall width of the culvert is 7m. Dense vegetation was also noted at the inlet side of the

structure.

Approach Embankments and Waterway

The Hymany Dam lies upstream of the culvert structure and has an approximate surface area of 7000 m². The dam is an earth embankment dam with a concrete lined side-channel spillway. The dam structures are in urgent need of assessment and rehabilitation. Failure of this structure may result in extensive damage downstream of the dam. This work does not form part of the scope of works of this appointment and has not been investigated further by the respective engineers.

The river upstream of the culvert meanders along the watercourse. There are also many large trees present close to the watercourse. The vegetation directly upstream of the structure is dense and provides resistance to the free flow of water through the culvert.

No embankment protection has been provided at the outlet of the structure, except for protection provided along the border line of property 7 Seder Street. The protection consists of temporary stone pitching, which is not ideal, but has prevented further undermining of the boundary wall foundations. The waterway downstream of the structure meanders and severe scour damage is present.

A pipe crossing with 3 precast concrete barrels and gabion mattresses placed above the barrels lies approximately 110m downstream of the Seder Street Bridge. This provides access for to a cell site. The vegetation between Seder Street and the pipe crossing is dense.

1.3.2 Proposed Works

The following defects have been identified along with remedial works proposed:

Defect	Remedial Works
Dense vegetation, siltation and debris upstream of the culvert – restricting flow and causing water to dam upstream. This leads to overtopping of the structure and subsequent damage to the surrounding area.	Regular maintenance required to ensure that structure openings remain clear at all times.
Typical blocked stormwater pipe. This results in water damming upstream of the structure.	Regular maintenance required to ensure that structure openings remain clear at all times.
Undermining of the cut off wall and apron slab of the structure. Scouring of the waterway downstream of the structure.	Energy dissipaters required to reduce water velocities and scour at the outlet.
Typical damaged concrete to the headwalls – inlet	Concrete to be repaired and protection coating

and outlet ends.	applied.
Embankment protection to boundary wall downstream of structure. Sewer pipes and manholes exposed and are in danger of being damaged.	Realignment of the structure crossing and downstream water channel (away from the boundary structure) will prevent further damage to the boundary structure. Scour damage to be repaired.
Rubble from the partially collapsed boundary wall from 7 Seder Street, downstream of the structure.	This would need to be cleared to ensure rubble is not transported downstream.
Scoured waterway embankment exposing sewer pipeline and manhole services – in danger of being damaged.	Realignment of the structure crossing and downstream water channel (away from the services) will prevent further damage. Scour damage to be repaired.
Sharp bends and obstructions in the watercourse channel adversely affecting the hydraulics of the watercourse.	Waterway channel downstream of the structure to be realigned, straightened and lined to facilitate the flow and prevent scour due to high velocities in the channel.
Collapsed gabions downstream of the structure.	This is outside the scope of the project and it is suggested that City Parks be contacted to repair this issue.

1.3.3 Hydrological and Hydraulic Analysis

Hydrology

The catchment area of the bridge site is approximately 0.72 km² made up primarily of an urban environment with a relatively steep sloping watercourse channel (average catchment slope between 7% to 10%). The return period results are summarised in Table 1 below.

Table 1: Summary of Flow Calculations

Return period	Rational Alternative 2 (m ³ /s)	Rational Alternative 3 (m ³ /s)	Rational Average (m ³ /s)
1:10	13	10	12
1:20	16	12	14
1:40	20	14	17
1:50	24	15	19

Hydraulics

The average of the Rational Alternative methods from Table 1 above were used to determine bridge capacity

analysis, utilizing the HECRAS software to model the conditions of the site. The analyses show that the existing bridge, will be able to accommodate the minimum design flood for a class 4 road (1:10 year), but does not comply with the limit of water to shoulder break point for Q_{2T} (1:20 year) requirement. It is therefore proposed that the structure be upgraded to accommodate the minimum hydraulic design requirements.

1.4 Listed Activities

In terms of Sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as amended, and as read with the Environmental Impact Assessment (EIA) Regulations of Government Notices R 982 to 985 (as amended), 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	<p>Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells grit, pebbles or rock of more than 10 cubic metres from a watercourse.</p> <p><i>The proposed project will result in infilling or removal of more than 10m³ or more of material into/from a watercourse during the rehabilitation and upgrade of the bridge and associated infrastructure.</i></p>
GNR 985 of 08 Dec 2014, as amended (324 of 07 April 2017)	Listing Notice 3	<p>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</p> <p>c. Gauteng</p> <p>ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.</p> <p><i>There is vegetation coverage along the proposed works areas (and as a result of the wetland areas). The clearance of vegetation of approximately 300 square metres may occur within the wetland and buffer area. The proposed activities fall within an Ecological Support Area.</i></p>
GNR 985 of 08 Dec 2014, as amended (324 of 07 April 2017)	Listing Notice 3	<p>Activity 14: The development of:–</p> <p>(xii) infrastructure or structures with a physical footprint of 10 square meters or more –</p> <p>where such development occurs -</p>

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

1.5 Locality of study site

The bridge site is located along Seder Street between Medlar Road and Frangipani Street in Hymany Park – Randpark Ridge, north west of the Johannesburg CBD. The N1 Western Bypass lies to the south east of the site. The M5 (Beyers Naude) lies to the south west. Ysterhout Drive and Rabie Street lie north and north east. The CoJ’s Corporate GIS information locates the area as falling within the broader Region B. In terms of current ward demarcations, the study area falls within Ward 98. The approximate central coordinates of the study site is 26°

6°12.51"S; 27°56'59.98"E. Please refer to Figure 1: Locality Map below which depicts the study area in relation to the surrounding areas.

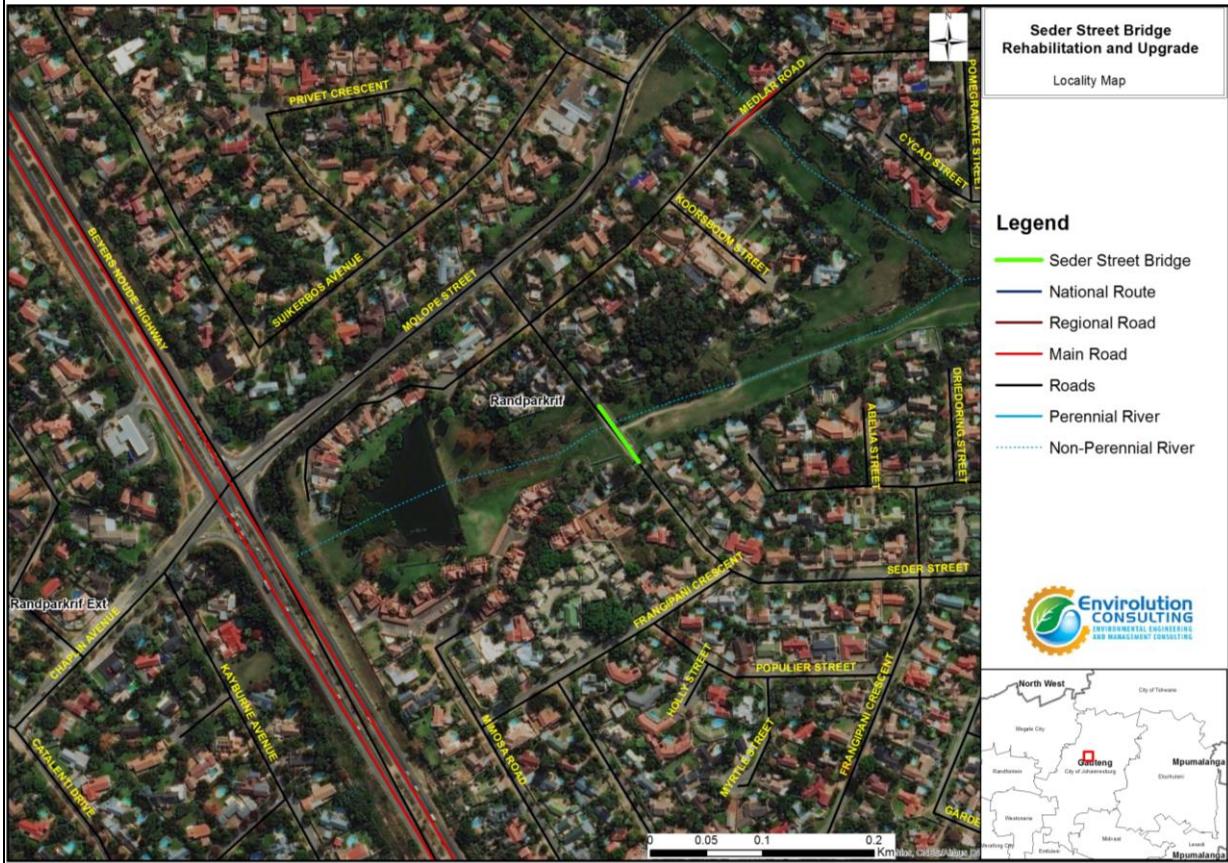


Figure 1: Locality Map

Select the appropriate box

The application is for an upgrade of an existing development

The application is for a new development

Other, specify

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

 YES

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

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 NO

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

 YES NO

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

Use License Application:

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

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

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

2. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

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

Several Acts, standards or guidelines have also informed the project process and the scope of issues assessed in this report. A listing of relevant legislation is provided in Table 3 below, where the level of applicability of the legislation or policy to the activity/project is detailed.

Table 3: 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)	<p>NEMA requires, inter alia, that:</p> <ul style="list-style-type: none"> • Development must be socially, environmentally, and economically sustainable. • Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. • Risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. <p>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>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.</p>	National Department of Environmental Affairs Gauteng Department of Agriculture and Rural Development (GDARD)	The Basic Assessment is undertaken in accordance with the requirements of Government Notice R982 of December 2014, as required in terms of the National Environmental Management, 1998 (Act No. 107 of 1998).
National Environmental Management Act (Act No. 107 of 1998)	<p>A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.</p> <p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that</p>	National Department of Environmental Affairs Gauteng Department of	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
	<p>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.</p>	<p>Agriculture and Rural Development (GDARD)</p>	<p>found application in the impact assessment phase.</p> <p>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.</p>
<p>National Water Act (Act No. 36 of 1998)</p>	<p>Section 21 water uses as per the NWA includes:</p> <p>21(a): Taking water from a water resource;</p> <p>21(b): Storing water;</p> <p>21(c): Impeding or diverting the flow of water in a watercourse;</p> <p>21(d): Engaging in a stream flow reduction activity;</p> <p>21(e): Engaging in a controlled activity;</p> <p>21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;</p> <p>21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;</p> <p>21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;</p> <p>21(i): Altering the bed, banks, course or characteristics of a watercourse;</p> <p>21(j): Removing, discharging or disposing of water found underground if it is necessary for the</p>	<p>Department of Water and Sanitation</p>	<p>The proposed development requires a Water Use License as Section 21 c and i of the NWA are triggered as a result of the proximity to the episodic stream and dams. A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal.</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	<p>efficient continuation of an activity or for the safety of people; and</p> <p>21(k): Using water for recreational purposes.</p> <p>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.</p> <p>Given the sensitivity associated with a project, DWS will determine whether the project will follow a General Authorisation process or a Water Use License Application process.</p>		
National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)	This Act provides management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act (Act No. 107 of 1998); the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.	Department of Environmental Affairs (DEA)	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 1 st July 2009. Section 20 of the Environment Conservation Act (Act No. 73 of 1989), under which waste management was previously governed, was repealed. In general, the act seeks to ensure that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the constitution, in ensuring an environment that is not harmful to health and wellbeing.	Department of Environmental Affairs (DEA) National Department of Environmental Affairs – lead authority for regulating hazardous	No waste license activities are applicable to this project. The developer will however be required to store and manage waste in accordance with the requirements of this Act and associated Standards.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
		waste. Provincial Environmental Department – for regulating general waste	
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Section 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas”. The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. Dust Control Regulation Control Regulations, R. No. 827 of 1 November 2013.	National Department of Environmental Affairs	While no permitting or licensing requirements arise from this legislation for the site, this Act will find application during the construction phase of the project. The implementation of dust mitigation measures are included as part of the project EMPr and will continue to apply throughout the life cycle of the project. Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan
National Heritage Resource Act, 1999 (Act No. 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including the construction of a road, exceeding 300m in length. In accordance with the NHRA, an independent heritage consultant is to conduct a cultural	South African Heritage Resources Association (SAHRA)	Should any heritage sites be unearthed during excavations, a permit would be required to be obtained from SAHRA.

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

3. ALTERNATIVES

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

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

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

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

The rehabilitation and upgrade must:

- Adequately enhance safety of bridge users.
- Enhance erosion protection.

Other factors considered to reach the alternatives discussed in the table below include:

- Durability
- Costs
- Practicality
- Social upliftment
- Construction timeframes

There are no site alternatives as the bridge itself requires rehabilitation and upgrading given the current state.

Provide a description of the alternatives considered

No.	Alternative type, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
1.	Design Alternatives	<p>Alternative 1 – Rehabilitation of the Existing Structure and Installation of Additional Pipes</p> <p>This alternative will entail the rehabilitation of the existing concrete structure, installation of additional pipes to increase the hydraulic capacity of the crossing and the installation of additional protection works to the embankments and waterway channel. The existing configuration of the culvert structure will be maintained with additional culvert barrels proposed to be added to the existing structure.</p> <p>The addition of at least 3 additional pipe barrels (to match the existing) is required to ensure compliance to the minimum design flood for a class 4 road (1:10 year), and the limit of water to shoulder break point for Q2T (1:20 year) requirement. This results in an upgraded crossing width that is comparable to that of the new precast concrete culvert proposed in option 2 below.</p> <p>Although this alternative can alleviate the probability of the structure overtopping (provided that the inlets are kept clear and free from blockages at all times), this solution does not adequately address the defects and concerns evident on site (structure orientation towards the properties alongside the downstream channel, etc.). Extensive protection works of the adjoining property boundaries as well as to the exposed services will be required in addition to river training works to redirect the stream to an alignment that would enhance the hydraulics of the downstream waterway channel.</p> <p>As a result of upgrading works being required (to increase the hydraulic capacity of the structure) for any solution proposed, it</p>

		<p>is recommended that the upgrade solution address deficiencies and defects (other than just the crossing hydraulic capacity) of the structure.</p> <p>Construction Requirements</p> <ul style="list-style-type: none">• Accommodation of the river flow during construction (damming and piping of water across the construction footprint).• Traffic accommodation for the installation of additional pipe crossings. It will be required that the road will be closed for the duration of the construction, preventing crossing over the river. Alternative detours will need to be identified with adequate signage erected to direct the general public.• Clearing and grubbing of the construction area.• Excavation of road prism surrounding the existing culvert and installation location of the new culvert.• Excavation and formalisation (realignment and straightening) of the waterway downstream of structure (to a trapezoidal cross section). The channel is to be lined with 'Armorflex' concrete type blocks (or similar).• The new pipe crossings sections are to be an extension of the existing structure and will consist of the following:<ul style="list-style-type: none">○ The pipes are to be founded on an engineered fill / competent bedrock (if available). Geotechnical investigations are required to confirm and finalise founding assumptions.○ Demolition of the wing walls (on the extension side) with the extension of the existing apron slabs, cut-off walls and reconstruction of wingwalls on the widened portion are required.○ Construction of debris walls upstream of the structure, placed the same distance from the entrance of the culvert as the height of the culvert, two thirds the height of the culvert opening, and placed in line with the walls of the culvert.• Construction of roadway prism.• Re-construction of the excavated roadway (on approach and over the structure) inclusive of galvanised steel guardrails along both edges across the structure.• Construction of downstream gabion weirs:
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		<ul style="list-style-type: none">○ Gabions installed and properly anchored into surrounding embankment.○ Grouting of gabions and addition of a concrete capping over the gabions, this will ensure debris is not caught in the gabions.○ Construction of a concrete apron slabs downstream of the weirs with energy dissipaters.○ Installation of precast concrete pipes through the gabion weir to allow for normal flow conditions.○ Plunge pool at the structure outlet will need to be filled up with the downstream channel aligned to suit levels of the outlet structure.● To increase the hydraulic capacity of the bridge structure and surrounds, the vegetation overgrowth upstream of the structure will be removed and a concrete slab with a cut off wall installed. In addition, 'Armorflex' concrete type blocks will be installed as a scour protection measure in addition to reducing vegetation growth at the inlet.● Gabion embankment protection works will be installed at both the inlet and outlet ends of the structure, alongside the property boundary and along that portion of the downstream channel where existing services are exposed.● Removal of large blocks of concrete from Hymany dam spillway to ensure these do not get transported downstream and cause damage the culvert during high floods. <p>Advantages</p> <ul style="list-style-type: none">● All defects pertaining to concrete of the existing structure will be repaired with the upgraded structure.● The new structure will have sufficient hydraulic capacity to safely accommodate a 1:10 year design flood, whilst not overtopping in the event of a 1:20-year design flood i.e. hydraulic capacity of structures applicable to a class 4 road classification structure will be achieved.● Blockages at the inlet will be reduced as compared to the current situation due to the increased clear widths of the structure openings.● The upgraded structure will further reduce backwater effects of floods and damming of water upstream of the
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		<p>structure due to a greater opening area and the installation of the debris walls.</p> <ul style="list-style-type: none"> • With the lining of the waterway channel downstream of the structure, embankments and the waterway channel itself will be protected against scour. • Construction cost is lower than that compared to Alternative 2 – but minimally different. • Construction duration is shorter than Alternative 2 – minimal difference. <p>Disadvantages</p> <ul style="list-style-type: none"> • Significant disruption to traffic access across the culvert will be experienced. • More maintenance is required than that of option 2 (required on a regular basis to keep the inlet structures clear). • Not recommended that the current structure orientation be maintained as protection works alongside property boundaries etc. will deteriorate over time. • It must be further noted that the waterway beyond the extent of the current scope of works (approximately 100m downstream of the structure) will be required to be upgraded to ensure that the design floods are contained within a channel rather than flooding the surrounding area. <p>Alternative 2 – Construction of a New Precast Concrete Culvert (Preferred)</p> <p>This alternative includes the demolition of the existing structure and the construction of a new 3- barrel culvert utilizing rectangular pre-cast portal culverts. The new configuration of the culvert will accommodate the hydraulic capacity required as well as reducing obstructions from larger vegetation and debris transported from upstream towards the structure. The orientation of the new structure as well as the widening, realignment and straightening of the water channel downstream will be directed away from the adjoining private properties, enhancing the flow hydraulics downstream of the structure.</p> <p>The waterway downstream of the structure is fairly steep with gradients up to 10%. This steep gradient drastically increases</p>
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the velocity of the water in the waterway, increasing scour potential within the waterway channel and embankments. It is proposed that the waterway channel be lined ('Armorflex' concrete blocks or similar) up to a point where the waterway gradient flattens to allow reduced velocities. In addition, energy dissipaters such as grouted gabion weirs will be constructed at the end of the lined channel area to reduce the velocity of the channel flow.

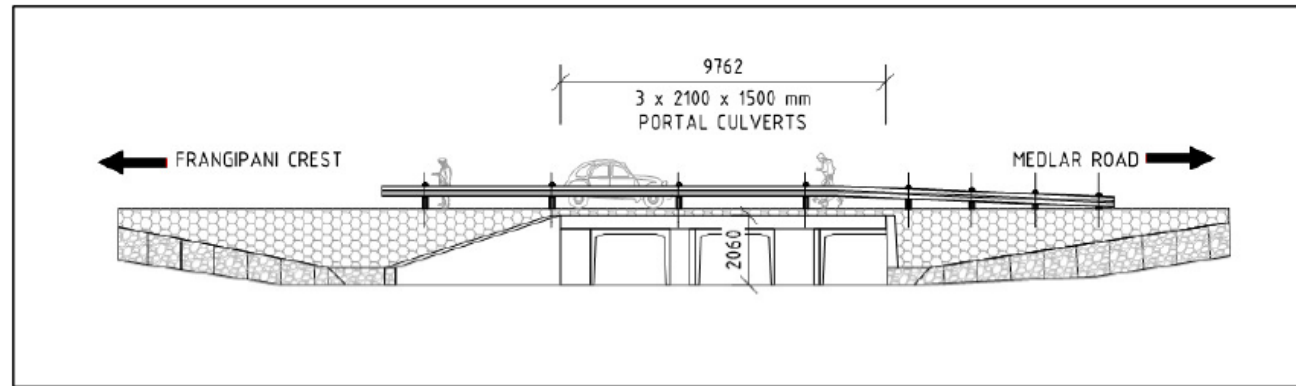


Figure 2: Elevation of new precast concrete culvert

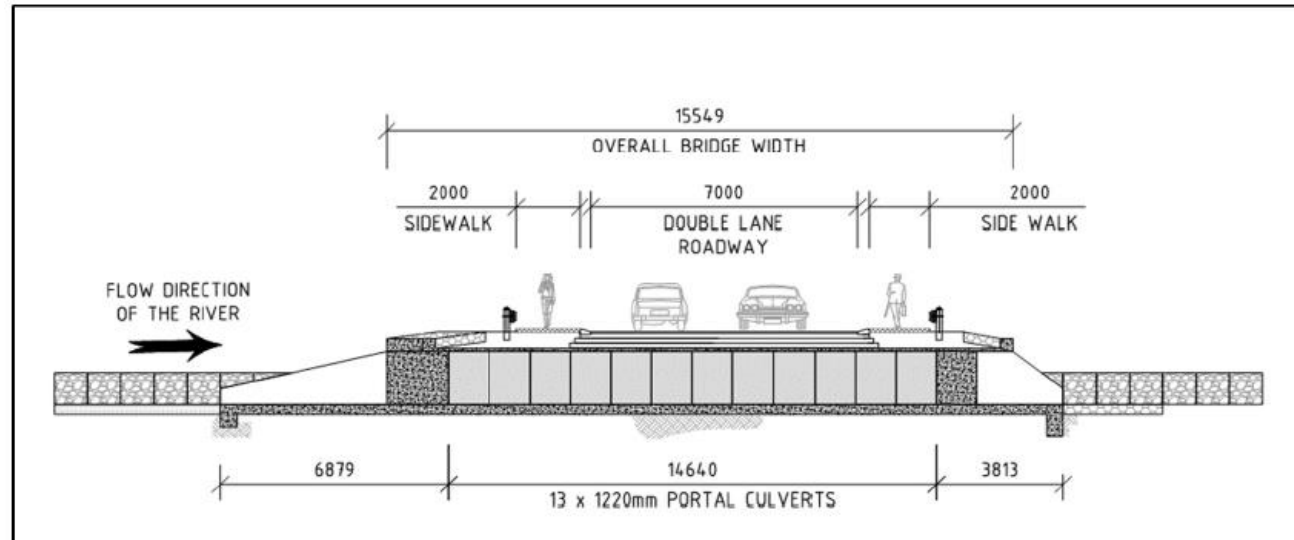


Figure 3: Long section through proposed upgraded culvert

Construction Requirements

- Accommodation of the river flow during construction (damming and piping of water across the construction footprint).
- Traffic accommodation for the upgraded bridge structure construction activities. It will be required that the road will be closed for the duration of the construction, preventing crossing over the river. Alternative detours will need to be identified with adequate signage erected to direct the general public.
- Clearing and grubbing of the construction area.
- Excavation of road prism surrounding the existing culvert and installation location of the new culvert.
- Excavation and formalisation (realignment and straightening) of the waterway downstream of structure (to a trapezoidal cross section). The channel is to be lined with 'Armorflex' concrete type blocks (or similar).
- Demolition and removal of existing culvert elements.

		<ul style="list-style-type: none">● The construction of an upgraded culvert structure consisting of the following:<ul style="list-style-type: none">○ The culvert structure is to be founded on a reinforced concrete invert slab, supported on an engineered fill / competent bedrock (if available). Geotechnical investigations are required to confirm and finalise founding assumptions.○ 3 new barrels (2.1m wide by 1.5m high) constructed with a 100mm reinforced concrete slab constructed over.○ New structure orientation is skew in relation to the road centreline (directed away from properties downstream of the structure).○ Construction of cast in-situ concrete wing walls, apron slabs and cut off walls.○ Construction of debris walls upstream of the structure, placed the same distance from the entrance of the culvert as the height of the culvert, two thirds the height of the culvert opening, and placed in line with the walls of the culvert.● Construction of roadway prism.● Construction of the roadway (on approach and over the structure) and is to be made up of the following:<ul style="list-style-type: none">○ Trafficked lanes of 3.5m each, inclusive of shoulders and raised sidewalks.○ 2 x 2m wide grassed sidewalks (extending over the structure).○ Galvanised steel guardrails along both edges across the structure.● Construction of downstream gabion weirs:<ul style="list-style-type: none">○ Gabions installed and properly anchored into surrounding embankment.○ Grouting of gabions and addition of a concrete capping over the gabions, this will ensure debris is not caught in the gabions.○ Construction of a concrete apron slabs downstream of the weirs with energy dissipaters.○ Installation of precast concrete pipes through the gabion weir to allow for normal flow conditions.● To increase the hydraulic capacity of the bridge structure and surrounds, the vegetation overgrowth upstream of the structure will be removed and a concrete slab with a cut off wall installed. In addition, 'Armorflex' concrete type blocks
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		<p>will be installed as a scour protection measure in addition to reducing vegetation growth at the inlet.</p> <ul style="list-style-type: none">• Gabion embankment protection works will be installed at both the inlet and outlet ends of the structure.• Removal of large blocks of concrete from Hymany dam spillway to ensure these do not get transported downstream and cause damage the culvert during high floods. <p>Advantages</p> <ul style="list-style-type: none">• All defects pertaining to concrete of the existing structure will be repaired with the upgraded structure.• The new structure will have sufficient hydraulic capacity to safely accommodate a 1:10 year design flood, whilst not overtopping in the event of a 1:20-year design flood i.e. hydraulic capacity of structures applicable to a class 4 road classification structure will be achieved.• Blockages at the inlet will be greatly reduced as compared to the current situation due to the increased clear widths of the structure openings.• The upgraded structure will further reduce backwater effects of floods and damming of water upstream of the structure due to a greater opening area and the installation of the debris walls.• With the lining of the waterway channel downstream of the structure, embankments and the waterway channel itself will be protected against scour.• Less maintenance would be required than what is currently required. <p>Disadvantage</p> <ul style="list-style-type: none">• Construction cost is higher than that compared to Alternative 1.• Construction duration is longer than Alternative 1.• Significant disruption to traffic access across the culvert will be experienced.
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		<ul style="list-style-type: none">• Some maintenance will be required on a regular basis to keep the inlet structures clear.• It must be further noted that the waterway beyond the extent of the current scope of works (approximately 100m downstream of the structure) will be required to be upgraded to ensure that the design floods are contained within a channel rather than flooding the surrounding area.
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Comparison of Alternatives

Table 4 below provides a comparison summary of the alternatives discussed above based on certain feasibility criteria.

Table 4: Matrix comparison of alternatives

Task	Alternative 1	Alternative 2 (Preferred)
	Rehabilitate existing and additional pipes	Construction of a new culvert
Complexity of construction	Low	Medium
Disruption to traffic access over structure	High	High
Traffic accommodation during construction	High	High
Possibility of structure overtopping due to hydraulic capacity of structure	High	Low
Construction Cost	Medium	Medium
Maintenance requirements	High	Low
Demolition works	Low	Medium
Rectifies existing design deficiencies hydraulic capacity, inlet blockages, backwater effects, etc.)	No	Yes

It is recommended that Alternative 2: Construction of a new culvert structure with rehabilitation to downstream waterway be approved for implementation as it is a long-term solution that addresses and minimises current defects identified on the structure, whilst minimising the effects of future flooding of the river channel.

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



4. PHYSICAL SIZE OF THE ACTIVITY

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:

Proposed activity
 Alternatives

Size of the activity	
	+/- 15 000m ²
	Ha/ m ²

or, for linear activities:

Proposed activity Alternative 1
 Alternative 2
 Alternative 3

Length of the activity:

m/km

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

Proposed activity
 Alternative

Size of the site/servitude:	
	+/- 15 000m ²
	m ²

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

Describe the type of access road planned:

Maximum use of existing roads shall be made.

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

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

Section A 6-8 has been duplicated 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.

Please refer to 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.

Please refer to 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.

Please refer to 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 times route

Instructions for completion of Section B for location/route alternatives

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

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

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

Section B 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 (complete only when appropriate for above)

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

1. PROPERTY DESCRIPTION

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

The proposed activities will take place along Seder Street, Randpark Ridge
Portion 107 of Farm Boschkop 199

2. ACTIVITY POSITION

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

Proposed Activity: Latitude (S):
Alternative: Longitude (E):

In the case of linear activities:

Alternative 1 (preferred):

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Latitude (S):	Longitude (E):
26° 6'12.28"S	27°56'59.76"E
26° 6'12.51"S	27°56'59.98"E
26° 6'12.77"S	27°57'0.22"E

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

Addendum of route alternatives attached [REDACTED]

The 21 digit Surveyor General code of each cadastral land parcel

Proposal	T	0	I	Q	0	0	0	0	0	0	0	0	0	0	0	1	9	9	0	0	1	0	7
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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
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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
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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)
Dolomite, sinkhole or doline areas

YES	[REDACTED]
[REDACTED]	NO

- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil
- Dispersive soils (soils that dissolve in water)
- Soils with high clay content (clay fraction more than 40%)
- Any other unstable soil or geological feature
- An area sensitive to erosion

YES	
YES	
YES	
	NO
	NO
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):**

[Redacted]

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):**

[Redacted]

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):**

[Redacted]

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

Terrain

The road over river bridge structure is located in a sub-urban environment consisting of residential dwellings with public open spaces (parks) bordering the bridge structure and stream embankments. The general terrain (watercourse and surrounding residential and open space areas) varies from gentle increasing in gradient within the watercourse itself and is covered by vegetation and large trees leading up to and away from the structure.

Hydrology

The site is situated in Quaternary Catchment A21C. In this catchment, the precipitation rate is considerably lower than the evaporation rate with a Mean Annual Precipitation (MAP) to Potential Evapotranspiration (PET) of 0.25 for Quaternary Catchment A21C. Consequently, wetlands in this area are sensitive to changes in regional hydrology, particularly where their catchment becomes transformed and the water available to sustain them becomes redirected.

Quaternary Catchment A21C falls in the first water management area (WMA), Limpopo. In this WMA the major

rivers include the Limpopo, Matlabas, Mokolo, Lephalele, Mogalakwena, Sand, Nzhelele, Mutale and Luvuvhu.

Surface water spatial layers such as the National Freshwater Ecosystems Priority Areas (NFEPA) Wetland Types for South Africa and Gauteng Department of Agriculture and Rural Development (GDARD) were consulted for the presence of wetlands and rivers. This layer reflects two perennial watercourses are shown, one of which flows underneath the Seder Road Bridge. Both watercourses flow into the Klein Jukskei River which drains into the Jukskei River. This river confluences with the Crocodile River which in turn joins with several rivers to the north, including the Elands and Marico Rivers to finally confluence with the Limpopo River. A dam which lies approximately 150m to the west of the bridge forms the headwaters of this watercourse. Refer to Figure 4: Hydrology Map. The wetland map indicates the bridge location in relation to the 15m, 30m, and 500m buffers. Refer to Figure 5: Wetland Map.

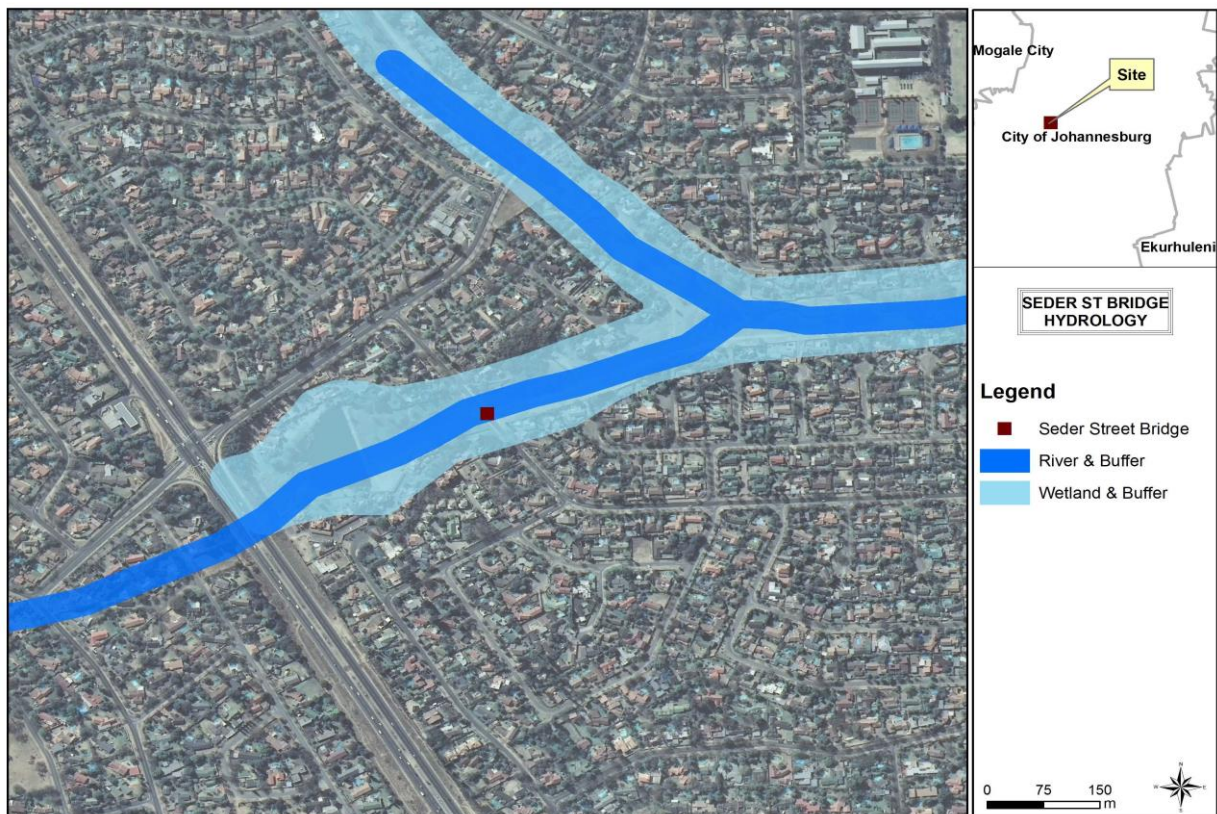


Figure 4: Hydrology Map

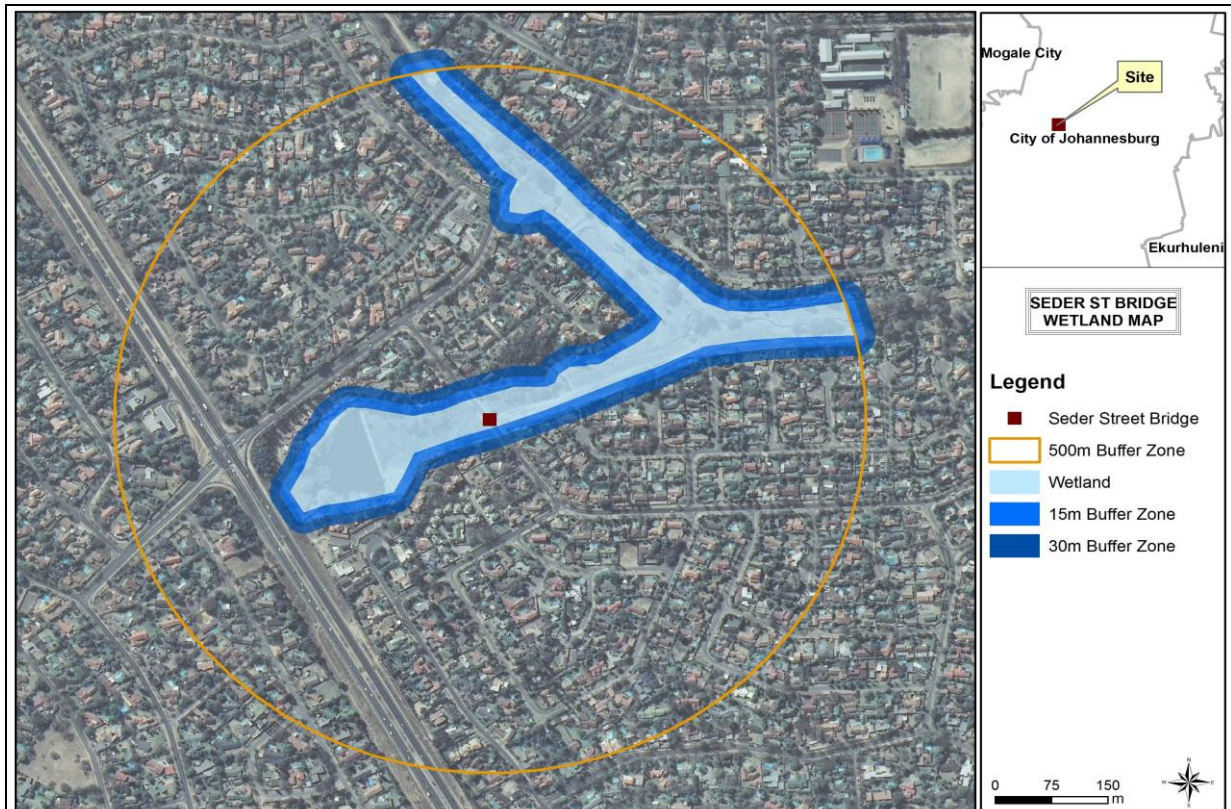


Figure 5: Wetland Map

The PES and EIS scores were calculated for the wetland likely to be impacted by the proposed bridge upgrade. The PES scores calculated in this assessment resulted into a low E. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable. The EIS score of 1.2 falls into a category characterised by Moderate importance and sensitivity. Wetlands in this category are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers. The Recommended Ecological Category (REC) is set at D.

Geology and Soil

Archaean granite and gneiss of the Halfway House Granite underlies the entire study site. This formation dates back to the Basement Complex that was formed close to the origin of the earth (approximately 4,600 to 2,500 million years ago). The basement complex acts in the same way as the shales. The shales are the most permeable of rock types, and water moves easily through them, becoming trapped above the intrusions. Groundwater recharge, such as seeps and springs, occurs on the slope face at the contact between the highly weathered shale and the impermeable layers. Erosion sets in with runoff increasing by as little as 5% in the soils found in this geological formation. Activities such as excavation and surface sealing in the catchment, adjacent and within wetlands with a Halfway House Granite Dome geology lead to the destruction of these ecosystems.

The regional soil classification for the study area specifies Glenrosa soil for the bridge area. This soil is described

as a potential seasonal to temporary wetland soil. It is characterised by a surface horizon which is maintained by biological activity and underlying rock or saprolite. Saprolite refers to a horizon of weathering rock which still has distinct affinities with the parent rock. Penetration of roots and water in Glenrosa soil is typically non-uniform and restricted to spaces between fragments of rock or saprolite.

Refer to **Appendix G1** for full Wetland Delineation and Functional Assessment Report.

6. AGRICULTURE

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 4)?

	NO
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Please note: The Department may request specialist input/studies in respect of the above.

7. GROUNDCOVER

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

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

Natural veld - good condition % =	Natural veld with scattered aliens % = 30%	Natural veld with heavy alien infestation %	Veld dominated by alien species % =	Landscaped (vegetation) % =
Sport field % =	Cultivated land % =	Paved surface (hard landscaping) % = 30%	Building or other structure % = 30%	Bare soil % = 10%

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

The proposed site traverses the Egoli Granite Grassland ecosystem which is an endangered terrestrial ecosystem.

The dominant presence of underlying granite in the region is directly related to the presence of Egoli Granite Grassland, a grassland type currently under severe pressure from urbanisation. Grassland in the Highveld region is maintained by a complex interplay between the effects of altitude, soils, severe frost and burning. Interference that negates the effect of any one of the environmental conditions often results in an increase in woody species and, consequently, in a loss of grassland habitat.

Egoli Granite Grassland is characterised by a high species richness with a patchy dominance of various grass species and a large variety of forbs. Egoli Granite Grassland is extremely poorly conserved, with only 0.02%

(26ha) of the vegetation type currently protected. Therefore, the current protection status of this grassland is completely inadequate in order to meet South Africa’s international obligations in terms of the Convention on Biological Diversity. Egoli Granite Grasslands are threatened by habitat fragmentation and transformation. Therefore, every effort needs to be made to minimise destructive effects of development in this region on the remaining patches of this vegetation type. The disturbance of soils and vegetation results in the invasion of alien and invasive species. Vegetation in this vegetation unit is currently dominated by aliens such as Poplar (*Populus sp.*), Eucalyptus sp., Black Wattle (*Acacia mearnsii*), Giant Reed (*Arundo donax*), Syringa (*Melia azederach*) and Weeping Willow (*Salix Babylonica*). The highly invasive herbaceous species, Pom-pom Weed (*Campuloclinium macrocephalum*) is found throughout the region.

Are there any rare or endangered flora or fauna species (including red list species) present on the site

YES	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:

The study site is located on an Ecological Support Area.

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 study site is located on an Ecological Support Area.

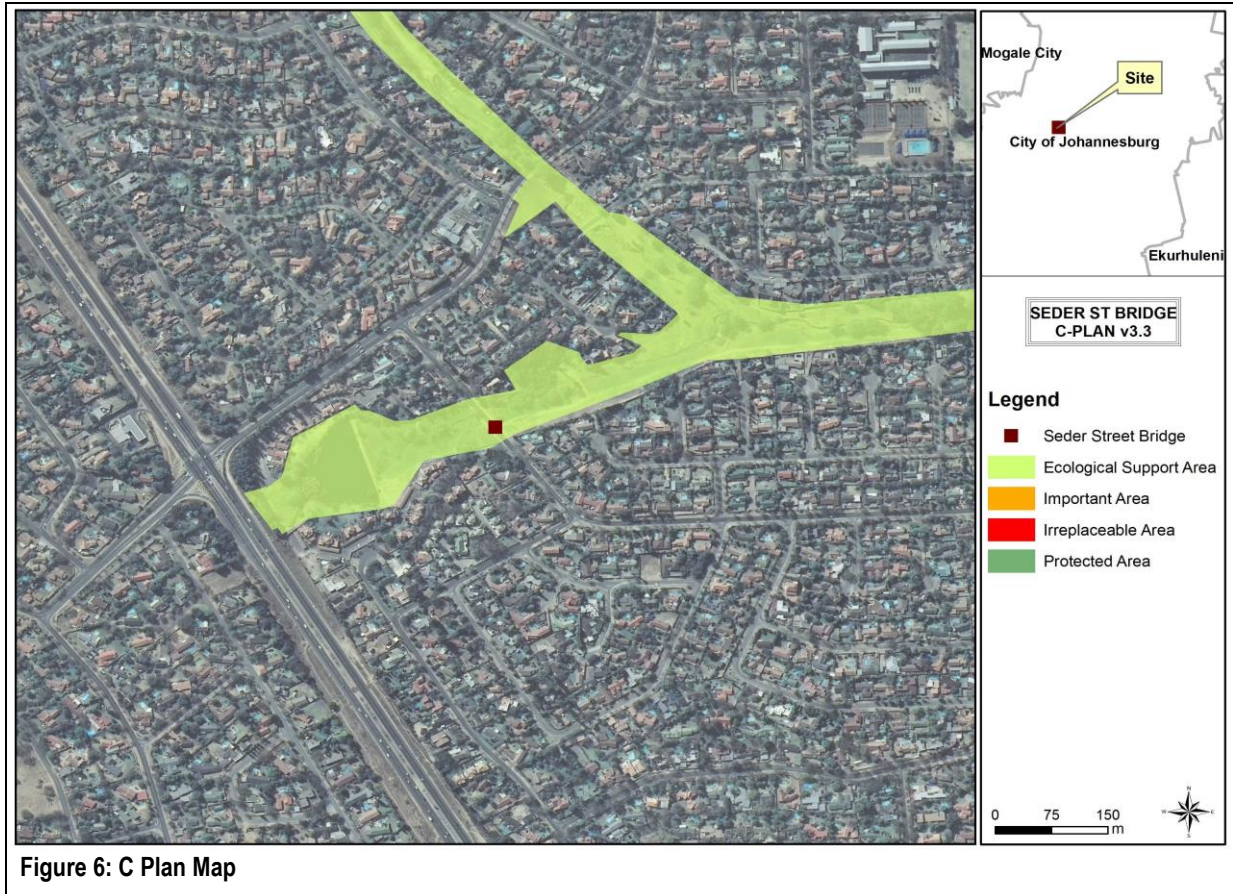


Figure 6: C Plan Map

Was a specialist consulted to assist with completing this section YES

If yes complete specialist details

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

Are any further specialist studies recommended by the specialist? 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: May 2018

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.

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	9	12,17	4	2,4	
	9	9	9	2,4,9	4	
WEST	12	4,9		4,9	9	EAST
	9	2,4,6	9	9	9	
	2	9	19	9	9	

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
If yes indicate the type of reports below

YES	
-----	--

Appendix G1 – Wetland/Riparian Delineation and Functional Assessment
Appendix G1(i) – General Wetland Rehabilitation and Monitoring Plan

Appendix G2 – Heritage Assessment

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%).

Roodepoort covers an area of 161.50 km² with a total population of approximately 326 416 inhabitants within 109 707 households. In terms of gender, 50.33% of the population is female and 49.67% is male. Majority of the population are black (51.42%), followed by 35.40% white, 8.23% coloured, 4.01% indian and 0.94% other. The predominant languages are English (29.81%), Afrikaans (23.97%), Zulu (9.02%) and Tswana (8.84%).

Randpark Ridge covers an area of 9 km² with a total population of approximately 18 033 inhabitants within 6059 households. In terms of gender, 52.72% of the population is female and 47.28% is male. Majority of the population are white (64.10%), followed by 23.77% black, 7.58% indian, 3.19% coloured and 1.37% other. The predominant language is English (67.43%).

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.

Shopping centres in Randpark Ridge include Randridge Mall, Trinity Village Shopping Centre, and Honey Crest Shopping Centre.

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).

73.3% of Roodepoort's population are classified as the working age, with a dependency ratio of 36.4%. 12.6% of Roodepoort's population receives no income at all, 11.6% earns within the R19 601 – R38 200 bracket, 16.4% earns within the R307 601 – R614 400 bracket, 8.5% earns within the R614 001 – R1 228 800, and 1% earns R2 457 601+.

Education

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

1.8% of the population aged 20+ in Roodepoort has received no education, 29.7% has received some form of higher education, and 36.1% has completed matric. Roodepoort is home to several private and state schools including Trinity House (within Randpark Ridge) and Charter College. The University of South Africa's (UNISA) Science campus is also located in Roodepoort.

Randpark Ridge is home to several educational institutes including Spark School, and Randpark Primary.

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?

YES	NO
-----	----

If YES, explain:



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

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

The entire area is underlain by geological deposits of insignificant or zero fossil sensitivity. The affected deposits comprise gneisses and migmatites, which are described on the SAHRIS Fossil Sensitivity Browser as containing no fossils. These deposits are Early to Late Archaean in age and represent highly metamorphosed blocks of continental crust.

Due to the lack of intrinsic heritage significance in the bridge itself, as well as the transformed nature of the immediate surrounds and unfossiliferous nature of the underlying geology, it is not anticipated that the limited interventions of an upgrade to the bridge will negatively impact any significant heritage resources.

This bridge has not been identified as a significant heritage resource. Randpark Ridge was established in the early 1980's and as such, this bridge is unlikely to be older than 60 years. Although the existing bridge is located approximately 200m from the Hy-Many Heritage Site, it is unlikely that the proposed bridge upgrade will impact on this, or any other, significant heritage resources.

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

SAHRA and PHRAG are being engaged in the environmental process through the public participation process as registered Interested and/ Affected Parties/ Stakeholders.

For further details, please refer to the Heritage Assessment attached with **Appendix G2** and **Appendix F**.

Will any building or structure older than 60 years be affected in any way?
 Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?
 If yes, please attached the comments from SAHRA in the appropriate Appendix

	NO
	NO

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):

[REDACTED]

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?

YES

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

Comments have been received from IAP's (residents within the area) to register as I&APs, advising on the current conditions within the area and providing suggestions.

Please refer to **Appendix E4** for Proof Of Correspondence and **E6** for Comments and Response Report.

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

[REDACTED]

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 to be included on the database. The database was 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:

- 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 Proof of Site Notices.
- 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 (ii)** for the notification letter.
- Hand-delivered the notification letter with Registration and Comment Sheet to the adjacent landowners in close proximity of the boundary of the property (See **Appendix E2 (i)** for the – knock and drop register).
- Published an advertisement in the newspaper (See **Appendix E3** for proof of advertisements).
- Communication with local authorities and stakeholders (See **Appendix E4** for proof of correspondence with I&APs).

Initial I&AP notification was conducted in April 2018. This is being re-conducted and is running parallel to the release of this DBAR (10 March 2020 until 09 April 2020). Proof of advert, site notices and notification letters will be included in the FBAR.

Please note that any further comments received during the review period of the draft Basic Assessment as well as responses provided will be captured and recorded within the Comments and Response Report, attached as Appendix E6, in the FBAR.

A copy of the Draft Basic Assessment Report for public review is available for public review at the Boskruin Library at Kelly Avenue, Boskruin, Johannesburg, 2154 for a legislated 30-day commenting period (10 March 2020 until 09 April 2020).

5. APPENDICES FOR PUBLIC PARTICIPATION

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

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

Appendix 2 – Written notices issued Attached as **Appendix E2**

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

Appendix 4 – Communications to and from I&APs Attached as **Appendix E4**

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

Appendix 6 – Comments and Responses Report Attached as **Appendix E6**

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

Section D has been duplicated for 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?
 If yes, what estimated quantity will be produced per month?

YES	[redacted]
Could not be determined at this stage	

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

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

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

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

Will the activity produce solid waste during its operational phase?
 If yes, what estimated quantity will be produced per month?

[redacted]	NO
------------	----

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

[redacted]

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?

[redacted]

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

[redacted]

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

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? NO
 If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility? NO
 If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

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

During Construction, wastes must be separated at source and disposed at relevant suitably licensed facilities. Waste should be separated into recyclable and non-recyclable materials and distributed for recycling where applicable. During the construction phase, construction waste rubble should be used as fill material and as foundation for the proposed upgrade processes where possible. The re-use of construction waste materials will minimize the amount of waste that will need to be disposed of at registered municipal waste facilities.

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)? YES NO
 Will the activity produce any effluent that will be treated and/or disposed of on site? YES 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 NO
 If yes, is it controlled by any legislation of any sphere of government? YES NO

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

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

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, and minimal gases e.g. carbon dioxide, carbon monoxide from construction vehicle emissions and other diesel powered machinery and during the construction phase.

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
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month: YES NO

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 NO

If yes, list the permits required

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

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

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

A Water Use License Application has been uploaded onto the DWS eWULAAS portal. Refer to **Appendix F**. The DBAR will also be 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.

Issue/ Comment/ Concern	Response
Comments have been received from IAP's (residents within the area) to register as I&APs, advising on the current conditions within the area and providing suggestions.	
Please refer to Appendix E4 for Proof Of Correspondence and E6 for Comments and Response Report.	

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included).
(A full response must be provided in the Comments and Response Report that must be attached to this report):

Refer to Appendix E6 – Comments and Response Report

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

As per the DEA Screening attached as **Appendix I4**, the following environmental sensitivities have been identified:

Table 5: Summary of Environmental Sensitivities

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Civil Aviation Theme			X	
Plant Species Theme				X
Defence Theme				X
Terrestrial Biodiversity Theme	X			

Based on the above table, it is important to note that the most important environmental sensitivity identified is the watercourse and surrounding wetland area. The development is relatively small scale thus only a Wetland Delineation and Functional Assessment Study and a Heritage Impact Assessment were conducted, however, the Environmental Management Programme attached as **Appendix H** have accommodated for mitigation measures that covers fauna and flora as well.

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

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

- The **Nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **Extent**, wherein it is indicated whether:
 - 1 is limited to the immediate area or site of development
 - 2 is the local area
 - 3 is regional
 - 4 is national
 - 5 is international
- The **Duration**, wherein it is indicated whether:
 - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - Medium-term (5–15 years) – assigned a score of 3;
 - Long term (> 15 years) - assigned a score of 4; or;
 - Permanent - assigned a score of 5.
- The **Magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - 0 is small and will have no effect on the environment;
 - 2 is minor and will not result in an impact on processes;
 - 4 is low and will cause a slight impact on processes;
 - 6 is moderate and will result in processes continuing but in a modified way;
 - 8 is high (processes are altered to the extent that they temporarily cease); and
 - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **Probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - Assigned a score of 3 is probable (distinct possibility);
 - Assigned a score of 4 is highly probable (most likely); and
 - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **Significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
 - The status, which is described as **positive, negative** or **neutral**.
 - The degree to which the impact can be reversed.
 - The degree to which the impact may cause irreplaceable loss of resources.
 - The degree to which the impact can be mitigated.

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

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

Alternative 1 – Rehabilitation of the Existing Structure and Installation of Additional Pipes

Table 6: Construction Impacts

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of Impact: <u>Changing the quantity and fluctuation properties of the watercourse by for example restricting water flow.</u></p> <p>Source of Impact: The compaction of soil, the removal of vegetation, surface water redirection of water during construction activities.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Description</th> <th style="text-align: center;">Without Mitigation</th> <th style="text-align: center;">With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td style="text-align: center;">Definite (5)</td> <td style="text-align: center;">Highly Probable (4)</td> </tr> <tr> <td>Duration</td> <td style="text-align: center;">Medium term (3)</td> <td style="text-align: center;">Short term (2)</td> </tr> <tr> <td>Extent</td> <td style="text-align: center;">Local (2)</td> <td style="text-align: center;">Local (2)</td> </tr> <tr> <td>Magnitude</td> <td style="text-align: center;">Moderate (6)</td> <td style="text-align: center;">Low (4)</td> </tr> <tr> <td>Significance</td> <td style="text-align: center;">55 (Medium)</td> <td style="text-align: center;">32 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td style="text-align: center;">Negative</td> <td style="text-align: center;">Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Short term (2)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	55 (Medium)	32 (Medium)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • Designs should take into account soil properties, slopes and runoff energy. • Inclusion of attenuation structures with the aim of preventing future flooding. • Construction must be restricted to the dryer winter months where possible. • 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 contractors 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 EMP. High energy stormwater input into the watercourses should be prevented at all cost. 	<p>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly Probable (4)																					
Duration	Medium term (3)	Short term (2)																					
Extent	Local (2)	Local (2)																					
Magnitude	Moderate (6)	Low (4)																					
Significance	55 (Medium)	32 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of Impact: <u>Changes in sediment entering and exiting the system.</u></p>	<ul style="list-style-type: none"> • Consider the various methods and equipment available and select whichever method(s) that will have the least impact on 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED												
<p>Source of Impact: Changing the amount of sediment entering the water resource and associated change in turbidity (increasing or decreasing the amount). Construction and operational activities will result in earthworks and soil disturbance as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the wetland and increase the turbidity of the water.</p> <p>Possible sources of the impacts include:</p> <ul style="list-style-type: none"> • 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 successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil. • Disturbance of soil surface. • Disturbance of slopes through creation of roads and tracks adjacent to the watercourse. • Erosion (e.g. gully formation, bank collapse). <table border="1" data-bbox="192 1233 813 1390"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Definite (5)</td> <td>Probable (3)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Short term (2)</td> </tr> <tr> <td><i>Extent</i></td> <td>Regional (3)</td> <td>Regional (3)</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	<i>Probability</i>	Definite (5)	Probable (3)	<i>Duration</i>	Medium term (3)	Short term (2)	<i>Extent</i>	Regional (3)	Regional (3)	<p>watercourses.</p> <ul style="list-style-type: none"> • Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed. • Construction in and around watercourses must be restricted to the dryer winter months where possible. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area. • 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 and that plan must be implemented immediately upon completion of construction. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • 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 	<p>effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation												
<i>Probability</i>	Definite (5)	Probable (3)												
<i>Duration</i>	Medium term (3)	Short term (2)												
<i>Extent</i>	Regional (3)	Regional (3)												

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Magnitude</i>	Moderate (6)	Low (4)	erosion and pollution problems. <ul style="list-style-type: none"> Monitoring should be done to ensure that sediment pollution is timeously dressed. 																						
<i>Significance</i>	60 (Medium)	27 (Low)																							
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of impact: <u>Introduction and spread of alien vegetation.</u></p> <p>Source of Impact: The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Highly Probable (4)</td> <td>Probable (3)</td> </tr> <tr> <td><i>Duration</i></td> <td>Long term (4)</td> <td>Short term (2)</td> </tr> <tr> <td><i>Extent</i></td> <td>Regional (3)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>Low (4)</td> </tr> <tr> <td><i>Significance</i></td> <td>52 (Medium)</td> <td>24 (Low)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	<i>Probability</i>	Highly Probable (4)	Probable (3)	<i>Duration</i>	Long term (4)	Short term (2)	<i>Extent</i>	Regional (3)	Local (2)	<i>Magnitude</i>	Moderate (6)	Low (4)	<i>Significance</i>	52 (Medium)	24 (Low)	<i>Status (positive or negative)</i>	Negative	Negative	<ul style="list-style-type: none"> Weed control. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area and returning it where possible afterwards. Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. 	Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.
Description	Without Mitigation	With Mitigation																							
<i>Probability</i>	Highly Probable (4)	Probable (3)																							
<i>Duration</i>	Long term (4)	Short term (2)																							
<i>Extent</i>	Regional (3)	Local (2)																							
<i>Magnitude</i>	Moderate (6)	Low (4)																							
<i>Significance</i>	52 (Medium)	24 (Low)																							
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of the Impact: <u>Loss and disturbance of wetland habitat and fringe vegetation.</u></p> <p>Source of impact: Removal of damaged structures and</p>			<ul style="list-style-type: none"> Weed control in buffer zone. 	Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>rehabilitation activities within wetland areas.</p> <table border="1" data-bbox="190 368 813 691"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Definite (5)</td> <td>Highly probable (4)</td> </tr> <tr> <td>Duration</td> <td>Medium term (3)</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>55 (Medium)</td> <td>28 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly probable (4)	Duration	Medium term (3)	Temporary (1)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	55 (Medium)	28 (Low)	Status (positive or negative)	Negative	Negative		<p>necessary.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly probable (4)																					
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Extent	Local (2)	Local (2)																					
Magnitude	Moderate (6)	Low (4)																					
Significance	55 (Medium)	28 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Changes in water quality due to pollution.</u></p> <p>Source: Construction activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/ivers and a reduction in watercourse integrity.</p> <table border="1" data-bbox="190 1038 813 1358"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Definite (5)</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>Low (4)</td> </tr> <tr> <td>Significance</td> <td>50 (Medium)</td> <td>21 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Probable (3)	Duration	Short term (2)	Temporary (1)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	50 (Medium)	21 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • Provision of adequate sanitation facilities located outside of the watercourse/riparian area or its associated buffer zone. • Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. • The development footprint must be fenced off from the watercourse and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use. • Maintenance of construction vehicles/ equipment should not take place within the watercourse or watercourse buffer. • Control of waste discharges. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Probable (3)																					
Duration	Short term (2)	Temporary (1)																					
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Significance	50 (Medium)	21 (Low)																					
Status (positive or negative)	Negative	Negative																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of the Impact: <u>Exposure to erosion and subsequent sedimentation.</u></p> <p>Source:</p> <ul style="list-style-type: none"> Removal of vegetation without proper rehabilitation or failure of rehabilitation; Destruction of intact soil crusts; Access roads, especially on slopes, channels rainfall and causes erosion; Lack of rehabilitation or failed rehabilitation; Construction vehicles disturbing areas; and Failure of rehabilitation of the construction footprint. <table border="1" data-bbox="192 911 813 1225"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Highly Probable (4)</td> <td>Probable (3)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Short term (2)</td> </tr> <tr> <td>Extent</td> <td>Local (2)</td> <td>Site (1)</td> </tr> <tr> <td>Magnitude</td> <td>High (8)</td> <td>Moderate (6)</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> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Probable (3)	Duration	Long term (4)	Short term (2)	Extent	Local (2)	Site (1)	Magnitude	High (8)	Moderate (6)	Significance	56 (Medium)	27 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> Treatment of pollution should be prioritised accordingly. Install litter traps downstream from the bridge. Do not allow erosion to develop on a large scale before taking action. Where possible, no construction/ activities should be undertaken within the riparian area. The extent of riparian conditions should be verified by a wetland specialist and no activities should take place within these areas without a Water Use License granted by DWS for these activities. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area. Alien/ exotic tree species that are removed for the development footprint should be replaced by indigenous species, naturally occurring along riparian areas in Johannesburg. Protect all areas susceptible to erosion (especially the sloped rocky grassland) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Highly Probable (4)	Probable (3)																					
Duration	Long term (4)	Short term (2)																					
Extent	Local (2)	Site (1)																					
Magnitude	High (8)	Moderate (6)																					
Significance	56 (Medium)	27 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Loss and disturbance of heritage sites due to the development.</u></p> <table border="1" data-bbox="192 1358 813 1390"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation				<ul style="list-style-type: none"> 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 	<p>Low risk anticipated provided that the mitigation measures are implemented correctly.</p>															
Description	Without Mitigation	With Mitigation																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED									
Probability	Very improbable (1)	Very improbable (1)	museum so that an investigation and evaluation of the finds can be made.										
Duration	Permanent (4)	Permanent (4)											
Extent	Site (1)	Site (1)											
Magnitude	Minor (2)	Minor (2)											
Significance	7 (Low)	7 (Low)											
Status (positive or negative)	Negative	Negative											
<p>Nature of Impact: <u>Visual</u></p> <p>Surface disturbances and the presence of a construction team are uncharacteristic events in the study area and may cause unsightly views as a result of the activity.</p> <p>Introduction of construction equipment, ground staff, construction vehicles and equipment that is unfamiliar in the baseline environment.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Construction vehicles. • Construction material. • Barricading and fencing. • Rubble on site. • Construction crew. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	<ul style="list-style-type: none"> • Construction vehicles should only park in designated areas. • Waste to be kept only at specific sites on site and to be removed weekly. • Do not locate the construction camp or laydown yards within 1km from any residential area or tourist attraction, unless it can be completely screened from sensitive viewpoints. Preferably, construction camps should be in a dedicated construction camp in the industrial area, in an area that is already disturbed. • Avoid the construction of additional access roads by keeping to existing roads where possible. • Avoid removal of any large trees or shrubs that may open views to the construction site and compromise the natural screening capacity of the study area. • Clearly demarcate the construction site to limit the area of disturbance. • 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 	<p>The site will not be visually appealing during the construction phase.</p>
Description	Without Mitigation	With Mitigation											
Probability	Definite (5)	Highly Probable (4)											
Duration	Medium term (3)	Medium term (3)											

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																		
<i>Extent</i>	Site (1)	Site (1)	appropriate dump site. <ul style="list-style-type: none"> 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. 																			
<i>Magnitude</i>	Moderate (6)	Low (4)																				
<i>Significance</i>	50 (Medium)	32 (Medium)																				
<i>Status (positive or negative)</i>	Negative	Negative																				
<p>Nature of Impact: <u>Dust Generation</u></p> <p>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.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Clearing of vegetation. Construction vehicles. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Definite (5)</td> <td>Probable (3)</td> </tr> <tr> <td><i>Duration</i></td> <td>Short term (2)</td> <td>Short term (2)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>High (8)</td> <td>Moderate (6)</td> </tr> <tr> <td><i>Significance</i></td> <td>60 (Medium)</td> <td>30 (Low)</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	<i>Probability</i>	Definite (5)	Probable (3)	<i>Duration</i>	Short term (2)	Short term (2)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	High (8)	Moderate (6)	<i>Significance</i>	60 (Medium)	30 (Low)	<ul style="list-style-type: none"> 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. 	Medium risk (as the amount of dust emitted into the air will be of high volumes); unless mitigation measures are implemented.
Description	Without Mitigation	With Mitigation																				
<i>Probability</i>	Definite (5)	Probable (3)																				
<i>Duration</i>	Short term (2)	Short term (2)																				
<i>Extent</i>	Local (2)	Local (2)																				
<i>Magnitude</i>	High (8)	Moderate (6)																				
<i>Significance</i>	60 (Medium)	30 (Low)																				

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of Impact: <u>Crime, safety and security</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Lack of security. Easy access. Construction area not enclosed. Poorly trained personnel using equipment and vehicles. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td>Magnitude</td> <td>Moderate (6)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td>44 (Medium)</td> <td>27 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Probable (3)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	44 (Medium)	27 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> 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. 	<p>If not mitigated, medium risk to personnel as well as the construction site if safety measures are not put in place before construction commences.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Highly Probable (4)	Probable (3)																							
Duration	Medium term (3)	Medium term (3)																							
Extent	Local (2)	Local (2)																							
Magnitude	Moderate (6)	Low (4)																							
Significance	44 (Medium)	27 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of Impact: <u>Noise</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Construction vehicles. Equipment and machinery. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Definite (5)</td> <td>Definite (5)</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Definite (5)	<ul style="list-style-type: none"> 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 	<p>High risk as construction vehicles and equipment causes noise pollution.</p>															
Description	Without Mitigation	With Mitigation																							
Probability	Definite (5)	Definite (5)																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
Duration	Medium term (3)	Medium term (3)	activities outside the timeframes stated above. <ul style="list-style-type: none"> 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. 	
Extent	Local (2)	Local (2)		
Magnitude	Moderate (6)	Low (4)		
Significance	55 (Medium)	45 (Medium)		
Status (positive or negative)	Negative	Negative		
Nature of impact: <u>Traffic and accessibility</u> This Alternative will entail the upgrading of the existing concrete structure. Public traffic and general access over the structure will be compromised.			<ul style="list-style-type: none"> Traffic accommodation for construction activities affecting the travelled way as well as the sidewalks of the travelled way. If one lane is expected to be closed, "Stop and Go" will be used for traffic accommodation. In the case of complete road closure, traffic diversion must be accommodated for. 	High risk
Description	Without Mitigation	With Mitigation		
Probability	Definite (5)	Highly Probable (4)		
Duration	Short term (2)	Short term (2)		
Extent	Local (2)	Local (2)		
Magnitude	High (8)	Medium (6)		
Significance	60 (Medium)	40 (Medium)		
Status (positive or negative)	Negative	Negative		
Nature of impact: <u>Socioeconomic</u> Source of Impact: <ul style="list-style-type: none"> Job creation for local skilled labour, general labour and suppliers. 			<ul style="list-style-type: none"> General and skilled locals must be considered for employment during construction (contractor and construction crew). Local suppliers must be considered for the purchase of construction material. 	Medium

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
Description	Without Enhancement	With Enhancement		
Probability	Probable (3)	Highly Probable (4)		
Duration	Medium term (3)	Medium term (3)		
Extent	Local (2)	Local (2)		
Magnitude	Moderate (6)	High (8)		
Significance	33 (Medium)	52 (Medium)		
Status (positive or negative)	Positive	Positive		

Alternative 2 – Construction of a New Precast Concrete Culvert (Preferred)

Table 7: Construction Impacts

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of Impact: <u>Changing the quantity and fluctuation properties of the watercourse by for example restricting water flow.</u></p> <p>Source of Impact: The compaction of soil, the removal of vegetation, surface water redirection of water during construction activities.</p> <table border="1" data-bbox="190 676 813 949"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>Regional (3)</td> <td>Regional (3)</td> </tr> <tr> <td>Magnitude</td> <td>High (8)</td> <td>Moderate (6)</td> </tr> <tr> <td>Significance</td> <td>70 (High)</td> <td>48 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Regional (3)	Regional (3)	Magnitude	High (8)	Moderate (6)	Significance	70 (High)	48 (Medium)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • Designs should take into account soil properties, slopes and runoff energy. • Inclusion of attenuation structures with the aim of preventing future flooding. • Construction must be restricted to the dryer winter months where possible. • 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 contractors 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 EMP. High energy stormwater input into the watercourses should be prevented at all cost. 	<p>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly Probable (4)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Regional (3)	Regional (3)																					
Magnitude	High (8)	Moderate (6)																					
Significance	70 (High)	48 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of Impact: <u>Changes in sediment entering and exiting the system.</u></p> <p>Source of Impact: Changing the amount of sediment entering the water resource and associated change in turbidity (increasing or decreasing the amount). Construction and operational activities will result in earthworks and soil disturbance as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the wetland and increase the turbidity of the water.</p> <p>Possible sources of the impacts include:</p>	<ul style="list-style-type: none"> • Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses. • Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed. • Construction in and around watercourses must be restricted to the dryer winter months where possible. • Retain vegetation and soil in position for as long as possible, 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<ul style="list-style-type: none"> • 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 successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil. • Disturbance of soil surface. • Disturbance of slopes through creation of roads and tracks adjacent to the watercourse. • Erosion (e.g. gully formation, bank collapse). <table border="1" data-bbox="192 790 813 1056"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>Regional (3)</td> <td>Regional (3)</td> </tr> <tr> <td>Magnitude</td> <td>High (8)</td> <td>Moderate (6)</td> </tr> <tr> <td>Significance</td> <td style="background-color: red; color: white;">70 (High)</td> <td style="background-color: yellow;">48 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Regional (3)	Regional (3)	Magnitude	High (8)	Moderate (6)	Significance	70 (High)	48 (Medium)	Status (positive or negative)	Negative	Negative	<p>removing it immediately ahead of construction/ earthworks in that area.</p> <ul style="list-style-type: none"> • 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 and that plan must be implemented immediately upon completion of construction. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • 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 dressed. 	
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly Probable (4)																					
Duration	Medium term (3)	Medium term (3)																					
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Significance	70 (High)	48 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of impact: <u>Introduction and spread of alien vegetation.</u></p> <p>Source of Impact: The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are</p>	<ul style="list-style-type: none"> • Weed control. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area and returning it where possible afterwards. • Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>implemented alien plants can easily colonise and impact on downstream users.</p> <table border="1" data-bbox="190 391 813 662"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Highly Probable (4)</td> <td>Probable (3)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Medium term (3)</td> </tr> <tr> <td>Extent</td> <td>Regional (3)</td> <td>Local (2)</td> </tr> <tr> <td>Magnitude</td> <td>Moderate (6)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td>52 (Medium)</td> <td>27 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Probable (3)	Duration	Long term (4)	Medium term (3)	Extent	Regional (3)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	52 (Medium)	27 (Low)	Status (positive or negative)	Negative	Negative		
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Magnitude	Moderate (6)	Low (4)																					
Significance	52 (Medium)	27 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Loss and disturbance of wetland habitat and fringe vegetation.</u></p> <p>Source of impact: Removal of damaged structures and rehabilitation activities within wetland areas.</p> <table border="1" data-bbox="190 861 813 1141"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	High (8)	Moderate (6)	Significance	65 (High)	44 (Medium)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • Weed control in buffer zone. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly probable (4)																					
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Magnitude	High (8)	Moderate (6)																					
Significance	65 (High)	44 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Changes in water quality due to pollution.</u></p> <p>Source: Construction activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/streams and a reduction in</p>	<ul style="list-style-type: none"> • Provision of adequate sanitation facilities located outside of the watercourse/riparian area or its associated buffer zone. • Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. • The development footprint must be fenced off from the 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>watercourse integrity.</p> <table border="1" data-bbox="192 363 813 635"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	High (8)	Moderate (6)	Significance	65 (High)	44 (Medium)	Status (positive or negative)	Negative	Negative	<p>watercourse and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.</p> <ul style="list-style-type: none"> • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use. • Maintenance of construction vehicles/ equipment should not take place within the watercourse or watercourse buffer. • Control of waste discharges. • Treatment of pollution should be prioritised accordingly. • Install litter traps downstream from the bridge. 	
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly Probable (4)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Local (2)	Local (2)																					
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Significance	65 (High)	44 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Exposure to erosion and subsequent sedimentation.</u></p> <p>Source:</p> <ul style="list-style-type: none"> • Removal of vegetation without proper rehabilitation or failure of rehabilitation; • Destruction of intact soil crusts; • Access roads, especially on slopes, channels rainfall and causes erosion; • Lack of rehabilitation or failed rehabilitation; • Construction vehicles disturbing areas; and • Failure of rehabilitation of the construction footprint. <table border="1" data-bbox="192 1201 813 1374"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Probable (3)	Duration	Long term (4)	Medium term (3)	Extent	Local (2)	Site (1)	Magnitude	High (8)	Moderate (6)	<ul style="list-style-type: none"> • Do not allow erosion to develop on a large scale before taking action. • Where possible, no construction/ activities should be undertaken within the riparian area. The extent of riparian conditions should be verified by a wetland specialist and no activities should take place within these areas without a Water Use License granted by DWS for these activities. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area. • Alien/ exotic tree species that are removed for the development footprint should be replaced by indigenous species, naturally occurring along riparian areas in Johannesburg. • Protect all areas susceptible to erosion (especially the sloped rocky grassland) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>						
Description	Without Mitigation	With Mitigation																					
Probability	Highly Probable (4)	Probable (3)																					
Duration	Long term (4)	Medium term (3)																					
Extent	Local (2)	Site (1)																					
Magnitude	High (8)	Moderate (6)																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
Significance	56 (Medium)	30 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of the Impact: <u>Loss and disturbance of heritage sites due to the development.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Very improbable (1)	Very improbable (1)	Duration	Permanent (4)	Permanent (4)	Extent	Site (1)	Site (1)	Magnitude	Minor (2)	Minor (2)	Significance	7 (Low)	7 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> 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. 	<p>Low risk anticipated provided that the mitigation measures are implemented correctly.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Very improbable (1)	Very improbable (1)																							
Duration	Permanent (4)	Permanent (4)																							
Extent	Site (1)	Site (1)																							
Magnitude	Minor (2)	Minor (2)																							
Significance	7 (Low)	7 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of Impact: <u>Visual</u></p> <p>Surface disturbances and the presence of a construction team are uncharacteristic events in the study area and may cause unsightly views as a result of the activity.</p> <p>Introduction of construction equipment, ground staff, construction vehicles and equipment that is unfamiliar in the baseline environment.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Construction vehicles. Construction material. Barricading and fencing. Rubble on site. Construction crew. 			<ul style="list-style-type: none"> Construction vehicles should only park in designated areas. Waste to be kept only at specific sites on site and to be removed weekly. Do not locate the construction camp or laydown yards within 1km from any residential area or tourist attraction, unless it can be completely screened from sensitive viewpoints. Preferably, construction camps should be in a dedicated construction camp in the industrial area, in an area that is already disturbed. Avoid the construction of additional access roads by keeping to existing roads where possible. Avoid removal of any large trees or shrubs that may open views to the construction site and compromise the natural screening capacity of the study area. Clearly demarcate the construction site to limit the area of disturbance. Keep dust levels down by regularly wetting dirt roads and exposed soil areas. 	<p>The site will not be visually appealing during the construction phase.</p>																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
Description	Without Mitigation	With Mitigation	<ul style="list-style-type: none"> 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. 	
Probability	Definite (5)	Highly Probable (4)		
Duration	Medium term (3)	Medium term (3)		
Extent	Site (1)	Site (1)		
Magnitude	High (8)	Moderate (6)		
Significance	60 (Medium)	40 (Medium)		
Status (positive or negative)	Negative	Negative		
<p>Nature of Impact: <u>Dust Generation</u></p> <p>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.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Clearing of vegetation. Construction vehicles. 			<ul style="list-style-type: none"> 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. 	<p>Medium risk (as the amount of dust emitted into the air will be of high volumes); unless mitigation measures are implemented.</p>
Description	Without Mitigation	With Mitigation		
Probability	Definite (5)	Probable (3)		
Duration	Medium term (3)	Medium term (3)		
Extent	Local (2)	Local (2)		
Magnitude	High (8)	Moderate (6)		
Significance	65 (High)	33 (Medium)		
Status (positive or negative)	Negative	Negative		

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of Impact: <u>Crime, safety and security</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Lack of security. Easy access. Construction area not enclosed. Poorly trained personnel using equipment and vehicles. <table border="1" data-bbox="192 616 813 887"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>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>33 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Probable (3)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	High (8)	Moderate (6)	Significance	52 (Medium)	33 (Medium)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> 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. 	<p>If not mitigated, medium risk to personnel as well as the construction site if safety measures are not put in place before construction commences.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Highly Probable (4)	Probable (3)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Local (2)	Local (2)																					
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Significance	52 (Medium)	33 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of Impact: <u>Noise</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Construction vehicles. Equipment and machinery. <table border="1" data-bbox="192 1098 813 1369"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>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>55 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Definite (5)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	High (8)	Moderate (6)	Significance	65 (High)	55 (Medium)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> 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 	<p>High risk as construction vehicles and equipment causes noise pollution.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Definite (5)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Local (2)	Local (2)																					
Magnitude	High (8)	Moderate (6)																					
Significance	65 (High)	55 (Medium)																					
Status (positive or negative)	Negative	Negative																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of impact: <u>Traffic and accessibility</u></p> <p>This Alternative will entail the upgrading of the existing concrete structure. Public traffic and general access over the structure will be compromised.</p> <table border="1" data-bbox="192 531 813 799"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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>Medium (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> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	High (8)	Medium (6)	Significance	65 (High)	44 (Medium)	Status (positive or negative)	Negative	Negative	<p>noise caused by mechanical equipment.</p> <ul style="list-style-type: none"> • Traffic accommodation for construction activities affecting the travelled way as well as the sidewalks of the travelled way. • If one lane is expected to be closed, “Stop and Go” will be used for traffic accommodation. • In the case of complete road closure, traffic diversion must be accommodated for. 	<p>High risk</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Highly Probable (4)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Local (2)	Local (2)																					
Magnitude	High (8)	Medium (6)																					
Significance	65 (High)	44 (Medium)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of impact: <u>Socioeconomic</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Job creation for local skilled labour, general labour and suppliers. <table border="1" data-bbox="192 1007 813 1300"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <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>High (8)</td> </tr> <tr> <td>Significance</td> <td>33 (Medium)</td> <td>52 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>	Description	Without Enhancement	With Enhancement	Probability	Probable (3)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	High (8)	Significance	33 (Medium)	52 (Medium)	Status (positive or negative)	Positive	Positive	<ul style="list-style-type: none"> • General and skilled locals must be considered for employment during construction (contractor and construction crew). • Local suppliers must be considered for the purchase of construction material. 	<p>Medium</p>
Description	Without Enhancement	With Enhancement																					
Probability	Probable (3)	Highly Probable (4)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Local (2)	Local (2)																					
Magnitude	Moderate (6)	High (8)																					
Significance	33 (Medium)	52 (Medium)																					
Status (positive or negative)	Positive	Positive																					

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.

Alternative 1 – Rehabilitation of the Existing Structure and Installation of Additional Pipes

Table 8: Operational Impacts

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of Impact: <u>Changing the quantity and fluctuation properties of the watercourse by for example restricting water flow.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Definite (5)</td> <td>Probable (3)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Medium term (3)</td> </tr> <tr> <td>Extent</td> <td>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 style="background-color: yellow;">55 (Medium)</td> <td style="background-color: green;">30 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Probable (3)	Duration	Long term (4)	Medium term (3)	Extent	Regional (3)	Regional (3)	Magnitude	Low (4)	Low (4)	Significance	55 (Medium)	30 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) on the site above the river area resulting from the proposed stormwater upgrade should be taken into account. 	<p>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Probable (3)																					
Duration	Long term (4)	Medium term (3)																					
Extent	Regional (3)	Regional (3)																					
Magnitude	Low (4)	Low (4)																					
Significance	55 (Medium)	30 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of impact: <u>Introduction and spread of alien vegetation.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Likely (2)</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>Low (4)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td style="background-color: green;">30 (Low)</td> <td style="background-color: green;">18 (Low)</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Probable (3)	Likely (2)	Duration	Medium term (3)	Medium term (3)	Extent	Regional (3)	Local (2)	Magnitude	Low (4)	Low (4)	Significance	30 (Low)	18 (Low)	<ul style="list-style-type: none"> Weed control in buffer zone. Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. Rehabilitate or revegetate disturbed areas. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>			
Description	Without Mitigation	With Mitigation																					
Probability	Probable (3)	Likely (2)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Regional (3)	Local (2)																					
Magnitude	Low (4)	Low (4)																					
Significance	30 (Low)	18 (Low)																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of the Impact: <u>Loss and disturbance of watercourse habitat and fringe vegetation.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Highly Probable (4)</td> <td>Improbable (1)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Medium term (3)</td> </tr> <tr> <td>Extent</td> <td>Local (2)</td> <td>Site (1)</td> </tr> <tr> <td>Magnitude</td> <td>Low (4)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td>40 (Medium)</td> <td>8 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Improbable (1)	Duration	Long term (4)	Medium term (3)	Extent	Local (2)	Site (1)	Magnitude	Low (4)	Low (4)	Significance	40 (Medium)	8 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • Weed control in buffer zone. • Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed. • Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish. • Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas. • Operational activities should not impact on rehabilitated or naturally vegetated areas. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Highly Probable (4)	Improbable (1)																							
Duration	Long term (4)	Medium term (3)																							
Extent	Local (2)	Site (1)																							
Magnitude	Low (4)	Low (4)																							
Significance	40 (Medium)	8 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of the Impact: <u>Loss and disturbance of heritage sites due to the development</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Very improbable (1)	Very improbable (1)	Duration	Permanent (4)	Permanent (4)	Extent	Site (1)	Site (1)	Magnitude	Minor (2)	Minor (2)	Significance	7 (Low)	7 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • 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. 	<p>Low risk anticipated provided that the mitigation measures are implemented correctly.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Very improbable (1)	Very improbable (1)																							
Duration	Permanent (4)	Permanent (4)																							
Extent	Site (1)	Site (1)																							
Magnitude	Minor (2)	Minor (2)																							
Significance	7 (Low)	7 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of Impact: <u>Dust Generation</u></p>			<ul style="list-style-type: none"> • Dust suppression and wet spraying should be implemented during maintenance works. 	<p>Low risk</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Construction machinery and heavy vehicles during maintenance which will likely make use of the existing gravel roads to transport equipment and material to the site are likely to generate dust which is likely to be perceptible by adjacent residents and the watercourse. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of maintenance activities.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Construction vehicles. • Machinery used for maintenance. <table border="1" data-bbox="190 775 813 1091"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Improbable (2)</td> </tr> <tr> <td>Duration</td> <td>Temporary (1)</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>27 (Low)</td> <td>14 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Probable (3)	Improbable (2)	Duration	Temporary (1)	Temporary (1)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	27 (Low)	14 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • 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. 	
Description	Without Mitigation	With Mitigation																					
Probability	Probable (3)	Improbable (2)																					
Duration	Temporary (1)	Temporary (1)																					
Extent	Local (2)	Local (2)																					
Magnitude	Moderate (6)	Low (4)																					
Significance	27 (Low)	14 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of Impact: <u>Crime, safety and security</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Site/ area more accessible – may attract more criminals. • Vandalism. • Vehicles travelling at high speeds – not safe for 	<ul style="list-style-type: none"> • Fencing the bridge walls. • Lighting on bridge. • Speed bumps must be put in place. • Speed limits must be specified and adhered to. 	<p>Low risk if mitigation measures are implemented.</p>																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
pedestrians, other motorists as well as residents.				
Description	Without Mitigation	With Mitigation		
Probability	Highly Probable (4)	Improbable (2)		
Duration	Medium term (3)	Medium term (3)		
Extent	Local (1)	Local (1)		
Magnitude	Moderate (6)	Low (4)		
Significance	40 (Medium)	16 (Low)		
Status (positive or negative)	Negative	Negative		
<p>Nature of Impact: <u>Noise</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Consistent movement of vehicles and pedestrians over the bridge. Construction vehicles during maintenance. Equipment and machinery during maintenance. 			<ul style="list-style-type: none"> 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. 	High risk
Description	Without Mitigation	With Mitigation		
Probability	Definite (5)	Definite (4)		
Duration	Long term (4)	Long term (4)		
Extent	Local (2)	Local (2)		
Magnitude	High (8)	Moderate (6)		
Significance	70 (High)	48 (Medium)		
Status (positive or negative)	Negative	Negative		
<p>Nature of Impact: <u>Changes in sediment entering and exiting</u></p>			<ul style="list-style-type: none"> Monitoring should be done to ensure that sediment pollution is 	Expected to be limited provided that the mitigation measures

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p><u>the system.</u></p> <p>Bank stabilization will in turn prevent further sediment input.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Possible (2)</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>Regional (3)</td> <td>Site (1)</td> </tr> <tr> <td>Magnitude</td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td>Significance</td> <td>24 (Low)</td> <td>48 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	Probability	Possible (2)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Regional (3)	Site (1)	Magnitude	Moderate (6)	High (8)	Significance	24 (Low)	48 (Medium)	Status (positive or negative)	Negative	Positive	<p>timeously dressed.</p>	<p>are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Enhancement	With Enhancement																							
Probability	Possible (2)	Highly Probable (4)																							
Duration	Medium term (3)	Medium term (3)																							
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Significance	24 (Low)	48 (Medium)																							
Status (positive or negative)	Negative	Positive																							
<p>Nature of the Impact: <u>Changes in water quality due to pollution.</u></p> <p>The proposed activities include clearing of debris. The rehabilitation and upgrade would allow for less pollution in the form of debris to clog the waterway. This would in turn reduce the risk of flooding.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Enhancement	With Enhancement	Probability	Probable (3)	Highly Probable (4)	Duration	Medium term (3)	Medium term (3)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Moderate (6)	Significance	33 (Medium)	44 (Medium)	<ul style="list-style-type: none"> • Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. • Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. • Regular independent water quality monitoring should form part of operational procedures in order to identify pollution • Treatment of pollution identified should be prioritized accordingly. • Regular clearing of debris. 	<p>Medium</p>			
Description	Without Enhancement	With Enhancement																							
Probability	Probable (3)	Highly Probable (4)																							
Duration	Medium term (3)	Medium term (3)																							
Extent	Local (2)	Local (2)																							
Magnitude	Moderate (6)	Moderate (6)																							
Significance	33 (Medium)	44 (Medium)																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of the Impact: <u>Erosion protection</u></p> <p>The proposed activities include erosion protection measures. This will result in bank stabilization.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Medium term (3)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>Moderate (6)</td> </tr> <tr> <td><i>Significance</i></td> <td>33 (Medium)</td> <td>44 (Medium)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Probable (3)	Highly Probable (4)	<i>Duration</i>	Medium term (3)	Medium term (3)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Moderate (6)	Moderate (6)	<i>Significance</i>	33 (Medium)	44 (Medium)	<i>Status (positive or negative)</i>	Positive	Positive	<ul style="list-style-type: none"> Erosion protection measures. Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. 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 and maintenance. Monitor rehabilitation and ensure that alien invasive species are removed and dealt with in accordance to the Environmental Management Programme. Maintenance workers or operational activities may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to. 	Medium
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Probable (3)	Highly Probable (4)																							
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	Moderate (6)	Moderate (6)																							
<i>Significance</i>	33 (Medium)	44 (Medium)																							
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of Impact: <u>Visual</u></p> <p>The site will be aesthetically appealing during the operational phase as the bridge would have been upgraded and reopened.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Probable (3)	Highly Probable (4)	<ul style="list-style-type: none"> Regular clearing of debris from watercourse. Maintenance of bridge/ road. 	Medium															
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Probable (3)	Highly Probable (4)																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	Low (4)	Moderate (6)																							
<i>Significance</i>	30 (Low)	44 (Medium)																							
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of impact: <u>Traffic and access.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Medium term (3)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td><i>Significance</i></td> <td>33 (Medium)</td> <td>52 (Medium)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Probable (3)	Highly Probable (4)	<i>Duration</i>	Medium term (3)	Medium term (3)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Moderate (6)	High (8)	<i>Significance</i>	33 (Medium)	52 (Medium)	<i>Status (positive or negative)</i>	Positive	Positive	<ul style="list-style-type: none"> • Maintenance of bridge. • Regular clearing of debris to prevent clogging and overtop flooding. 	Medium
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Probable (3)	Highly Probable (4)																							
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	Moderate (6)	High (8)																							
<i>Significance</i>	33 (Medium)	52 (Medium)																							
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of Impact: <u>Safety.</u></p> <p>Bridge will be safer to cross for vehicles, pedestrians and cyclists.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Medium term (3)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td><i>Significance</i></td> <td>33 (Medium)</td> <td>52 (Medium)</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Probable (3)	Highly Probable (4)	<i>Duration</i>	Medium term (3)	Medium term (3)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Moderate (6)	High (8)	<i>Significance</i>	33 (Medium)	52 (Medium)	<ul style="list-style-type: none"> • Maintenance of the bridge. • Maintenance must comply with safety regulations. • Regular clearing of debris from watercourse to prevent clogging and overtop flooding. 	Medium			
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Probable (3)	Highly Probable (4)																							
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	Moderate (6)	High (8)																							
<i>Significance</i>	33 (Medium)	52 (Medium)																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of impact: <u>Socioeconomic</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Safer crossing over bridge. • Overall upliftment of the area. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Medium term (3)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Low (4)</td> <td>Moderate (6)</td> </tr> <tr> <td><i>Significance</i></td> <td>27 (Low)</td> <td>44 (Medium)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Probable (3)	Highly Probable (4)	<i>Duration</i>	Medium term (3)	Medium term (3)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Low (4)	Moderate (6)	<i>Significance</i>	27 (Low)	44 (Medium)	<i>Status (positive or negative)</i>	Positive	Positive	<ul style="list-style-type: none"> • Maintenance of the bridge. • Maintenance must comply with safety regulations. • Regular clearing of debris from watercourse to prevent clogging and overtop flooding. 	Medium
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Probable (3)	Highly Probable (4)																							
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	Low (4)	Moderate (6)																							
<i>Significance</i>	27 (Low)	44 (Medium)																							
<i>Status (positive or negative)</i>	Positive	Positive																							

Alternative 2 – Construction of a New Precast Concrete Culvert (Preferred)

Table 9: Operational Impacts

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of Impact: <u>Changing the quantity and fluctuation properties of the watercourse by for example restricting water flow.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Definite (5)</td> <td>Probable (3)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Medium term (3)</td> </tr> <tr> <td>Extent</td> <td>Regional (3)</td> <td>Local (2)</td> </tr> <tr> <td>Magnitude</td> <td>Low (4)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td style="background-color: yellow;">55 (Medium)</td> <td style="background-color: green;">27 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Definite (5)	Probable (3)	Duration	Long term (4)	Medium term (3)	Extent	Regional (3)	Local (2)	Magnitude	Low (4)	Low (4)	Significance	55 (Medium)	27 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) on the site above the river area resulting from the proposed stormwater upgrade should be taken into account. 	<p>Impacts to the flow characteristics of this watercourse are likely to be permanent unless rehabilitated.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Definite (5)	Probable (3)																					
Duration	Long term (4)	Medium term (3)																					
Extent	Regional (3)	Local (2)																					
Magnitude	Low (4)	Low (4)																					
Significance	55 (Medium)	27 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of impact: <u>Introduction and spread of alien vegetation.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Likely (2)</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>Low (4)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td style="background-color: green;">30 (Low)</td> <td style="background-color: green;">18 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Probable (3)	Likely (2)	Duration	Medium term (3)	Medium term (3)	Extent	Regional (3)	Local (2)	Magnitude	Low (4)	Low (4)	Significance	30 (Low)	18 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> Weed control in buffer zone. Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. Rehabilitate or revegetate disturbed areas. 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																					
Probability	Probable (3)	Likely (2)																					
Duration	Medium term (3)	Medium term (3)																					
Extent	Regional (3)	Local (2)																					
Magnitude	Low (4)	Low (4)																					
Significance	30 (Low)	18 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of the Impact: <u>Loss and disturbance of watercourse habitat and fringe vegetation.</u></p>	<ul style="list-style-type: none"> Weed control in buffer zone. Monitor rehabilitation and the occurrence of erosion twice during 	<p>Expected to be limited provided that the mitigation measures are implemented correctly and</p>																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Highly Probable (4)</td> <td>Improbable (1)</td> </tr> <tr> <td>Duration</td> <td>Long term (4)</td> <td>Medium term (3)</td> </tr> <tr> <td>Extent</td> <td>Local (2)</td> <td>Site (1)</td> </tr> <tr> <td>Magnitude</td> <td>Low (4)</td> <td>Low (4)</td> </tr> <tr> <td>Significance</td> <td>40 (Medium)</td> <td>8 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Improbable (1)	Duration	Long term (4)	Medium term (3)	Extent	Local (2)	Site (1)	Magnitude	Low (4)	Low (4)	Significance	40 (Medium)	8 (Low)	Status (positive or negative)	Negative	Negative	<p>the rainy season for at least two years and take immediate corrective action where needed.</p> <ul style="list-style-type: none"> • 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. 	<p>effective rehabilitation of the site is undertaken where necessary.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Highly Probable (4)	Improbable (1)																							
Duration	Long term (4)	Medium term (3)																							
Extent	Local (2)	Site (1)																							
Magnitude	Low (4)	Low (4)																							
Significance	40 (Medium)	8 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of the Impact: <u>Loss and disturbance of heritage sites due to the development</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Mitigation	With Mitigation	Probability	Very improbable (1)	Very improbable (1)	Duration	Permanent (4)	Permanent (4)	Extent	Site (1)	Site (1)	Magnitude	Minor (2)	Minor (2)	Significance	7 (Low)	7 (Low)	Status (positive or negative)	Negative	Negative	<ul style="list-style-type: none"> • 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. 	<p>Low risk anticipated provided that the mitigation measures are implemented correctly.</p>
Description	Without Mitigation	With Mitigation																							
Probability	Very improbable (1)	Very improbable (1)																							
Duration	Permanent (4)	Permanent (4)																							
Extent	Site (1)	Site (1)																							
Magnitude	Minor (2)	Minor (2)																							
Significance	7 (Low)	7 (Low)																							
Status (positive or negative)	Negative	Negative																							
<p>Nature of Impact: <u>Dust Generation</u></p> <p>Construction machinery and heavy vehicles during maintenance which will likely make use of the existing gravel roads to transport equipment and material to the site are likely to generate dust which is likely to be perceptible by adjacent</p>			<ul style="list-style-type: none"> • 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. 	<p>Low risk</p>																					

POTENTIAL IMPACTS	PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>residents and the watercourse. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of maintenance activities.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Construction vehicles. • Machinery used for maintenance. <table border="1" data-bbox="190 614 813 925"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Improbable (2)</td> </tr> <tr> <td>Duration</td> <td>Temporary (1)</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>27 (Low)</td> <td>14 (Low)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Probable (3)	Improbable (2)	Duration	Temporary (1)	Temporary (1)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Low (4)	Significance	27 (Low)	14 (Low)	Status (positive or negative)	Negative	Negative		
Description	Without Mitigation	With Mitigation																					
Probability	Probable (3)	Improbable (2)																					
Duration	Temporary (1)	Temporary (1)																					
Extent	Local (2)	Local (2)																					
Magnitude	Moderate (6)	Low (4)																					
Significance	27 (Low)	14 (Low)																					
Status (positive or negative)	Negative	Negative																					
<p>Nature of Impact: <u>Crime, safety and security</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Site/ area more accessible – may attract more criminals. • Vandalism. • Vehicles travelling at high speeds – not safe for pedestrians, other motorists as well as residents. <table border="1" data-bbox="190 1284 813 1356"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Highly Probable (4)</td> <td>Improbable (2)</td> </tr> </tbody> </table>	Description	Without Mitigation	With Mitigation	Probability	Highly Probable (4)	Improbable (2)	<ul style="list-style-type: none"> • Fencing the bridge walls. • Lighting on bridge. • Speed bumps must be put in place. • Speed limits must be specified and adhered to. 	<p>Low risk if mitigation measures are implemented.</p>															
Description	Without Mitigation	With Mitigation																					
Probability	Highly Probable (4)	Improbable (2)																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<i>Duration</i>	Medium term (3)	Medium term (3)																							
<i>Extent</i>	Local (1)	Local (1)																							
<i>Magnitude</i>	Moderate (6)	Low (4)																							
<i>Significance</i>	40 (Medium)	16 (Low)																							
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of Impact: <u>Noise</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Consistent movement of vehicles and pedestrians over the bridge. Construction vehicles during maintenance. Equipment and machinery during maintenance. <table border="1"> <thead> <tr> <th>Description</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Definite (5)</td> <td>Definite (4)</td> </tr> <tr> <td><i>Duration</i></td> <td>Long term (4)</td> <td>Long term (4)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>High (8)</td> <td>Moderate (6)</td> </tr> <tr> <td><i>Significance</i></td> <td>70 (High)</td> <td>48 (Medium)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Negative</td> <td>Negative</td> </tr> </tbody> </table>			Description	Without Mitigation	With Mitigation	<i>Probability</i>	Definite (5)	Definite (4)	<i>Duration</i>	Long term (4)	Long term (4)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	High (8)	Moderate (6)	<i>Significance</i>	70 (High)	48 (Medium)	<i>Status (positive or negative)</i>	Negative	Negative	<ul style="list-style-type: none"> 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. 	High risk
Description	Without Mitigation	With Mitigation																							
<i>Probability</i>	Definite (5)	Definite (4)																							
<i>Duration</i>	Long term (4)	Long term (4)																							
<i>Extent</i>	Local (2)	Local (2)																							
<i>Magnitude</i>	High (8)	Moderate (6)																							
<i>Significance</i>	70 (High)	48 (Medium)																							
<i>Status (positive or negative)</i>	Negative	Negative																							
<p>Nature of Impact: <u>Changes in sediment entering and exiting the system.</u></p> <p>Bank stabilization will in turn prevent further sediment input.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>			Description	Without	With Enhancement				<ul style="list-style-type: none"> Monitoring should be done to ensure that sediment pollution is timeously dressed. 	Expected to be limited provided that the mitigation measures are implemented correctly and effective rehabilitation of the site is undertaken where necessary.															
Description	Without	With Enhancement																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
	Enhancement																								
Probability	Possible (2)	Highly Probable (4)																							
Duration	Medium term (3)	Long term (4)																							
Extent	Regional (3)	Site (1)																							
Magnitude	Moderate (6)	High (8)																							
Significance	24 (Low)	52 (Medium)																							
Status (positive or negative)	Negative	Positive																							
<p>Nature of the Impact: <u>Changes in water quality due to pollution.</u></p> <p>The proposed activities include clearing of debris. The rehabilitation and upgrade would allow for less pollution in the form of debris to clog the waterway. This would in turn reduce the risk of flooding.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td>Duration</td> <td>Medium term (3)</td> <td>Long term (4)</td> </tr> <tr> <td>Extent</td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td>Magnitude</td> <td>Moderate (6)</td> <td>Moderate (6)</td> </tr> <tr> <td>Significance</td> <td>33 (Medium)</td> <td>48 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	Probability	Probable (3)	Highly Probable (4)	Duration	Medium term (3)	Long term (4)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	Moderate (6)	Significance	33 (Medium)	48 (Medium)	Status (positive or negative)	Positive	Positive	<ul style="list-style-type: none"> • Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. • Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects. • Regular independent water quality monitoring should form part of operational procedures in order to identify pollution • Treatment of pollution identified should be prioritized accordingly. • Regular clearing of debris. 	Medium
Description	Without Enhancement	With Enhancement																							
Probability	Probable (3)	Highly Probable (4)																							
Duration	Medium term (3)	Long term (4)																							
Extent	Local (2)	Local (2)																							
Magnitude	Moderate (6)	Moderate (6)																							
Significance	33 (Medium)	48 (Medium)																							
Status (positive or negative)	Positive	Positive																							
<p>Nature of the Impact: <u>Erosion protection</u></p> <p>The proposed activities include erosion protection measures.</p>			<ul style="list-style-type: none"> • Erosion protection measures. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas 	Medium																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>This will result in bank stabilization.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>Probable (3)</td> <td>Highly Probable (4)</td> </tr> <tr> <td>Duration</td> <td>Medium term (3)</td> <td>Long term (4)</td> </tr> <tr> <td>Extent</td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td>Magnitude</td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td>Significance</td> <td>33 (Medium)</td> <td>56 (Medium)</td> </tr> <tr> <td>Status (positive or negative)</td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	Probability	Probable (3)	Highly Probable (4)	Duration	Medium term (3)	Long term (4)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	High (8)	Significance	33 (Medium)	56 (Medium)	Status (positive or negative)	Positive	Positive	<p>should be fenced off to prevent vehicular, pedestrian and livestock access.</p> <ul style="list-style-type: none"> • 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 and maintenance. • Monitor rehabilitation and ensure that alien invasive species are removed and dealt with in accordance to the Environmental Management Programme. • Maintenance workers or operational activities may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to. 	
Description	Without Enhancement	With Enhancement																							
Probability	Probable (3)	Highly Probable (4)																							
Duration	Medium term (3)	Long term (4)																							
Extent	Local (2)	Local (2)																							
Magnitude	Moderate (6)	High (8)																							
Significance	33 (Medium)	56 (Medium)																							
Status (positive or negative)	Positive	Positive																							
<p>Nature of Impact: <u>Visual</u></p> <p>The site will be aesthetically appealing during the operational phase as the bridge would have been upgraded and reopened.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <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> </tbody> </table>			Description	Without Enhancement	With Enhancement	Probability	Highly probable (4)	Definite (5)	Duration	Medium term (3)	Long term (4)	Extent	Local (2)	Local (2)	Magnitude	Moderate (6)	High (8)	Significance	44 (Medium)	70 (High)	Status (positive or negative)	Positive	Positive	<ul style="list-style-type: none"> • Regular clearing of debris from watercourse. • Maintenance of bridge/ road. 	Medium
Description	Without Enhancement	With Enhancement																							
Probability	Highly probable (4)	Definite (5)																							
Duration	Medium term (3)	Long term (4)																							
Extent	Local (2)	Local (2)																							
Magnitude	Moderate (6)	High (8)																							
Significance	44 (Medium)	70 (High)																							
Status (positive or negative)	Positive	Positive																							

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED																					
<p>Nature of impact: <u>Traffic and access.</u></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Highly probable (4)</td> <td>Definite (5)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Long term (4)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td><i>Significance</i></td> <td style="background-color: yellow;">44 (Medium)</td> <td style="background-color: red;">70 (High)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Highly probable (4)	Definite (5)	<i>Duration</i>	Medium term (3)	Long term (4)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Moderate (6)	High (8)	<i>Significance</i>	44 (Medium)	70 (High)	<i>Status (positive or negative)</i>	Positive	Positive	<ul style="list-style-type: none"> • Maintenance of bridge. • Regular clearing of debris to prevent clogging and overtop flooding. 	Medium
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Highly probable (4)	Definite (5)																							
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<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of Impact: <u>Safety.</u></p> <p>Bridge will be safer to cross for vehicles, pedestrians and cyclists.</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td><i>Probability</i></td> <td>Highly probable (4)</td> <td>Definite (5)</td> </tr> <tr> <td><i>Duration</i></td> <td>Medium term (3)</td> <td>Long term (4)</td> </tr> <tr> <td><i>Extent</i></td> <td>Local (2)</td> <td>Local (2)</td> </tr> <tr> <td><i>Magnitude</i></td> <td>Moderate (6)</td> <td>High (8)</td> </tr> <tr> <td><i>Significance</i></td> <td style="background-color: yellow;">44 (Medium)</td> <td style="background-color: red;">70 (High)</td> </tr> <tr> <td><i>Status (positive or negative)</i></td> <td>Positive</td> <td>Positive</td> </tr> </tbody> </table>			Description	Without Enhancement	With Enhancement	<i>Probability</i>	Highly probable (4)	Definite (5)	<i>Duration</i>	Medium term (3)	Long term (4)	<i>Extent</i>	Local (2)	Local (2)	<i>Magnitude</i>	Moderate (6)	High (8)	<i>Significance</i>	44 (Medium)	70 (High)	<i>Status (positive or negative)</i>	Positive	Positive	<ul style="list-style-type: none"> • Maintenance of the bridge. • Maintenance must comply with safety regulations. • Regular clearing of debris from watercourse to prevent clogging and overtop flooding. 	Medium
Description	Without Enhancement	With Enhancement																							
<i>Probability</i>	Highly probable (4)	Definite (5)																							
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<i>Significance</i>	44 (Medium)	70 (High)																							
<i>Status (positive or negative)</i>	Positive	Positive																							
<p>Nature of impact: <u>Socioeconomic</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> • Safer crossing over bridge. 			<ul style="list-style-type: none"> • Maintenance of the bridge. • Maintenance must comply with safety regulations. • Regular clearing of debris from watercourse to prevent clogging 	Medium																					

POTENTIAL IMPACTS			PROPOSED MITIGATION	RISK OF THE IMPACT MITIGATION NOT BEING IMPLEMENTED
<ul style="list-style-type: none"> Overall upliftment of the area. 			and overtop flooding.	
Description	Without Enhancement	With Enhancement		
Probability	Probable (3)	Definite (5)		
Duration	Medium term (3)	Long term (4)		
Extent	Local (2)	Local (2)		
Magnitude	Moderate (6)	High (8)		
Significance	33 (Medium)	70 (High)		
Status (positive or negative)	Positive	Positive		

NO GO ALTERNATIVE

No go Alternative (compulsory). This is the option of not rehabilitating and upgrading the bridge. This option will result in limited impacts already occurring in the study area. However, should the infrastructure not be developed as proposed, community upliftment will fail to occur. This is an undesirable option for the project as it will pose negative impacts on the social and economic perspective and is not considered desirable. The negative impacts of the no go option alternative are considered to outweigh the positive impacts of this alternative. The no go option is therefore not preferred.

Table 10: Potential impacts should the Development not be Approved “No-Go” Alternative

POTENTIAL IMPACTS:	SIGNIFICANCE RATING OF IMPACTS (POSITIVE OR NEGATIVE):	PROPOSED MITIGATION:	SIGNIFICANCE RATING OF IMPACTS AFTER MITIGATION:	RISK OF THE IMPACT AND MITIGATION NOT BEING IMPLEMENTED
Changing the quantity and fluctuation properties of the wetland – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Changes in sediment entering and exiting the system – No-go would mean study site status quo is maintained.	N – High	If rehabilitation and upgrade of the bridge and associated infrastructure does not occur, bank stabilization would not be achieved and in turn, sediment will continue to enter the river.	N – High	High 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 wetland/ riparian habitat and fringe vegetation – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	High risk
Changes in water quality due to pollution: during construction – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk

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
quo is maintained.				
Changes in water quality due to pollution: during operation – No-go would mean study site status quo is maintained.	N – High	If rehabilitation and upgrade of the bridge and associated infrastructure does not occur, debris would not be cleared from the watercourse and additional pollution will accumulate and cause clogging. This increases the risk of flooding.	N – High	High risk
Exposure to erosion and subsequent sedimentation: during construction – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Erosion protection: during operation – No-go would mean study site status quo is maintained and erosion along the river banks is not addressed.	N – High	If erosion protection measures are not implemented, bank stabilization will fail to occur. Erosion and subsequent sedimentation will continue.	N – High	High risk
Loss and disturbance of heritage sites – No-go would imply no heritage sites or artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk No heritage artefacts are expected to be in the study area in its current state.
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	High risk
Crime, safety and security: during operation – No-go would imply the site remains the same.	P – Medium	There are no mitigation measures	P – Medium	Medium risk

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
Safety: during operation – No-go would imply that the bridge remains the same.	N – High	Rehabilitation and upgrading of the bridge will provide a safer crossing over the watercourse for vehicles, pedestrians and cyclists.	N – High	High risk
Dust generation – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Noise – No-go would imply no construction noise and no added noise during operation.	P – High	There are no mitigation measures	P – High	Low risk
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	Rehabilitation and upgrading of the bridge will provide job opportunities for locals and for local suppliers.	N – High	High risk
Socioeconomic impacts anticipated during the operational period – No-go would mean that overall community upliftment will not occur.	N – High	Rehabilitation and upgrading of the bridge will provide a safer crossing over the watercourse for vehicles, pedestrians and cyclists.	N – High	High risk
Traffic and accessibility – No-go would imply that residents continue using the Bridge in their current state.	N – High	Not upgrading the bridge will imply that the bridge remains less safe to cross as a result of current faults in the infrastructure.	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 – High	A rehabilitated and upgraded bridge and a free flowing watercourse would be aesthetically appealing and	N – High	High risk

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
		complement the area.		

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

- Appendix G1 – Wetland/Riparian Delineation and Functional Assessment
- Appendix G1(i) – General Wetland Rehabilitation and Monitoring Plan
- Appendix G2 – Heritage 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 Environmental Management Programme.

3. IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING AND CLOSURE PHASE

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

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:

Should the proposed development be approved, the majority of cumulative impacts will be related to the construction phase. Some of these include:

- Noise pollution – construction activities must be limited to prescribed times, i.e. weekdays from 08:00 to 17:00; public holidays must be avoided.
- A stormwater management plan must be implemented as construction is anticipated to alter the flow of stormwater.
- Visual impacts – construction vehicles and machinery will not be aesthetically appealing – site camp should be located in an area with low visibility from surrounding developments and road networks, as well as away from the watercourse and other sensitive areas.
- Dust – dust suppression must be implemented, especially in the winter months.
- Safety – construction crew are not to be allowed to stay on site after hours; adequate security/ site supervision must be made during the day. No construction worker may enter another property without permission.

These cumulative impacts can be mitigated if activities are correctly planned and measures are implemented to manage impacts.

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 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 include:

Disturbance of the wetland

- Riparian areas may be disrupted.

Benefits of the project include the following:

- The proposed development will negate the problem of flooding in 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 downstream economic development at local and regional scale. These will extend beyond the site and would be experienced at local and regional scale.
- The health of the ecosystem (wetland on site) will improve and water will flow freely.
- Safe crossing over the watercourse for motorists, pedestrians and cyclists.

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 option of not rehabilitating and upgrading the bridge and associated infrastructure. This option will result in limited impacts already occurring in the study area. However, should the infrastructure not be

rehabilitated and upgraded as proposed, the social benefits (JRA's objectives) associated with the proposed activities will not be addressed. This is an undesirable option for the project as it will not only pose negative impacts on the social perspective, but on the economic perspective as well. The no go option is therefore not preferred.

6. IMPACT SUMMARY OF THE PROPOSAL OR PREFERRED ALTERNATIVE

Alternative 2 is the preferred alternative as it is a long term solution that addresses and minimises current defects identified on the existing infrastructure, whilst minimising the effects of future flooding of the river channel. This Alternative will require less maintenance over time and the hydraulic capacity will be efficient. Alternative 1 requires less construction work; however, it is a temporary solution to the problem and would require a higher level of maintenance during the operation phase. The construction cost of Alternative 1 is lower than the costs associated with Alternative 2. **Alternative 2 would have a medium construction impact, which would be higher than Alternative 1, but will have a low operation impact in comparison to the Alternative 1.**

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 rehabilitation and upgrade. 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 rehabilitation and upgrade of the bridge and associated infrastructure. 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.

Envirovolution is in favour of Alternative 2 – Construction of a New Precast Concrete Culvert (Preferred) as it is a long term solution that addresses and minimises current defects identified on the structure, whilst minimising the

effects of future flooding of the river channel. This Alternative will require less maintenance over time and the hydraulic capacity will be efficient.

The proposed structure for Alternative 2 is larger than Alternative 1 thus would result in a higher impact significance. Public traffic and general access over the structure will be compromised for both alternatives, however, the impact would be higher for Alternative 2 due to the demolition of the existing structure.

Traffic accommodation will be required for the road closure and direction of traffic to alternate routes and detours.

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, the project's benefits outweigh the potential negative impacts.

General Recommendations

Envirolution Consulting (Pty) Ltd recommends that Alternative 2 – Construction of a New Precast Concrete Culvert (Preferred) 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 activities.
9. Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and

soil, thus preventing surface and groundwater pollution.

10. Servicing/maintenance/washing of vehicles must not be carried on the construction site and only emergency repairs can be done on site.
11. In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/incidents, as per the requirements of NEMA.
12. Construction noise on site must not exceed 85 decibels (DB) as stipulated in the Occupation Health and Safety Act.
13. All relevant legislation and requirements of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
14. Compliance with all legal requirements in relation to environmental management and conditions of the authorisation issued by GDARD.
15. Maximise the employment of local people and the procurement of local resources during the construction and maintenance phases to ensure maximum benefit to the provincial/local economy.
16. Implement the recommendations made in the specialist studies and EMPr.
17. The EMPr should form part of the contractor's tender documentation.

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

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

The current state of the bridge is poor and unsafe. The proposed rehabilitation and upgrade to the bridge will allow for a safer crossing over the bridge for motorist and pedestrians and allow for the overall upliftment of the community. The project will also create jobs which will provide relief to the problem of unemployment.

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

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 appendixes 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
- A2 – C-Plan Map
- A3 – Wetland Delineation Map
- A4 – Hydrology Map

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Route Position Information – N/A

Appendix E: Public participation information

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

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

Appendix G: Specialist Reports

- Appendix G1 – Wetland/Riparian Delineation and Functional Assessment
- Appendix G1(i) – General Wetland Rehabilitation and Monitoring Plan
- Appendix G2 – Heritage Assessment

Appendix H: EMPr**Appendix I: Other information**

- I1 – EAP Declaration and Expertise
- I2 – Specialist Declaration and Expertise
- I3 – Preliminary Design Report
- I4 – DEA Screening Report

CHECKLIST

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

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