Sibanye-Stillwater Rustenburg Platinum Mines (Pty) Ltd

Proposed Riverbank Protection Measures for the Dorpspruit

Draft Basic Assessment Report

DEDECT Reference Number: To be Assigned

October 2022

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Sibanye-Stillwater Rustenburg Platinum Mines (Pty) Ltd

Proposed Riverbank Protection Measures for the Dorpspruit

October 2022

AVDE Project Ref: 639226

Prepared by: Kirthi Peramaul

VERSION CONTROL

Alta van Dyk Environmental cc

Version: Draft

Reviewed by: Suzanne van Rooy

Signed:

Position: Environmental Specialist

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Abbreviations

AVDE	Alta van Dyk Environmental Consultants
BAR	Basic Assessment Report
BID	Background Information Document
CBA 1	Critical Biodiversity Area 1
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
ESA 1	Ecological Support Area 1
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
NWA	National Water Act
NW DEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
PES	Present Ecological State
Pr. Sci. Nat	Professional Scientist of Nature
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

Glossary of Terms

Term	Definition
Clearing/Clearance	Clearing/Clearance refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire- breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated'.
Competent Authority	In respect of a listed activity or specified activity, means the organ of state charged by this Act (NEMA) with evaluating the environmental impact of that activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity
Conservation Plan Areas (C-Plan Areas)-	A tool developed by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) to identify sensitive areas. The main purposes of this tool is to: • serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process; • • inform protected area expansion and biodiversity stewardship programmes in the province; and serve as a basis for development of Bioregional Plans in municipalities within the province. Some of the aspects that inform the identification of C-Plan Areas include Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESA's), Watercourses, Ridges, Protected Areas, etc
Critical Biodiversity Area	Areas that are deemed important to conserve ecosystems and species. For this reason, these areas require protection.
Ecological Support Area	Areas that support the ecological functioning of protected areas or CBAs or provide important ecological infrastructure.
Environment	The surroundings within which humans exist and that are made up of— (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Assessment Practitioner	The individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmers or any other appropriate environmental instruments introduced through regulations.
Environmental Management Programme	A programme with set objectives and timeframes that seek to achieve a required end state and describes how activities that have

Term	Definition
	or could have an adverse impact on the environment will be mitigated, controlled and monitored.
Flora	Plant life that occurs in a specific geographical region and/habitat.
Fauna	Animal life that occurs in a specific geographical region and/habitat.
Interested and Affected Parties (IAPs)	a) any person, group of persons or organisation interested in or affected by such operation or activity; and (b) any organ of stale that may have jurisdiction over any aspect of the operation or activity.
Regulated area of a watercourse:	• The outer edge of the 1:100-year flood line and /or delineated riparian habitat whichever is the greatest measured from the middle of a river, spring, natural channel, lake or dam; • In the absence of a determined 1:100-year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); • 500m radius from the delineated boundary of any wetland or pan.
Riparian Area	A Habitat that includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
Rip rap	Loose stone used to form a foundation for breakwater or other structure
Public Participation Process	In relation to the assessment of the environmental impact of any application for an environmental authorisation, means a process by which potential Interested and Affected Parties are given opportunity to comment on, or raise issues relevant to, the application.
Urban edge	A demarcated edge of an area that is used as land use management tool to manage, direct and control the outer limits of development growth around an urban area. The aim is to control urban sprawl due to its associated adverse impacts.
Watercourse	(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 INTRODUCTION AND BACKGROUND

1.1 Background

Sibanye-Stillwater Rustenburg Platinum Mines (Pty) Ltd (SRPM) Khuseleka 1 Shaft, located near Rustenburg has an existing gas pipeline and a powerline that are at risk due to the continuous erosion of the bank of the Dorpspruit. It is the intention of SRPM to construct river protection measures to stabilise the banks of the Dorpspruit to prevent further erosion while securing the associated infrastructure. The eroded section of river channel will be addressed through the slight re-alignment of the current channel to a location closer to its original route through the provision of a rock armoured channel.

The National Environmental Management Act 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment Regulations 2014 (as amended) (EIA) require that listed activities that will warrant an Environmental Authorisation (EA) from the Competent Authority, which is the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT). A Basic Assessment Process is required to support an application for an Environmental Authorisation (EA), in line with the NEMA Environmental Impact Assessment (EIA) Regulations of 2014 as amended.

Alta van Dyk Environmental Consultants cc (AVDE) has been appointed by SRPM as the independent Environmental Assessment Practitioner (EAP) to undertake the required environmental related applications and associated public participation process.

1.2 Purpose of the Report

The Draft Basic Assessment Report (BAR) has been compiled in support of the environmental authorisation process required before the proposed project may commence. The Draft BAR documents the steps undertaken during the basic assessment process to assess the significance of impacts and determine measures to mitigate the potential impacts identified and enhance the benefits (or positive impacts) of the proposed project. The report presents the findings of the impact assessment and a description of the public participation undertaken that forms part of the Basic Assessment process. More specifically, the objectives of this BAR are to:

- Inform the stakeholders about the proposed project and the basic assessment process followed;
- Obtain contributions from stakeholders (including the applicant, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented and addressed;
- Assess in detail the potential environmental and socio-economic impacts of the project;
- Identify environmental and social mitigation measures to address the impacts assessed; and
- Produce a BAR that will assist the competent authority, the DEDECT to decide whether (and under what conditions) to authorise the proposed project.

1.3 Locality

The project is situated on the Remainder of Portion 1 of the Farm Town and Townlands of Rustenburg 272-JQ, within the Jurisdiction of the Rustenburg Local Municipality (RLM), North West Province. The study area is located along the R510 Beneden Road, with the interchange between Beneden Road and Buiten Street being located near the centre of the project study area. The Dorpspruit, a tributary of the Hex River, traverses the site from southwest to northeast. The centre coordinates of the site are 25°38'49.01"S: 27°15'14.20"E. According to the RLM Spatial Development Framework (SDF) (2010), the project area is situated within the urban edge. The project location is indicated in **Figure 1-1.** Project location details are summarised in **Table 1-1**.

Table 1-1 Project location details

Site specific details	Description	
Municipal jurisdiction	Rustenburg Local Municipality Bonjala Platinum District Municipality	
Ward number	Ward 43	
Nearest town	Rustenburg	
Coordinates	**Latitude**	**Longitude**
Site coordinates of the rock armour channel		
Start	25°38'50.10"S	27°15'13.04"E
Middle	25°38'49.07"S	27°15'14.03"E
End	25°38'47.70"S	27°15'12.53"E
Site coordinates of the access road		
Start	25°38'46.92"S	27°15'17.68"E
Middle	25°38'47.89"S	27°15'16.10"E
End	25°38'48.36"S	27°15'14.53"E

A project layout map is provided in **Figure 3-7.**

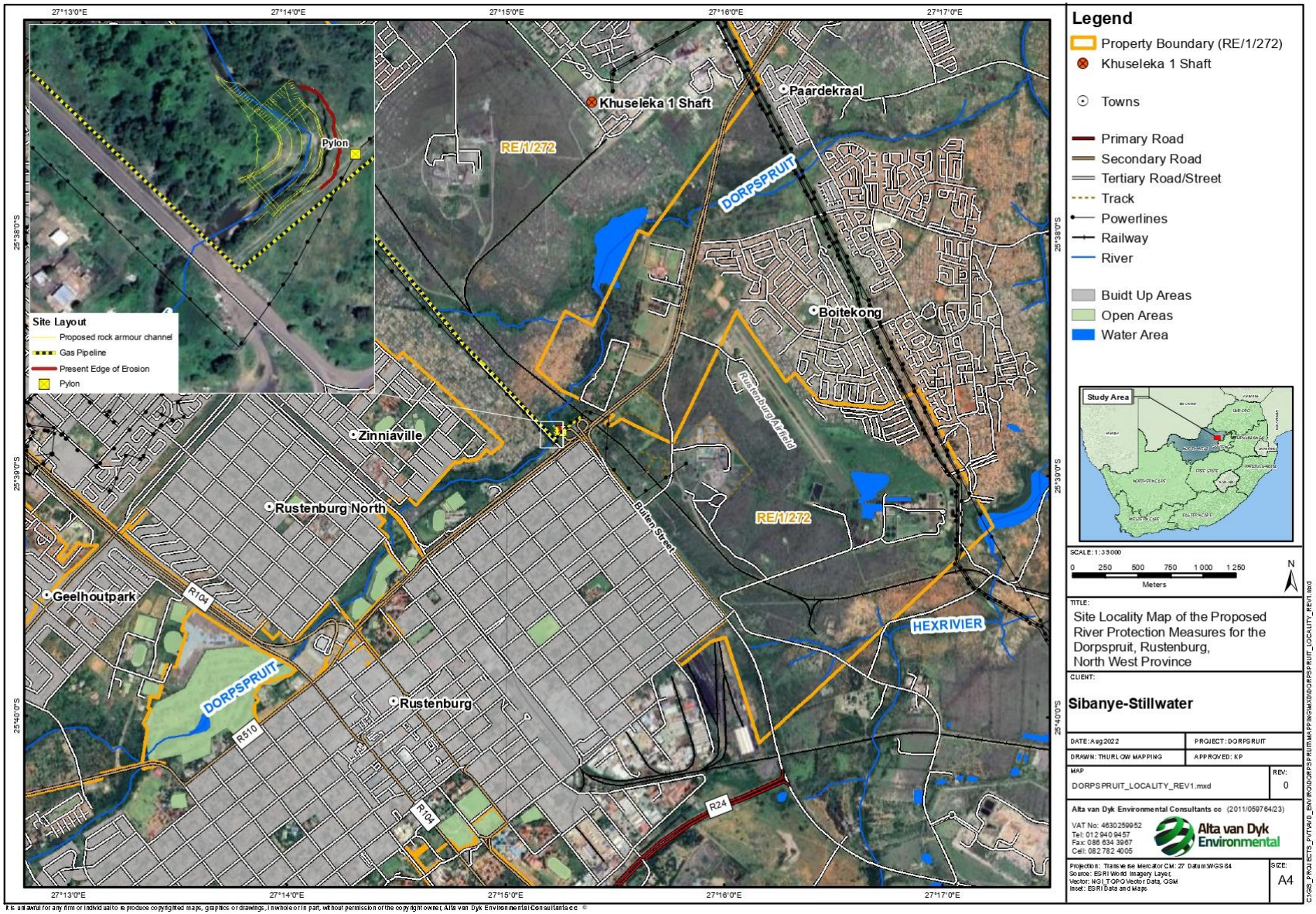


Figure 1-1 Locality Map of the Proposed Dorpspruit Riverbank Stabilisation

A description of the property on which the proposed project is located is provided in **Table 1-2**.

Table 1-2 Description of the properties

Activity	Proposed riverbank protection measures for Dorpspruit
Farm Name	Town and Townlands of Rustenburg 272-JQ
Portion	Remaining Extent of Portion 1
Registered Landowner	Rustenburg Local Municipality
SG21 number	T0JQ00000000027200001

The project applicant differs from the registered Landowner; hence consent has been obtained and provided in **Appendix D9**.

The proposed project falls within SRPM's mining right area (Mining Right Reference MR80) in terms of a Pooling and Sharing agreement between Sibanye-Stillwater RPM and Anglo American.

1.4 Applicant

The applicant for the project is Sibanye-Stillwater - Rustenburg Platinum Mines (SRPM) Pty Ltd. The details of the applicant are shown in **Table 1-3**.

Table 1-3 Details of the applicant

Applicant	Sibanye-Stillwater Rustenburg Platinum Mines (SRPM) Pty Ltd
Contact person	Grant Stuart
Postal Address	Private Bag X508 Marikana 0284
Telephone number:	014 495 0575
Email address	Grant.stuart@sibanyestillwater.com

1.5 Details of the Environmental Assessment Practitioner

Table 1-4 provides the details of the Environmental Assessment Practitioner (EAP) for the project.

Table 1-4: Details of the EAP

Environmental Assessment Practitioner	Kirthi Peramaul
Company	Alta van Dyk Environmental Consultants cc
Qualifications	BSc Hons Environmental Modelling and Monitoring
Professional Registrations	• South African Council for Natural Scientific Professions- Pr.Sci. Nat, Registration Number : 400012/18 • Environmental Assessment Practitioners Association of South Africa- Registered Environmental Assessment Practitioner: Number 2020/1537
Postal Address	Postnet Suite # 745 Private Bag X 1007 Lyttelton 0140
Telephone number:	012 940 9457

Fax number:	086 634 3967
Email address	kirthi@avde.co.za

1.5.1 Summary of the EAP's experience

Kirthi Peramaul (BSc Hons Environmental Monitoring and Modelling, Pr.Sci.Nat, Registered EAP). Kirthi has 13 years' experience in the environmental management field and is currently registered with the South African Council of Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Registration No 400012/18: Environmental Science) and is as a Registered Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (Registration No 2020/1537). Kirthi specialises in environmental authorisations, environmental compliance monitoring, environmental management plans, water use authorisation, stakeholder engagement, risk assessments and blue and green drop auditing. She has been involved in projects related to Waste Management, Linear Infrastructure, as well as Mixed-Use developments.

Refer to **Appendix A** for the Curriculum Vitae of the EAP.

1.6 Site sensitivity verification (DFFE Screening Tool)

On 5 July 2019, The Department of Forestry, Fisheries and the Environment (DFFE) gave Notice of the requirement to submit a report generated by the National Web-based Environmental Screening Tool in terms of section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the EIA Regulations, 2014, as amended. The submission of this report is compulsory when submitting an application for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 (as amended).

This Site Sensitivity Verification has been compiled to provide a rationale for the specialist studies undertaken as part of the environmental authorisation process and appended to this Draft BAR. This section addresses the findings of the Screening Tool Report (**Appendix B**), generated from the National Web Based Environmental Screening Tool, and provides a motivation for the various specialist studies identified to be conducted.

1.6.1 Proposed development area sensitivity

Table 1-5 is a summary of the environmental sensitivities within the application project area as identified in the Environmental Screening report.

Table 1-5 Environmental sensitivity of project area (DFFE Screening Tool)

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agricultural theme		X		
Animal species theme			X	
Aquatic biodiversity theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

1.6.2 Specialist assessment identified

Based on the environmental sensitivities of the proposed project area summarised in **Table 1-5**, the following list of specialist assessments were identified by the Screening Tool Report (**Table 1-6**). A motivation by the EAP has been provided where a study has not been undertaken.

Table 1-6 Specialist studies required as per the Screening Tool Report and relevant motivations

Specialist study	Included/not included	Motivation
Landscape/Visual Impact Assessment	Not included	The proposed project is situated within an urban setting; however, the riparian zone provides an aesthetic quality to the overall landscape of the area which is significantly transformed. The construction of the rip-rap rock armoured channel will eliminate current erosion activities. Such a design encourages the re-establishment of vegetation on the channel banks and the sense of place of a riparian setting will not be altered. The proposed development will not alter the landscape and therefore a Landscape/Visual Impact Assessment is not required.
Archaeological and Cultural Heritage Impact Assessment	Not included	The construction of ≈ 100m rip rap rock armour channel does not warrant a Heritage Impact Assessment in terms of Section 38 of the National Heritage Resources Act 25 of 1998. The project does not constitute the demolition of any existing infrastructure. As the proposed project is not applicable to Section 38 of the National Heritage Resources Act 25 of 1998, a Heritage Impact Assessment is not required. An Environmental Management Programme (EMPr) will be compiled for the proposed project, which will include mitigation measures required to minimise negative potential impacts. Any chance finds will be managed in accordance with the EMPr.
Palaeontology Impact Assessment	Not included	The proposed project area falls within the GREY category of SAHRA's Paleontological Sensitivity map, indicating insignificant/zero sensitivity thus no paleontological studies are required.
Terrestrial Biodiversity Impact Assessment	Riparian habitat has been included as part of the Riparian Delineation	In terms of the North West Biodiversity Sector Plan (2015), the proposed project area does not fall within a Critical Biodiversity Area or an Ecological Support Area. An overview of the vegetation commonly found in the study area, extent of potential ecological sensitive habitat and a Plant Species Plan has been included in the Riparian delineation, which is provided in **Appendix E**. The habitat along the affected reach of the Dorpspruit has been degraded, thus no Terrestrial Biodiversity Studies were undertaken.
Aquatic Biodiversity Impact Assessment	Included as part of the Riparian Delineation.	A Riparian Delineation has been undertaken and provided in **Appendix E**. Continuous Aquatic Biomonitoring is undertaken as part of the mining operations. Where applicable

Specialist study	Included/not included	Motivation
		such information has been used to supplement this BAR.
Hydrology Assessment	Included as part of the Detailed Design report	The Detailed Design report includes a Hydrology/hydraulics component which was required as input for the design.
Socio-Economic Assessment	Not included	As the proposed project entails the rehabilitation of a section of the Dorpspruit river bank, it is anticipated that the proposed riverbank protection measures will blend with the existing activities within the project area. A socio-economic assessment has not been undertaken.
Plant Species Assessment	Included as part of the Riparian Delineation.	An overview of the vegetation commonly found in the study area, extent of potential ecological sensitive habitat and a Plant Species Plan has been included in the Riparian delineation, which is provided in **Appendix E**.
Animal Species Assessment	Not included	In terms of the North West Biodiversity Sector Plan (2015), the proposed project area does not fall within a Critical Biodiversity Area or an Ecological Support Area. The habitat along the affected reach of the Dorpspruit has been degraded, thus no Animal Species Assessment has been undertaken.

1.7 Specialists

Table 1-7 details the specialist studies undertaken for the proposed riverbank protection measures.

Table 1-7 Specialist studies undertaken for the proposed project

Specialist study	Specialist	Expertise of specialist
Riparian Delineation and Water Use Risk Assessment for the Proposed River protection Measures in the Dorpspruit	Mr Dieter Kassier *WCS Scientific (Pty) Ltd*	B.Sc. (Hons) Environmental Science: Aquatic Ecosystem Health. *Pr.Sci.Nat*
Detailed Design of River Protection Measures for Dorpspruit	Deon van der Merwe *HEES (Pty) Ltd*	B.Eng (Agric) Pr Eng Engineer

1.8 Assumptions, qualifications and limitation

The assumptions and limitations pertaining to this BAR are presented in Table 1-8 below.

Table 1-8: Qualifications, assumptions and limitations

Aspect	Qualifications, assumptions and limitation
General	• It is assumed that AVDE has been provided with all relevant project information and that it was correct and valid at the time it was provided. • The potential impacts assessed in this report in relation to the proposed project is based on the assumption that the activities as provided in **Section 3** of this report will be undertaken. Should there be substantial changes to the project scope, potential impacts may need to be re-evaluated; • There will be no significant changes to the project description or surrounding environment between the completion of the Basic Assessment process and

Aspect	Qualifications, assumptions and limitation
	implementation of the proposed project that could substantially influence findings and recommendations with respect to mitigation and management. • The assessment of the mitigated scenario assumes that the design controls and recommended mitigation would be implemented adequately.
Riparian Delineation and Water Use Risk Assessment for the Proposed River protection Measures in the Dorpspruit	• A single day site visit was undertaken on 24 February 2022 during which all riparian habitats within and immediately adjacent to the study area were identified and delineated. The site visit coincided with the middle of summer, and the timing of the field survey was considered ideal for the purpose of the study. • Due to the scale of the remote imagery used (1:10 000 orthophotos and Google Earth Imagery), as well as the accuracy of the handheld GPS unit used to delineate riparian areas in the field, the delineated riparian boundaries cannot be guaranteed beyond an accuracy of about 10m on the ground. Should greater mapping accuracy be required, the riparian habitats would need to be pegged in the field and surveyed using conventional survey technique. • Sections of the project study area have been transformed by linear infrastructure developments – most notably the R510 (Beneden Street and Buiten Street interchange) and a further unnamed road, but also including powerlines and a pipeline. Some of these activities may have involved clearing of riparian vegetation on site, leading in changes to the extent of riparian habitat from the natural state. The delineation presented in this report represents the current extent of riparian habitat on site. • It is recognised that the passage of time may affect the information and assessment provided in this report. WCSS's opinions are therefore based upon the information that was made available to WCSS and which existed at the time of compiling this report.

1.9 Content of the Draft Basic Assessment Report

The Draft BAR has been compiled in accordance with the requirements of Government Notice R982 dated 4 December 2014 (as updated), Section 3 of Appendix I. These requirements and the sections of this Draft BAR in which they are addressed, are summarised in **Table 1-9**.

Table 1-9: Requirements of the BAR

No	Description	Reference
3 (1)	A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-	
a)	details of:	
	(i) the EAP who prepared the report; and	Section 1.5
	(ii) the expertise of the EAP, including a curriculum vitae;	Section 1.5. Appendix A
b)	The location of the activity, including:	Section 1.3
	(i) the 21 digit Surveyor General code of each cadastral land parcel	Section 1.3
	(ii) where available, the physical address and farm name;	Section 1.3
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	N/A
c)	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale	Figure 1.1 Figure 1.2 Figure 9.1
d)	A description of the scope of the proposed activity, including:	
	(i) All listed and specified activities triggered and being applied for	Table 4-1

No	Description	Reference
	(ii) A description of the associated structures and infrastructure related to the development	Section 3
e)	A description of the policy and legislative context within which the development is proposed including	
	(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report;	Section 4
	(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section 4
f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location	Section 2
g)	A motivation for the preferred site, activity and technology alternative	Section 6
h)	A full description of the process followed to reach the proposed development footprint within the approved site, including:	
	(i) Details of all the alternatives considered;	Section 6
	(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 8
	(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them	Section 6
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5
	(v) The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed or mitigated	Section 7
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives	Section 7
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section 7
	(viii) The possible mitigation measures that could be applied and level of residual risk;	Section 7
	(ix) The outcome of the site selection matrix	N/A
	(x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	N/A
	(xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity	Section 6 Section 9
i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including:	
	(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process	Section 8.2 Table 8.3 Table 8.4
	(ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 7
j)	An assessment of each identified potentially significant impact and risk, including:	

No	Description	Reference
	(i) Cumulative impacts	Section 7
	(ii) The nature, significance and consequences of the impact and risk	Section 7
	(iii) The extent and duration of the impact and risk	
	(iv) The probability of the impact and risk occurring	
	(v) The degree to which the impact and risk can be reversed	
	(vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) The degree to which the impact and risk can be avoided, managed or mitigated	
k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 9
l)	An environmental impact statement which contains-	
	(i) A summary of the key findings of the environmental impact assessment	Section 9
	(ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and the infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers	Section 9
	(iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	Section 7 Section 9
m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Section 9 Appendix F
n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Section 9
o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.8
p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 9.4
q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised	Section 9
r)	An undertaking under oath or affirmation by the EAP in relation to (i) The correctness of the information provided in the reports (ii) The inclusion of comments and inputs from stakeholders and I&APs (iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	Section 10
s)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
t)	Where applicable, any specific information required by the competent authority; and	NA
u)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 PROJECT MOTIVATION

2.1 Background to Sibanye-Stillwater

Sibanye-Stillwater is a producer of Platinum Group Metals (PGMs). These metals are essential for many industrial applications, especially catalytic converters for internal combustion engine emissions, as well as their widespread use in jewellery and investment. Saleable by-products produced from PGM mining include Gold, Copper, Nickel, Chrome and Cobalt.

The proposed project falls under Sibanye-Stillwater RMP operations. The mining operations, comprise three operating vertical shafts (Siphumelele 1, Khuseleka 1 and Thembelani 1), two decline shafts at Bathopele, two concentrating plants (the Waterval UG2 concentrator and the Waterval retrofit concentrator), a chrome recovery plant, the Western Limb tailings retreatment plant and related surface infrastructure and assets. The operation owns and maintains infrastructure which support the current mining operations. These include, but are not limited to electricity supply infrastructure i.e. pylons and an extensive piping network for compressed air which provides safe and breathable air for underground mining.

2.2 Need and desirability of the project

SRPM has a servitude registered adjacent to the Dorpspruit, a tributary of the Hex River, which includes a gas pipeline and powerline which are critical infrastructure for the mining operations. The proposed river protection measures are required as the Dorpspruit is eroding towards an electrical transmission line and compressed air pipeline owned by SRPM (Khuseleka 1 Shaft).

The progression of erosion has been significantly faster in recent years, resulting in ~ 5m distance between the riverbank and the gas pipeline and ~2m distance between the riverbank and the pylon. As the rate of erosion progresses, Sibanye-Stillwater has identified such erosion as a risk to the associated infrastructure and is proposing engineering interventions such as the rip rap rock armoured channel to prevent the risk of infrastructure failure. The project layout is provided in **Figure 2-1**.

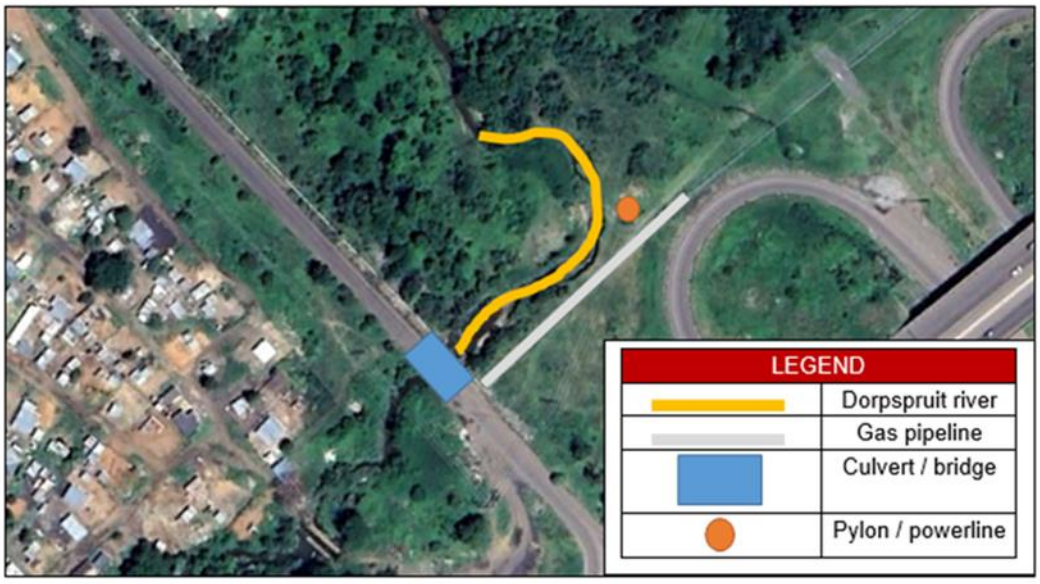


Figure 2-1 Project layout of the Dorpspruit River protection (HEES, 2022)

Figure 2-2 Gas pipeline ≈5m from the riverbank (HEES, 2022)

Figure 2-3 Anchor point of pylon ≈2m from riverbank (HEES, 2022)

Figure 2-4 shows the riverbank erosion progress between 2013 and 2021. The right bank edge of the Dorpspruit moved nearly 15m towards the east, closer to the pylon anchor in this 8-year period.

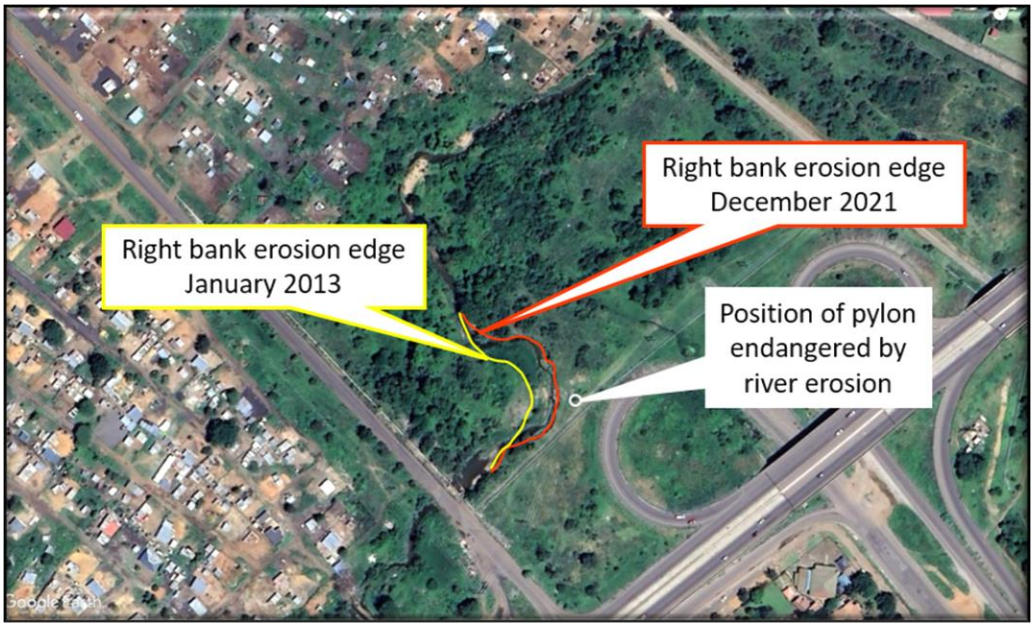


Figure 2-4 Riverbank erosion progression

As the rainy season is approaching, the risk of infrastructure failure due to the riverbank erosion has escalated. Infrastructure failure poses significant risks to the health and safety of personnel and ventilation requirements underground could potentially be compromised, resulting in the loss of human lives.

3 PROJECT DESCRIPTION

3.1 Construction of new infrastructure

The proposed project includes the following:

- Construction of a rip rap rock armoured channel; and
- Construction of a temporary access road.

A project layout map has been provided in **Figure 3-7** and details of the proposed infrastructure has been provided in **Table 3-1**.

Table 3-1 Summary of proposed infrastructure

Proposed Infrastructure	Coordinates	Specifications
Rip rap rock armoured channel	Start: 25°38'50.10"S; 27°15'13.04"E Middle: 25°38'49.07"S; 27°15'14.03"E End: 25°38'47.70"S; 27°15'12.53"E	Length of channel: ≈100m Bottom width of channel: ≈10 to12m Top width of channel: ≈18 to 20m
Temporary access road	Start: 25°38'46.92"S; 27°15'17.68"E Middle: 25°38'47.89"S; 27°15'16.10"E End: 25°38'48.36"S; 27°15'14.53"E	Length of road: ≈115m Width of road: ≈3.9m

3.1.1 Rip rap rock armoured channel

It is the intention of Sibanye-Stillwater to stabilise the banks of the Dorpspruit through engineering control measures by means of a rip rap rock armour channel (**Figure 3-1**).

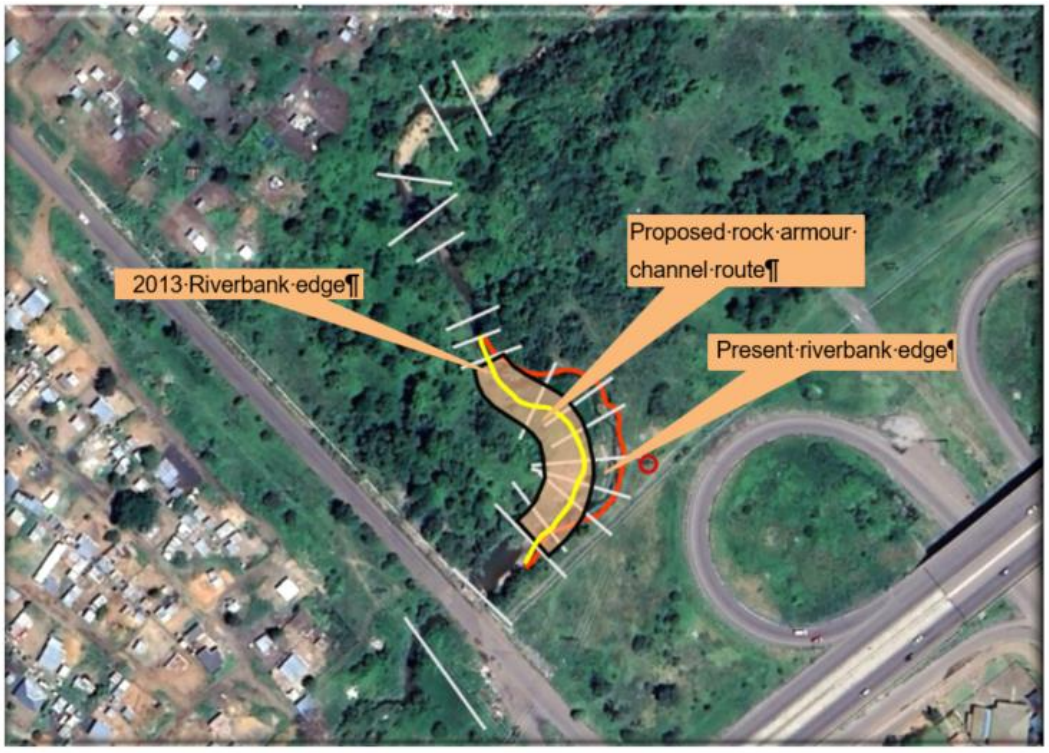


Figure 3-1 Proposed re-routing of the Dorpspruit with the rip rap armoured channel

The detailed design undertaken by HEES (Pty) Ltd (2022) considered the following input data into the design:

- Topographical Survey

- Hydrology and hydraulics
- Design of suitable riverbank erosion protection

Rip rap armouring is often used to provide a stable lining to resist the erosion of stormwater channels due to swift flowing water or in curved channels because of the availability of the materials, relative ease of construction and low cost. With rip rap armouring, layers of loose angular rock is placed on top of a geotextile membrane and the ability of these rock layers to deform and to remain effective even when limited undermining occur is a major advantage.

The culvert upstream was modelled in HecRas (hydraulic model), to ensure safe discharge capacity of the culvert without overtopping. The proposed channel will be approximately 100m in length, with a bottom width of ≈10 to12m and a top width of≈18 to 20m. The cross-section of the channel will be trapezoidal in shape and will require rip rap with approximately a d50 size of 300mm. The channel will have a conveyance capacity of 60m^3/s. The expected flow depth in the channel at 60m^3/s will be approximately 2.8m and the surface width of the waterbody in the channel at 60m^3/s will be approximately 18.5m. The estimated flow velocity of the water in the channel will below 2.0m/s.

The channel has been designed in such a manner to prevent the increase of flow and erosion downstream.

Figure 3-2 Image of a typical rip rap armoured channel (HEES, 2022)

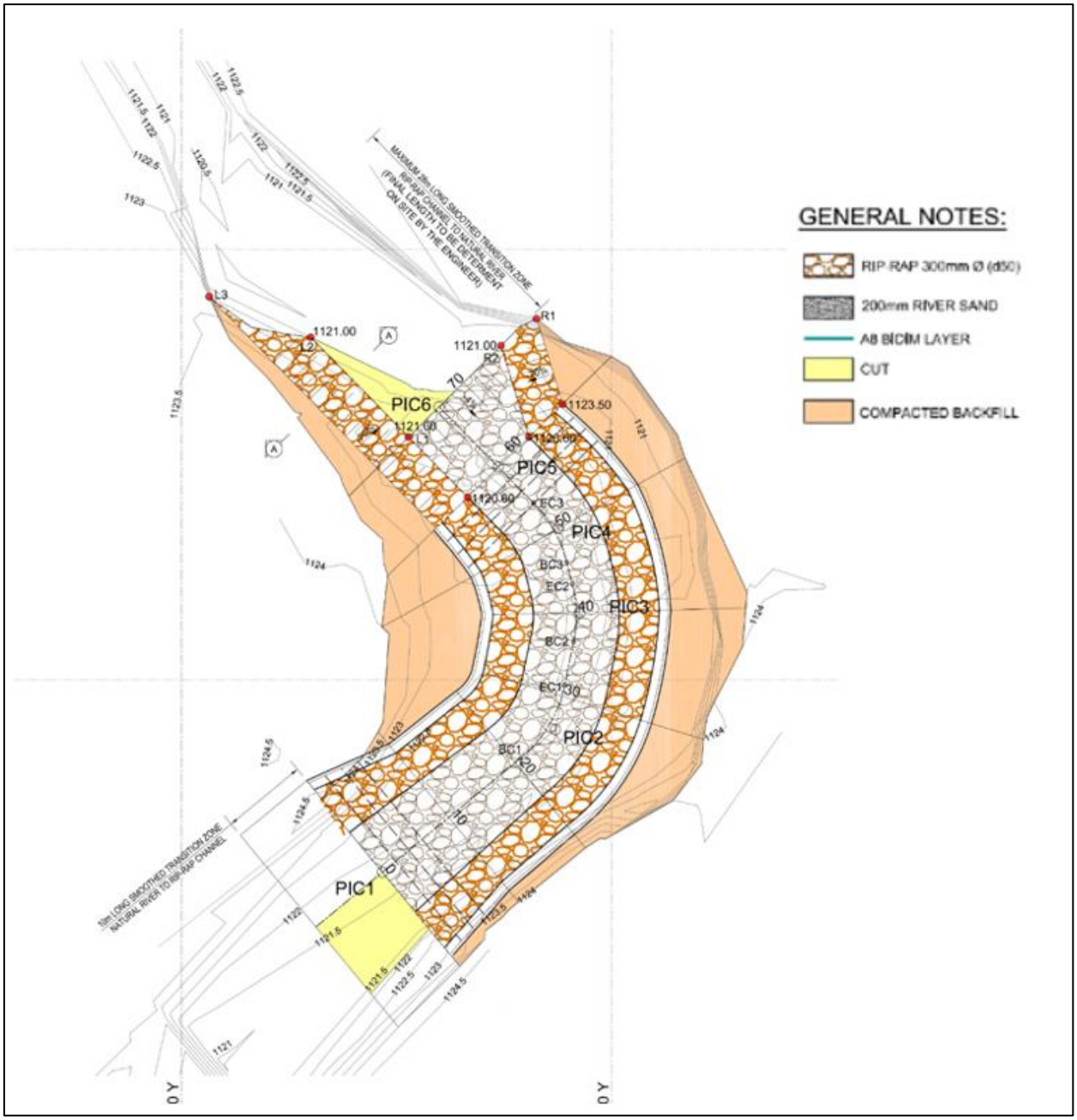


Figure 3-3 Channel layout plan (HEES, 2022)

The proposed sequence of construction will be undertaken:

- Excavation of a diversion canal/inclusion of concrete pipes (**Figure 3-4**) which shows the position of the proposed new flow area that will be constructed to allow for any minor flow to be conveyed during construction).
- Excavation of the new flow canal will commence, and the material excavated shall be used to backfill against the riverbank where current erosion occurs
- The diversion canal will be shaped from downstream to upstream for placement of the rock.
- After the excavation and backfill are completed and the canal shaped any flow will be able to pass through the final shaped section.
- A geotextile with a specification of A5 will be placed and the rock placed on top of the geotextile.

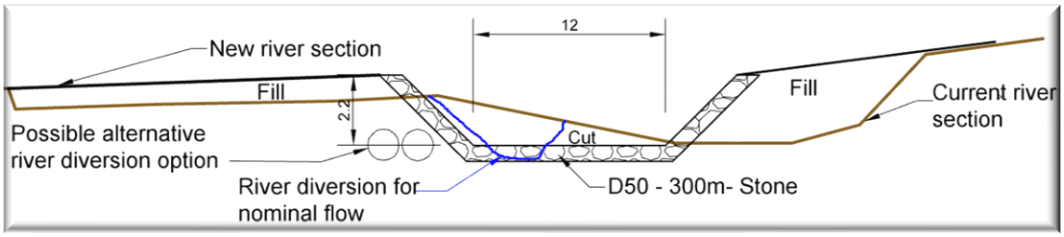


Figure 3-4 River diversion layout (HEES, 2022)

3.1.2 Temporary access road

Access to site will be obtained via Buiten Street and an existing vehicle crossover (**Figure 3-5**). A temporary access road will be constructed to allow through fare to the Dorpspruit for the purposes of construction activities. Sections of this access road falls within the powerline and gas pipeline servitude, hence the area has already been disturbed (**Figure 3-6**). No formal structures will be constructed as part of this access road other than a temporary vehicle cross over, across the stormwater diversion trench. Further details on the stormwater diversion trench has been provided in **Section 5**.

Figure 3-5 Existing vehicle crossover (shown with blue arrow)

Figure 3-6 Existing maintenance roads (shown with blue arrow)

3.1.3 Stormwater Management

As previously mentioned in **Section 3.1.1**, in order to ensure stormwater is accommodated, HEES undertook a hydrological analysis based on the hydrological study undertaken for the respective catchment. Basic hydrological parameters were used in determining the river capacity for input in the channel design.

3.2 Services Required

3.2.1 Temporary Material Laydown area

In order to ensure minimal disturbance on the riparian habitat, a material laydown area is proposed towards the south east of the site. Consent for use of this section of land from the North West Department of Public Works and Roads has been obtained, as the area falls within close proximity of the road (Buiten/R510 loop).

3.2.2 Waste management

All waste generated during the construction phase of the project will be temporarily stored at suitable locations (eg in receptacles/skips) and will be removed at regular intervals and disposed of appropriately at a licensed municipal waste site or acceptable disposal facility. The nearest landfill is the Waterval Landfill situated within the jurisdiction of the local municipality. It is anticipated that no waste will be generated during the operational phase.

3.2.3 Water and Sanitation

Sanitation services will be required for onsite personnel during the construction phase of the project. Chemical toilets will be used and serviced regularly by a registered waste contractor. Potable water will be provided by the appointed contractor.

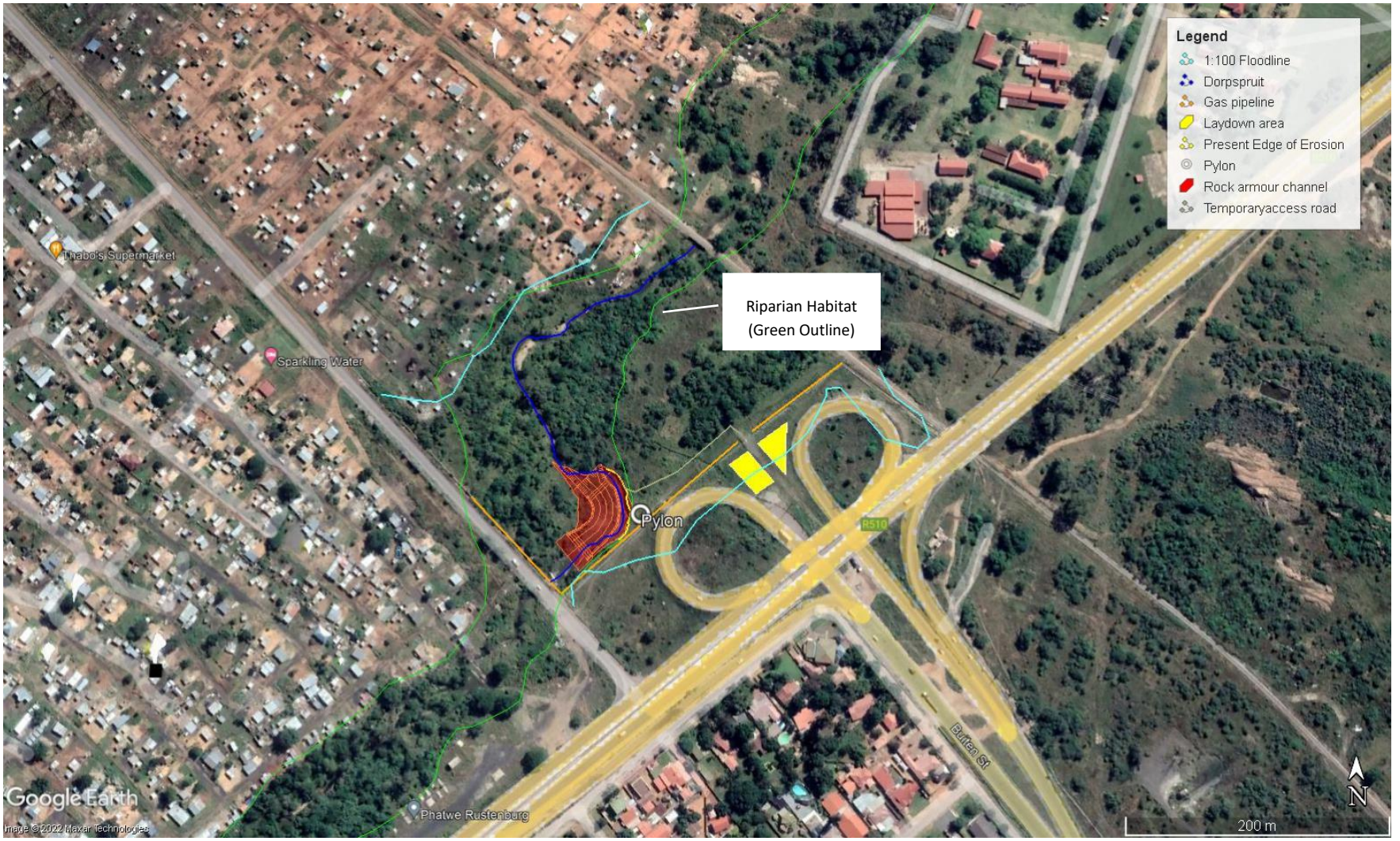


Figure 3-7 Google Earth image showing the project layout

4 LEGAL FRAMEWORK

4.1 Legal Requirements

There are several regulatory requirements at local, provincial and national level with which the proposed project need comply to. A brief summary of each of these legal requirements are provided in the following sections.

4.1.1 Constitution of the Republic of South Africa (Act No 108 of 1996)

The environmental right is mentioned in Section 24 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996). This states the following:

"...everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate.

The issuing of an environmental authorisation or other permits or licence for any aspect of the proposed project will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and socio- economic environment. The abovementioned authorisations, permits, or licences will be largely based on the legislation outlined in this Chapter.

4.1.2 National Environmental Management Act

NEMA is the environmental framework legislation promulgated to ensure that the environmental rights contemplated in Section 24 of the Constitution of South Africa (Act 108 of 1996) are realized. NEMA sets out:

- The fundamental principles that need to be incorporated in the environmental decision making process;
- The principles that is necessary to achieve sustainable development;
- Provides for duty of care to prevent, control and rehabilitate the effect of significant pollution and environmental degradation; and
- It allows for the prosecution of environmental crimes.

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an Environmental Authorisation issued by the competent authority (in this case the NWDEDECT). In this context, the Environmental Impact Assessment (EIA) Regulations, 2014, promulgated in terms of NEMA, govern the process, methodologies and requirements for the undertaking of EIAs in support of EA applications. Listing Notices 1-3 in terms of NEMA list activities that require EA (NEMA listed activities). The EIA Regulations, 2014, lay out two alternative authorisation processes. Depending on the type of activity that is proposed, either a BA process or a Scoping and Environmental Impact Reporting (S&EIR) process is required to obtain EA. Listing Notice 1, lists activities that require a BA process, while Listing Notice 2 lists activities that require S&EIR. Listing Notice 3 lists activities in certain sensitive geographic areas that also require a BA process.

Table 4-1 provides the listed activities triggered by the proposed development of the rip rap rock armour channel and associated infrastructure.

Table 4-1: Triggered listed activities for the proposed project

List and activity number	Listed activity	Description of activity
Listing 1 Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	Construction of the rip rap armour channel is proposed within a section of the Dorpspruit. During the construction process of the rip rap armour channel, soil and rock of more than 10 cubic metres from the river bed will be moved. The soil and sand excavated will be infilled on the side banks of the river.
Listing 3 Activity 12	The clearance of an area of more than 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. North West: vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland	Greater than 300m^2 of indigenous vegetation will be cleared, where required, for the rip rap channel, material laydown area and access road. The rip rap armour channel is proposed to be situated within the Dorpspruit.
Listing 3 Activity 14	The development of- ii. infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; North West: vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland	Construction of the rip rap armour channel is proposed within a section of the Dorpspruit. It is proposed that the Channel will be ≈100m in length with a bottom width of ≈10 to 12m and a top width of ≈18 to 20m. The rip rap armour channel has a footprint greater than 10m^2.

4.1.3 National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act (NEM:BA) serves to provide a framework for the management and conservation of South African biodiversity, under the auspices of the NEMA. The purpose of the act is to provide for the:

- Management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act,1998;
- The protection of species and ecosystems that warrant national protection;
- The sustainable use of indigenous biological resources;
- The fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources;
- The establishment and functions of a South African National Biodiversity Institute

Chapter 7 of the NEMBA regulations govern the 'PERMIT SYSTEM FOR LISTED THREATENED OR PROTECTED SPECIES'. In order to remove or relocate any Threatened species or Protected species identified on the site, the relevant permits must be applied for.

The proposed project entails the construction of a rip rap rock armoured channel within the active channel of the Dorpspruit as well as a temporary access road. In terms of the North West Biodiversity sector plan, the project does not fall within a Critical Biodiversity Area (CBA) or an Ecological Support Area (ESA). Minimal vegetation clearance will be required in support of the proposed project. No permitting requirements are triggered by the proposed project.

4.1.4 National Water Act

The purpose of the NWA is to ensure that the South Africa's water resources are protected, used, developed, conserved, managed and controlled. Chapter 4 of the act regulates water use, while Section 21 lists eleven water use types that are regulated [Section 21 (a) – (k)]. Watercourses and wetlands are protected in terms of this section, as both are regarded as water resources. The regulated area of a watercourse can be defined as follows:

- *The outer edge of the 1:100 year flood line and /or delineated riparian habitat whichever is the greatest measured from the middle of a river, spring, natural channel, lake or dam;*
- *In the absence of a determined 1:100 year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act);*
- *500m radius from the delineated boundary of any wetland or pan*

The proposed project will be undertaken within the active channel of the Dorpspruit, hence within the Department of Water and Sanitation's (DWS) regulated area. A General Authorisation application has been logged with DWS. The e-WULAAs reference number is WU24573. **Table 4-2** lists the water uses that require authorisation in terms of Section 21 of the National Water Act for the proposed development.

Table 4-2 List of Section 21 Water Uses to be applied for

Section 21 Water Use	Activities which require the Water Use Licence
(c) – impeding or diverting the flow of water in a watercourse (i) – altering the bed, banks, course or characteristics of a watercourse	• Construction of the rip rap rock armoured channel with the active channel of the Dorpspruit. • Establishment of the temporary access road within 100m from the edge of the Dorpspruit.

Proof of consultation with the DWS had been included in **Appendix D9**.

4.1.5 National Heritage Resources Act

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. Section 38 of this Act pertains to Heritage resources management and Section 38(1) states the following

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

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

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

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

(i) exceeding 5 000 m^2 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 m^2 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.

No permitting requirements are triggered by the proposed project. The South African Heritage Resource Agency (SAHRA) has been informed of the proposed project. Proof of notification has been included in **Appendix D**.

4.1.6 National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003)

The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) provides for a range of protected areas: protected environments, special nature reserves and natures reserves. South Africa has much valuable biodiversity outside of protected areas, but this is disappearing at an alarming rate. It has been recognised that in order to effectively conserve South Africa's biodiversity, conservation efforts must focus outside of formerly protected reserves, considering 80% of the country's most scarce and threatened habitats are privately owned. It is clearly not possible for government to purchase all the land identified as high priority in terms of habitat or threatened ecosystems to add to the system of state-owned protected areas.

According to the Department of Forestry Fisheries and the Environment (DFFE) protected areas register, the proposed study area is not situated within a protected area.

4.1.7 North West DEDECT: Bonjala Platinum District Municipality Environmental Management Framework (2020)

An Environmental Management Framework (EMF) is a tool that could guide development in such a way so as to ensure sustainable development to the benefit of current and future generations. The legal status for EMFs is provided by Chapter 5 of the National Environmental Management Act (NEMA) 107 of 1998, which aims to promote the integration of the principles of environmental management into the making of all decisions which may have a significant effect on the environment; ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them; and ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment.

According to the Bonjala Platinum District Municipality EMF, the proposed site falls within Zone A: Development Zone 1 (residential, business and other). This zone is described as a refinement of areas identified for future urban development in local municipal SDFs. These development uses include, amongst others, residential land uses, commercial land uses and land uses related to government functions, but specifically excludes industrial land uses and mining related land uses.

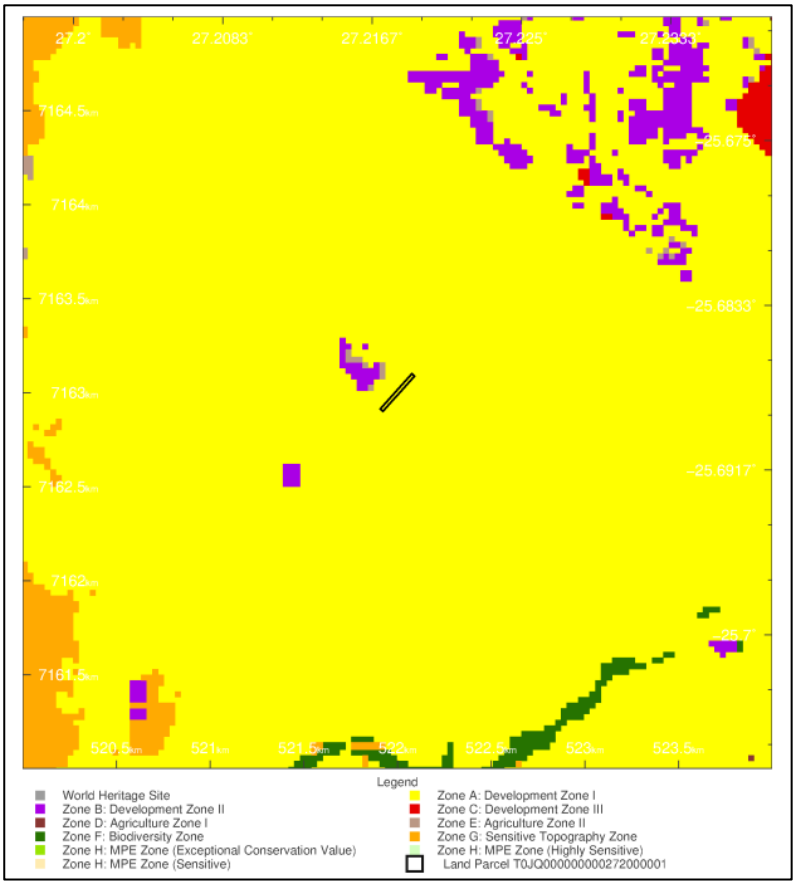


Figure 4-1 Management zones around the proposed site (site shown with the black line)

The proposed project entails the stabilisation of the Dorpspruit riverbank to prevent further erosion and watercourse protection. The proposed project can therefore be seen as an improvement of an eroded channel.

4.1.8 Rustenburg Local Municipality Integrated Development Plan (2022-2027)

The Integrated Development Plan is an important tool used by municipalities to provide vision, guidance and ultimately a roadmap towards developing the municipal area. Municipalities play an important role in ensuring sustainable integration between the cross cutting inter-dimensional sectors in achieving development in the area that is socially, economically and environmentally sustainable.

Chapter 5 of the IDP recognises protection and enhancement of environmental assets and natural resources. The proposed project is therefore aligned to the output of the IDP.

5 ENVIRONMENTAL STATUS QUO

5.1 Topography

The North West province is typically flat or has gently undulating plains within its central and western regions, whilst the eastern region varies in topography. The altitude of the North West province ranges from 920-1782m above sea level. In terms of the project area, the elevation

The project area is located at around 1126 metres above mean sea level (mamsl) in the south west, sloping slightly downwards towards the eroded river bank to an elevation of around 1123 mamsl towards north east.

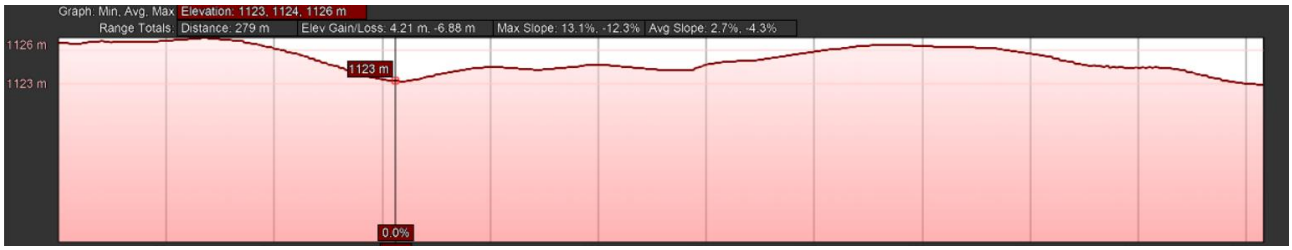


Figure 5-1 Google Earth elevation profile through the project area from south west to north east

5.2 Temperature and Rainfall

The Rustenburg area has a temperate humid subtropical climate according to the Köppen classification. It has very warm summers (from December to February) and mild winters (from June to August). Due to the altitude, summers are not quite as hot as one might expect. Precipitation occurs mainly in summer with a maximum (approximately 68 mm) encountered during January and a minimum (approximately 1 mm) encountered during July (Figure 5 1). The average daily temperatures ranges from a minimum of 11°C to a maximum of 17°C with the highest temperatures recorded during January and December and the lowest recorded during June and July (**Figure 5-2**).

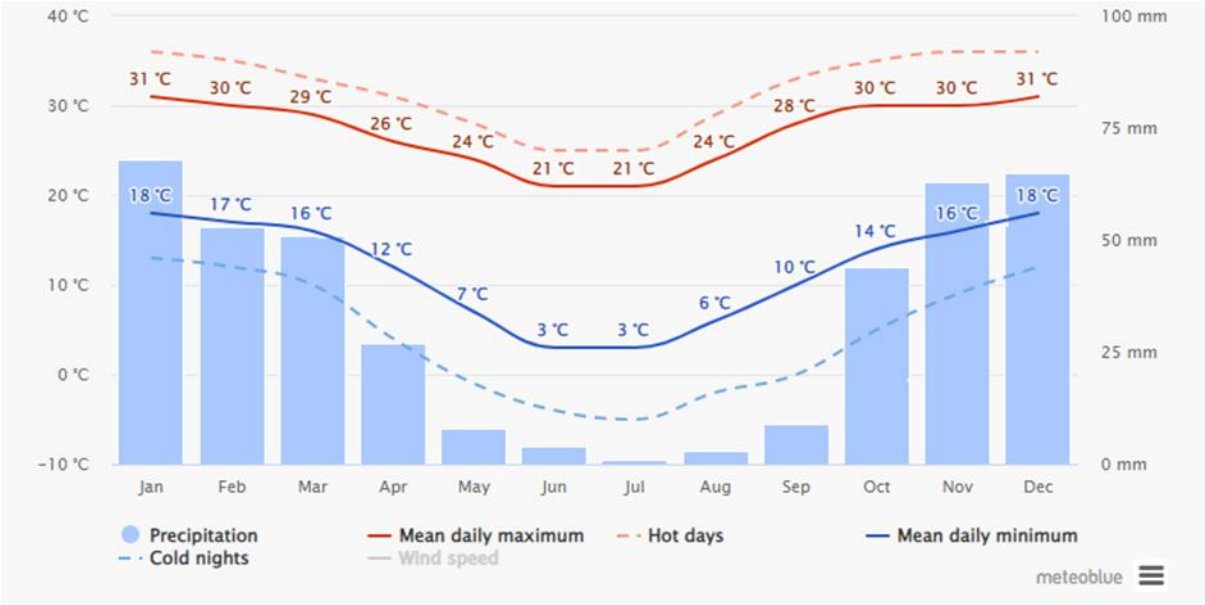


Figure 5-2 Rustenburg monthly temperature and precipitation (Meteoblu, 2022)

5.3 Geology and Soils

The site is located in one of the largest layered mafic intrusions in the world, namely the Bushveld Igneous Complex. The Bushveld Igneous Complex comprises a suite of layered ultramafic/mafic rock, up to nine (9) km thick (known as the Rustenburg Layered Suite), roofed by Rooiberg Group Felsic volcanics and granophyres and a suite of late Bushveld granites. This layered suite is preserved in five (5) lobes: the far western, western, eastern and northern, and the south-eastern lobe. A generalised geological map of the Bushveld Igneous Complex is provided in **Figure 5-3**. The underlying geology of the site consists of Mathlagame Norite-anorthosite of the Rustenburg layered suite. In terms of soils, the Dundee soil form was dominant in the project area. The Dundee soil form consists of an Orthic topsoil on top of a stratified alluvium horizon.

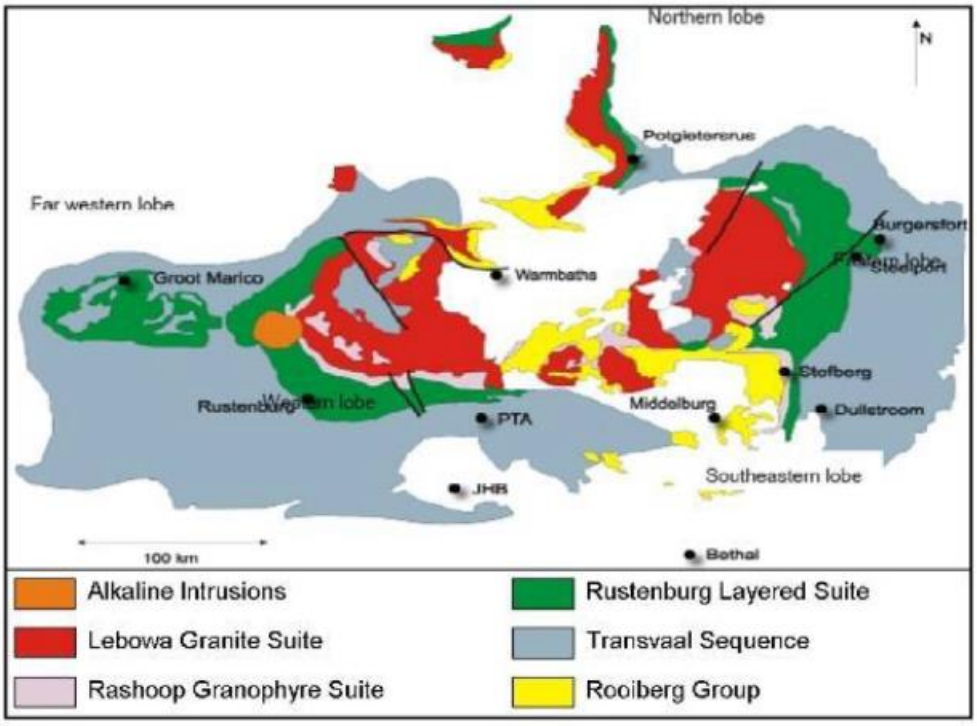


Figure 5-3 Generalised geological map of the Bushveld Igneous Complex

5.4 Biodiversity

5.4.1 Vegetation

It is important to note that the study area as depicted in **Figure 5-4** was defined by the wetland specialist as a 500m buffer around the location of the river protection measures. The river protection measures fall within the Savanna Biome, Central Bushveld Bioregion. At a finer level, the area is categorised as falling predominantly within the Moot Plains Bushveld (VM06) vegetation type. The distribution of this vegetation type is predominantly the North West and Gauteng Provinces, with the belt south of the Magaliesberg running from the Selons River Valley to Pretoria along the Magalies River and the belt north of the Magaliesberg running from Rustenburg towards the Crocodile River (Mucina & Rutherford, 2018). The Moot Plains Bushveld is characterised by low, thorny Vachellia savannah (e.g. *V. nilotica* and *V. tortilis subsp. heteracantha*) along the plains, low-slope woodlands and a graminoid-dominated herbaceous layer (Mucina & Rutherford, 2018).

This vegetation type is considered vulnerable. Some 13% is statutorily conserved, mainly in the Magaliesberg Nature Reserve. About 28% is transformed, mainly due to cultivation and urban and built-up areas. Alien invasive plants have a scattered occurrence and are dominated by species such as *Cereus jamacaru*, *Eucalyptus sp.*,

Jacaranda mimosifolia, *Lantana camara*, *Melia azedarach* and *Schinus sp.* Erosion is mainly very low to low, but moderate in some areas (Mucina & Rutherford, 2006).

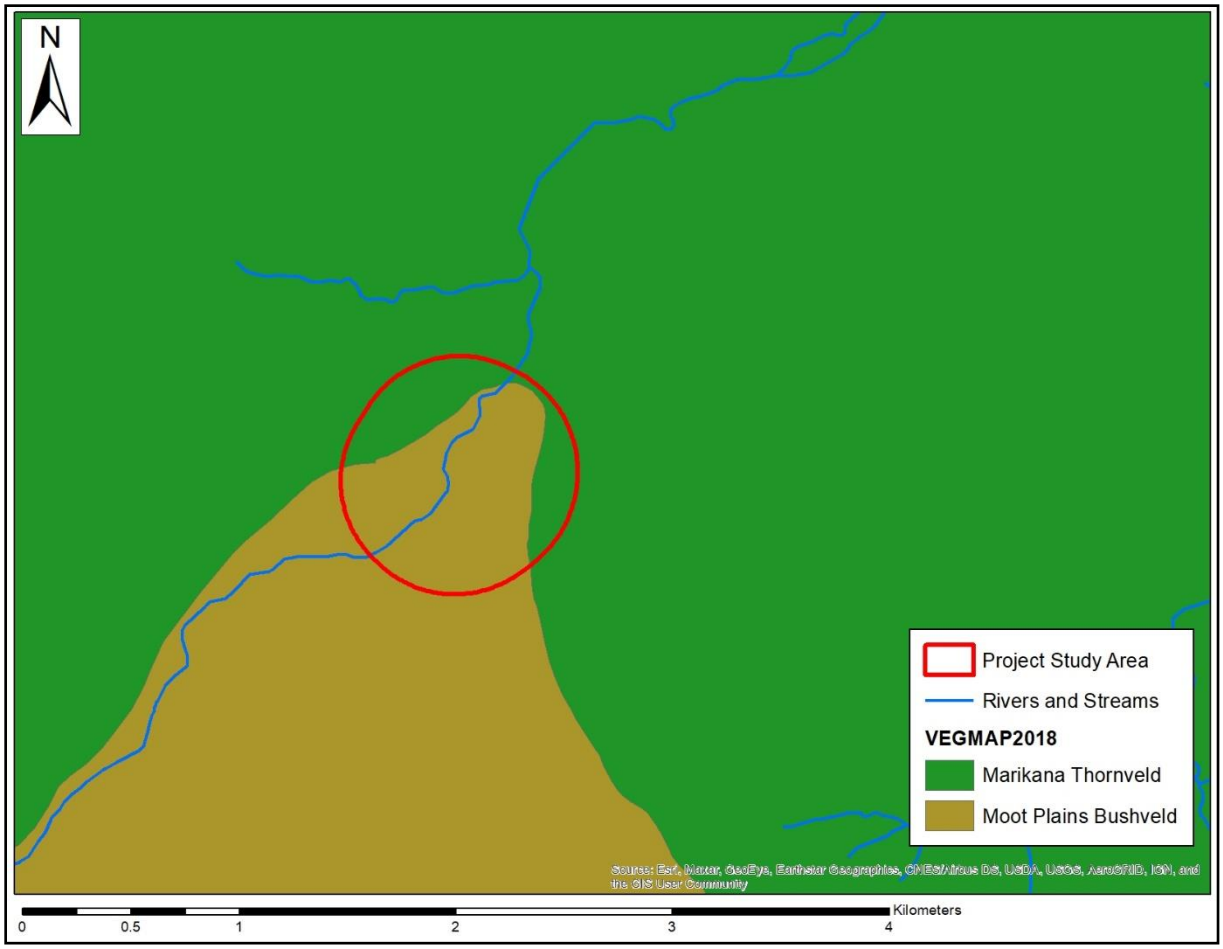


Figure 5-4 Vegetation map (WCS Scientific, 2022)

According to the Riparian Delineation undertaken by WCS Scientific plant species found within the project area include, *Cyperus dives*, assemblage of alien and pioneer species (*Arundo donax, Tithonia rotundifolia, Xanthium strumarium, Commelina benghalensis, Persicaria senegalensis* and *Sesbania punicea*) while larger tree species such as the indigenous *Searsia lancea* and *Vachellia karroo*, and alien species such as *Morus alba* and *Eucalyptus* sp. also occur.

5.4.2 North West Biodiversity Sector Plan (2015)

The North West Biodiversity Sector Plan (NWREAD, 2015) is a spatial tool that comprises a set of maps of biodiversity priority areas for use in land-use and development planning, environmental assessment and regulation, and natural resource management. One of the key outputs of the North West Biodiversity Sector Plan is the identification of biodiversity priority areas. This was achieved through the compilation of maps indicating Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

No terrestrial CBA or ESA areas occur within the project study area (**Figure 5-5**). Although the Dorpspruit River and associated habitat within the project area has been classified as an aquatic ESA – Ecological Support Areas (ESAs) *are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood*

mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBA's (NWREAD, 2015).

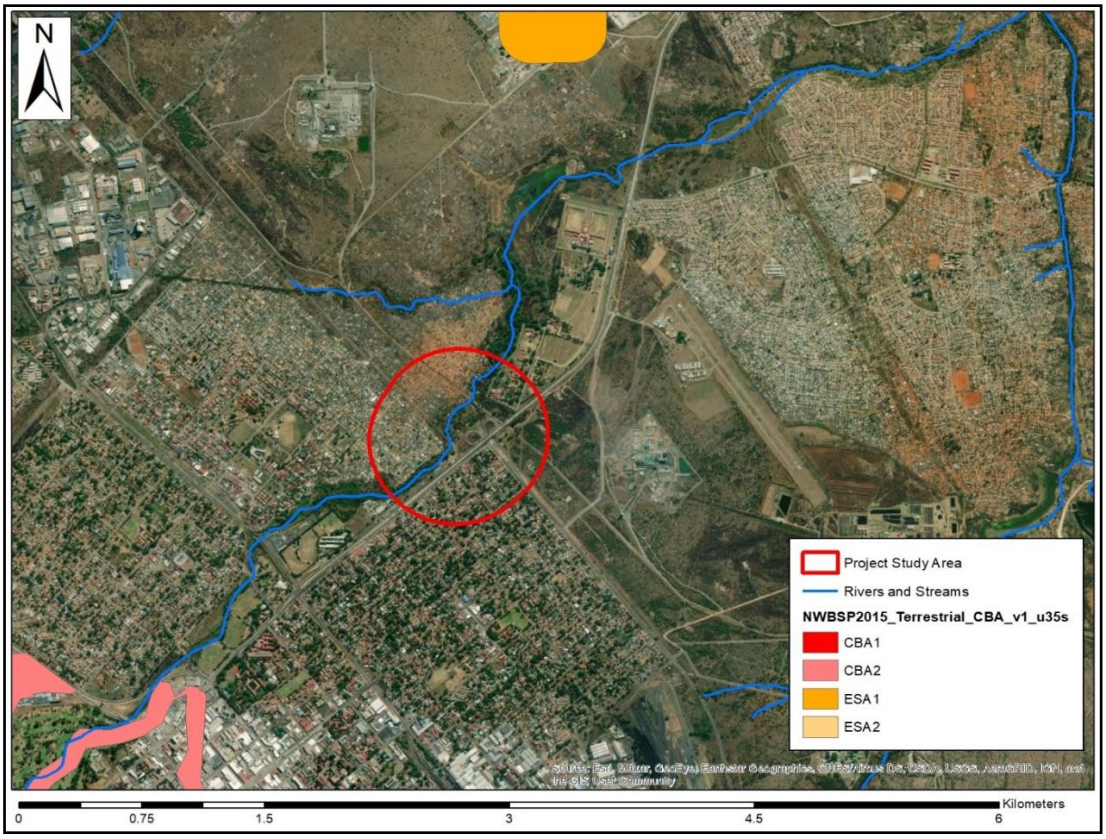


Figure 5-5 Extract from the provincial conservation plan terrestrial assessment for the study area (WCS Scientific, 2022)

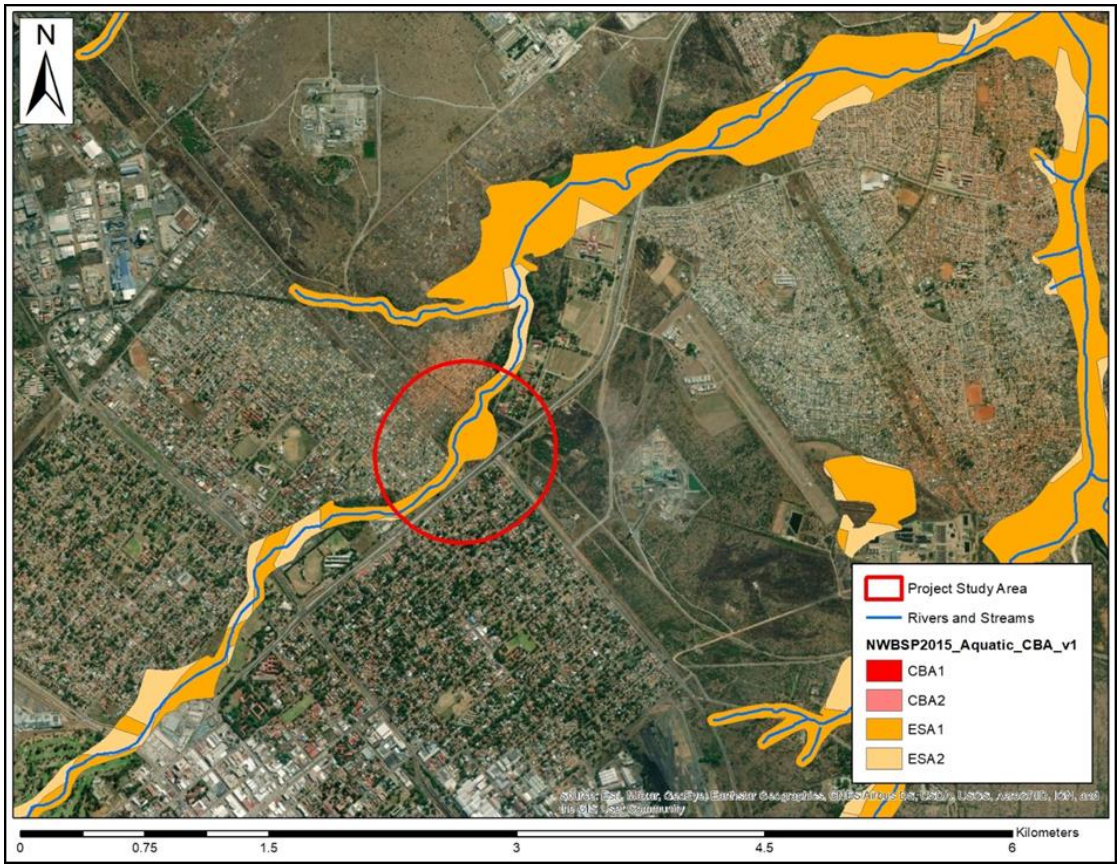


Figure 5-6 Extract from the provincial conservation plan aquatic assessment (WCS Scientific, 2022)

5.4.1 Invasive alien plants

The active channel of the Dorpsprruit is characterised by herbaceous vegetation, and woody species dominated by alien species such as *Morus alba*, *Tipuana tipu,* Eucalyptus sp, *Arundo donax*, *Tithonia rotundifolia, Xanthium strumarium, Melia azedarach and Sesbania punicea*. The control of alien vegetation has been considered as part of the impact assessment (**Section 7**) and included in the Environmental Management Programme (**Appendix F**).

5.5 Fauna

The dominant land use within the Dorpspruit sub-catchment is residential formal, with the immediate surrounds of the Dorpspruit being transformed through informal footpaths, service roads for maintenance activities, and the construction of the Buiten and Beneden interchange. The area is further disturbed by informal housing, dumping of waste, and sewage entering the Dorpspruit. As previously mentioned, the proposed project entails the stabilisation of the Dorpspruit riverbank, other than the temporary access track construction activities will be limited to the active channel. Due to the existing disturbances in the project area and degradation of the riparian habitat, it is not anticipated that faunal species will be impacted on by the riverbank stabilisation measures. Regular aquatic biomonitoring is undertaken by Sibanye-Stillwater within the Dorpspruit. Details of the aquatic biomonitoring is provided in **Section 5.7**.

5.6 Surface Water

Information provided in this Section has been sourced by the Riparian Assessment undertaken by WCS Scientific.

5.6.1 Catchments and Rivers

The study area is located on the outskirts of the town of Rustenburg along the R510 Beneden Road, with the interchange between Beneden Road and Buiten Street being located near the centre of the project study area. The Dorpspruit, a tributary of the Hex River, traverses the site from southwest to northeast (**Figure 5-7**).

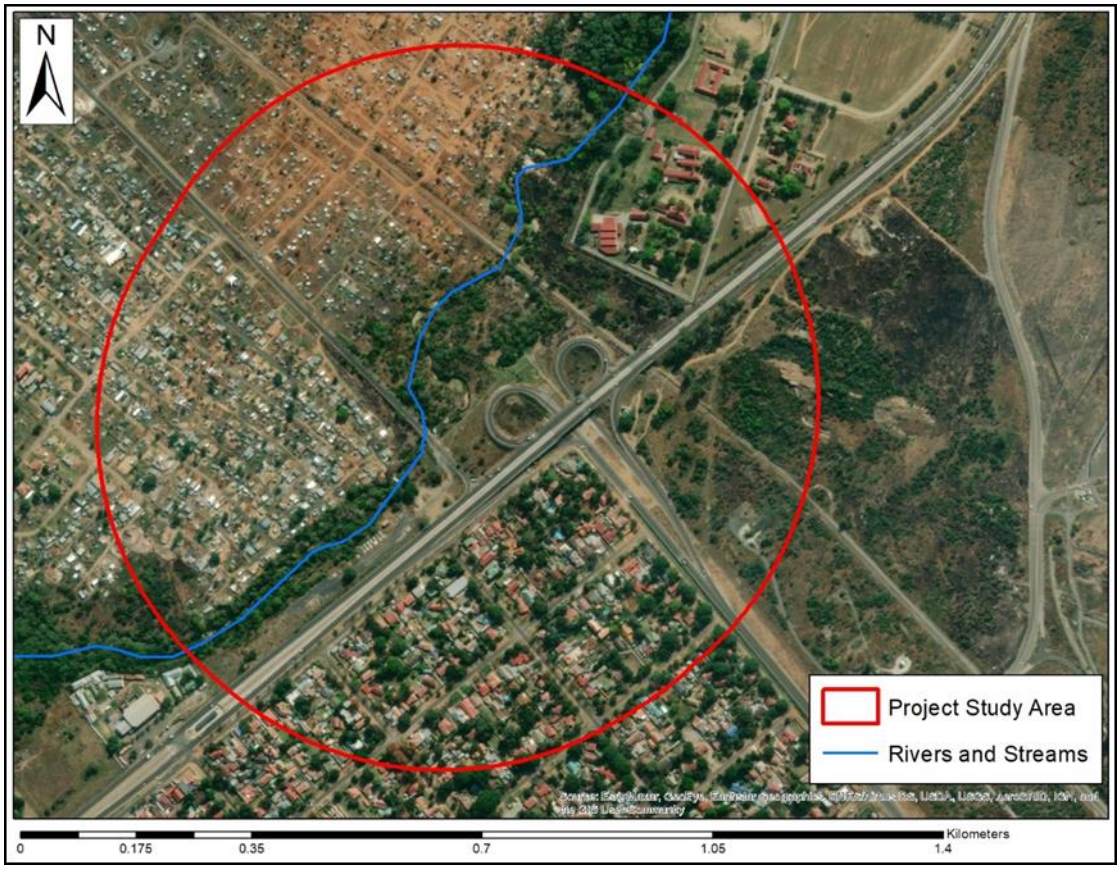


Figure 5-7 Map showing the study area overlain on recent aerial imagery (WCS Scientific, 2022)

The study area is located in the Limpopo River Catchment (Primary Catchment A), and more specifically quaternary catchment A22H (**Figure 5-8**). Catchment A22H is drained by the Hex River and its tributaries. Information regarding catchment size, mean annual rainfall and runoff for the quaternary catchment is provided in the **Table 5-1**

Table 5-1 Details relating to the catchment (WCS Scientific, 2022)

Quaternary Catchment	Catchment Surface Area (km2)	Mean Annual Rainfall (MAP) in mm	Mean Annual Run-off (MAR) in mm	MAR as % of MAP	Mean Annual Evaporation (MAE) in mm	MAP:MAE
22H	579	658	19.0	2.9 %	1 700	0.4

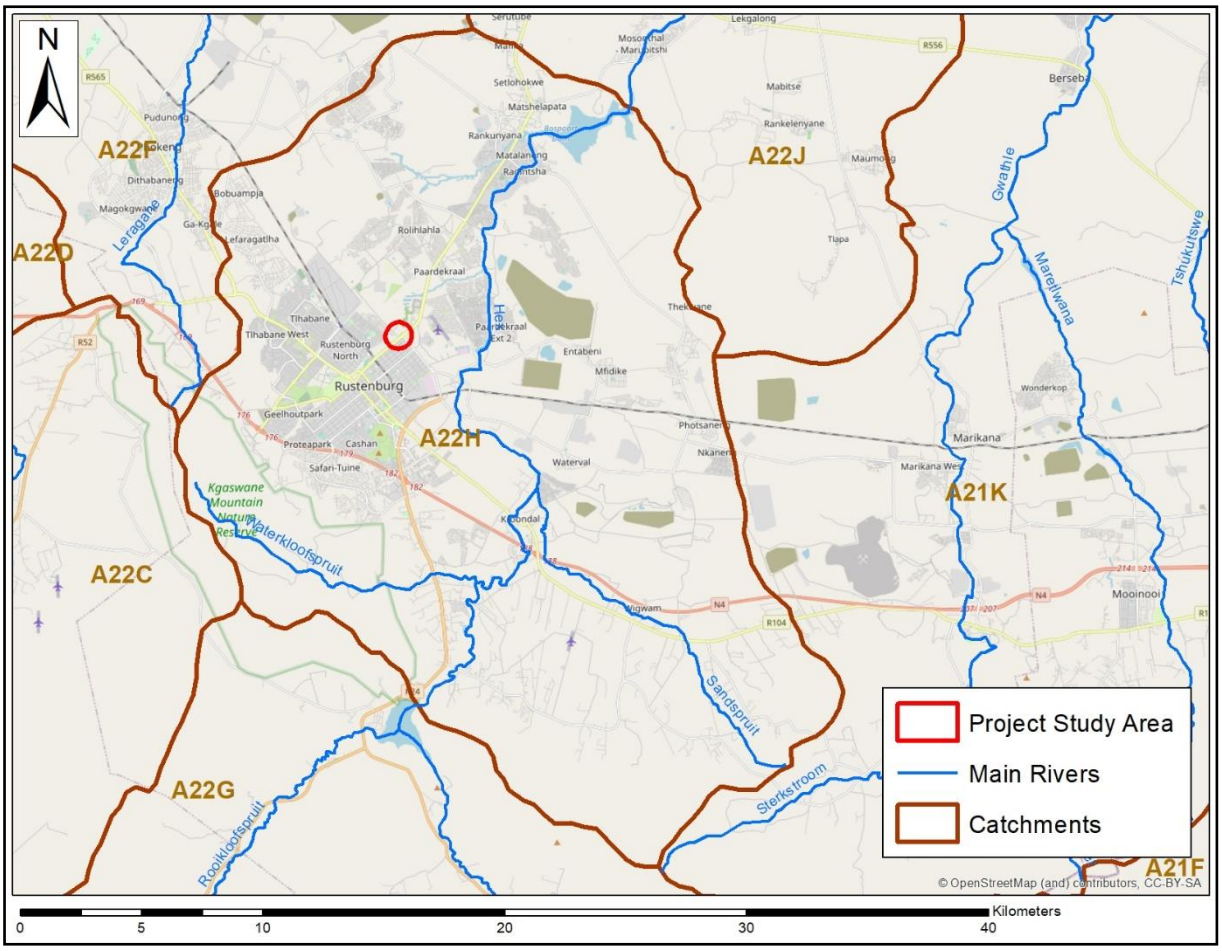


Figure 5-8 Map Showing the approximate location of the study area in relation to the quaternary catchment with principal rivers also illustrated (WCS Scientific, 2022)

The Hex River, located approximately 5km downstream of the study area and which forms the downstream receiving watercourse, is considered to be in a Present Ecological State of E (Seriously Modified) and of Moderate ecological importance and Moderate ecological sensitivity.

5.6.2 Riparian Delineation and Classification

Based on the National Wetland Map 5, a Seep wetland is expected to occur within the project study. However, the indicated Seep wetland is associated with the channel of the Dorpspruit River, and the typing of this river as a Seep wetland appears to be an error within the National Wetland Map 5 dataset.

Groundtruthing by WCS Scientific confirmed that a riparian habitat associated with the Dorpspruit was identified. The riparian habitat covers approximately 9.1 hectares within the project study area, which makes up 9.8 % of the site

Within the centre of the study area a tar road crosses the Dorpspruit via a high bridge structure, running southeast to northwest. The compressed air pipeline runs parallel to the tar road along its northern edge and is mounted on the bridge. Immediately east of the bridge the pipeline turns 90 degrees north, running along the edge of the riparian habitat. The powerline runs in parallel to the tar road on the southern side of the road, before turning across the road in a northerly direction and running roughly in parallel to the pipeline along the eastern edge of the riparian zone. Immediately downstream of the bridge the Dorpspruit is characterised by a shallow, largely unvegetated pool and vegetated banks.

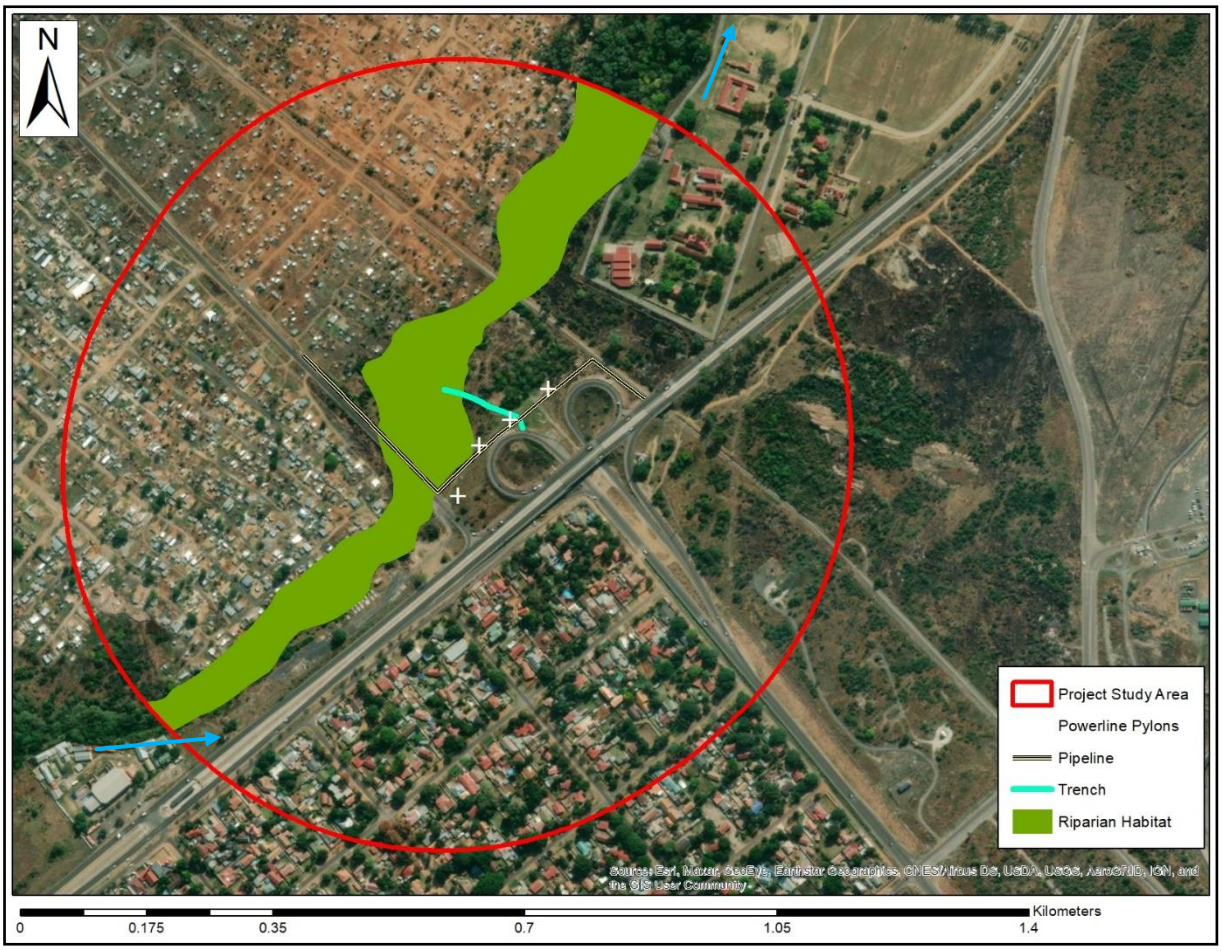


Figure 5-9 Map showing the extent of the delineated riparian habitat within the study area and immediate vicinity. Blue arrows indicate flow direction (WCS Scientific, 2022)

A short reach downstream (approximately 40m) the eastern bank is characterised by a sheer, eroding face with no riparian vegetation. At this point the eroding bank is approximately 2m from the nearest powerline stay and around 5-6m from the pipeline. Flow within the active channel was confined to a narrow flow path between low and banks, with a large vegetated point bar on the western bank. The channel enters a roughly 90 degree turn to the west roughly 80m downstream of the bridge. As this point the macro channel banks again become vegetated.

Figure 5-10 Photos showing the eroded riverbank and the proximity of the adjacent powerline poles and stays (WCS Scientific, 2022)

A review of historical aerial imagery on Google Earth was used to determine the progression of erosion on the eastern bank over time. (**Figure 5-11**).

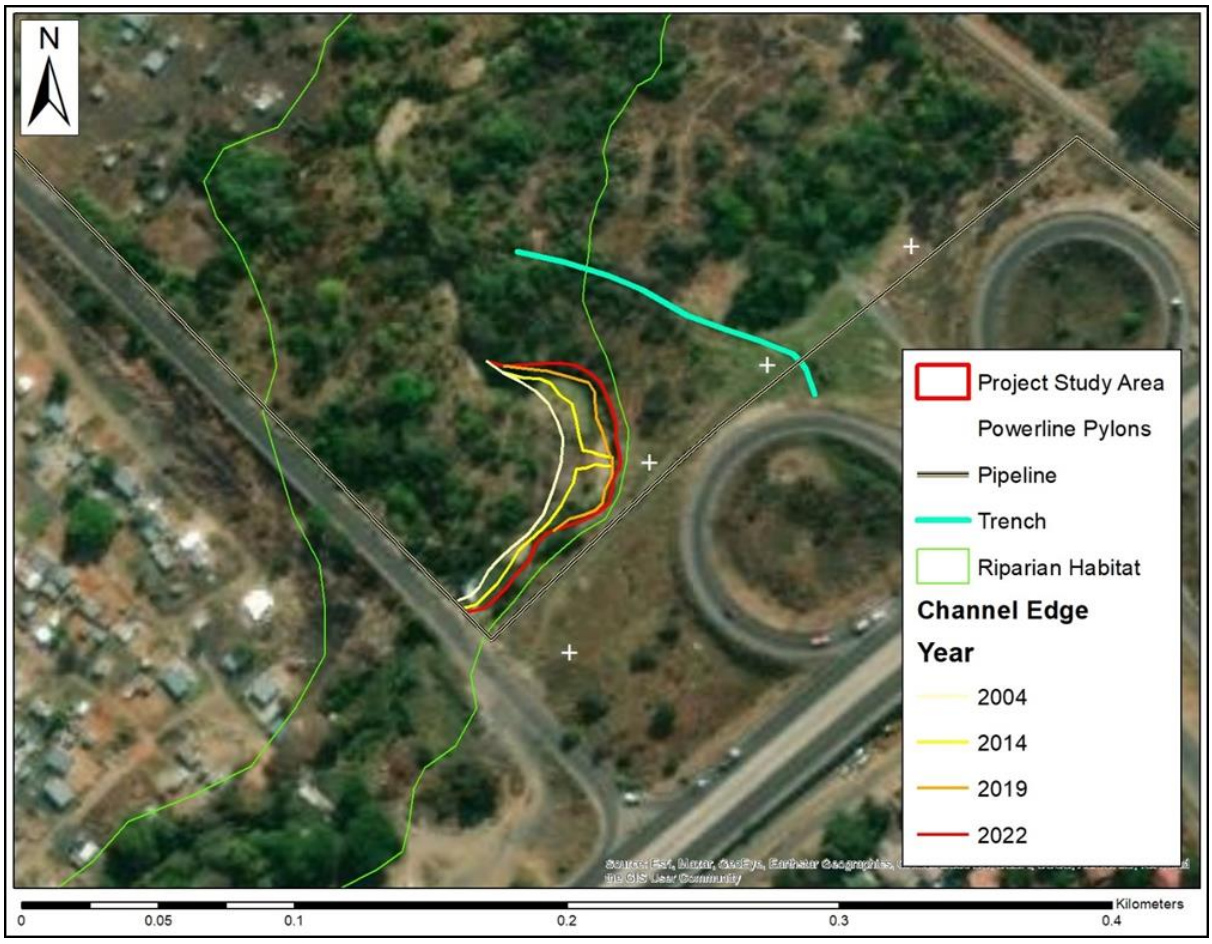


Figure 5-11 Map showing the change in the river channel edge over time, from 2004 to 2022. A clear north- and eastward migration of the channel bank towards the pipeline and powerline is evident (WCS Scientific, 2022)

Erosion of the eastern channel bank is already evident during the period from 2004 to 2013 (approximately a 9-year period), but it is clear that during the subsequent 9 year period (2013 to 2022) the progression of erosion has been significantly faster. A more detailed analysis shows that approximately during 2013/14 the adjacent road interchange was constructed, and a stormwater diversion trench appears to have been

excavated into the eastern bank of the river (refer to the light green line in **Figure 5-11**, as well as the Google Earth image in **Figure 5-12**). It is speculated that this may have created a nick-point that exacerbated the erosion of the bank. The most significant erosion event appears to have taken place between June 2016 and May 2017 (yellow and light orange lines in **Figure 5-11**), though further rapid erosion has also occurred in the subsequent years.

What appears evident from the review of historical imagery is that erosion of the bank is not occurring as a steady, continuous process, but rather appears linked to significant rainfall and runoff events during which rapid erosion takes place, followed by extended periods of limited or no erosion. This matches with observations during the field assessment where, during low flow conditions, no active erosion of the bank could be observed, and no elevated turbidity or sediment transport related to erosion of the eastern bank was evident within the Dorpspruit.

Figure 5-12 Two Google Earth images showing the changes that took place between Oct 2013 (top) and April 2014 (bottom), with specific emphasis on the stormwater diversion trench and damage to the eastern river bank

Further downstream the channel again turns sharply, this time in a northerly direction, before adopting a largely straight path northward for the next 250m, passing underneath a railway line bridge. An informal settlement has become established in very close proximity to the river channel in this reach. The active channel is much narrower in this reach, characterised by a series of slow-flowing pools and densely vegetated river banks.

The Dorpspruit enters the project study area from the south west as a confined, fairly straight and narrow channel with steep, densely vegetated banks. The river channel is characterised by a series of pools and shallow flowing sections with numerous sand banks and exposed bedrock in places. At least 2 low weir structures were observed across the stream channel upstream of the road bridge (refer to **Figure 5-13**, bottom row). Extensive littering was observed within the river channel and a strong sewage smell was evident.

Figure 5-13 Photos of the Dorpspruit and associated riparian habitat on site. Top photo shows a downstream view from the bridge. Middle row shows photos from a short distance downstream from the bridge. Bottom row shows photos from a short distance upstream of the bridge

5.6.3 Present Ecological Status (PES) Assessment

The PES assessment compares the current condition of a watercourse with its expected reference or natural conditions and rates the change on a scale of A to F as per **Table 5-2**.

Table 5-2 Table showing the rating scale used for the PES assessment (WCS Scientific, 2022)

Ecological Category	Description	Score (% of Total)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-89
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59

Ecological Category	Description	Score (% of Total)
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Critically modified. Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible	0-19

As no information is available on the reference state of the riparian habitat on site, historical aerial imagery of the area was used to determine the likely nature of the watercourse under natural conditions (**Figure 5-14**).

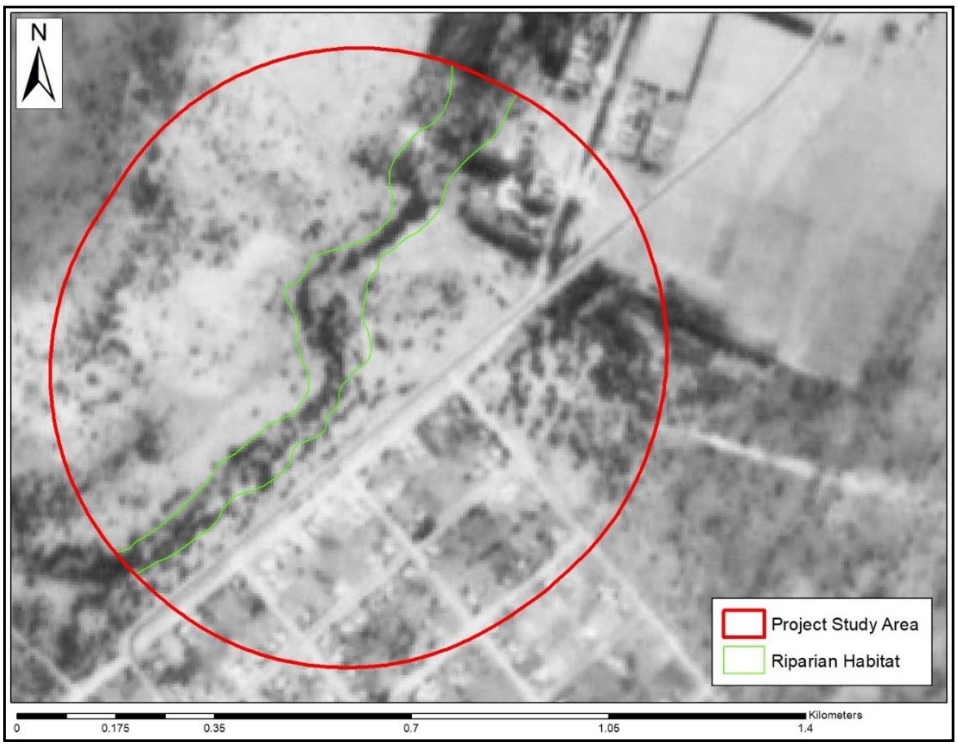


Figure 5-14 Historical aerial imagery from 1966 (Flight Plan 568) showing conditions within the project study area at the time

The earliest available imagery shows the presence of a residential areas, a number of roads and some cultivation in close proximity to the Dorpspruit, indicating that conditions illustrated on this image are likely already somewhat impacted and modified from the natural conditions. However, the image from 1966 indicates a riparian habitat of approximately the same extent as currently occurring on site, though the woody vegetation at the time appears noticeably sparser. The densification of trees within the riparian habitat could be a result of various causes, but likely includes the establishment and proliferation of alien species (which currently makeup a significant proportion of the woody vegetation on site), the exclusion of browsers and grazers, and likely also an altered fire regime. The image resolution makes it difficult to determine exact channel alignment of size, but indications are that the river channel at the time was smaller, less incised with vegetated banks, and an alignment (in the case of the reach immediately downstream of the current bridge) which is slightly further westwards than the current, and with a gentler curve westward downstream of the bridge.

In terms of the current situation, the riparian habitat on site is located on the outskirts of a large urban area, with a large proportion of the Dorpspruit sub-catchment affected by residential and industrial urban developments.

Figure 5-15 illustrates the location and extent of various land uses within the sub catchment. The most extensive land cover is defined as formal residential areas, which cover 35 % of the sub-catchment (**Table 5-3**), with a further 5 % of the sub-catchment covered by urban commercial land uses. Although more than 51% of the sub-catchment is still characterised by natural or largely natural vegetation (open woodland, natural grassland, dense forest and woodland, and natural rock surfaces), it is necessary to note that most of this natural vegetation is associated with the Magaliesberg Mountain Range and is located quite distant from the project study area.

The extensive urbanisation of the catchment has had significant impacts on flows within the Dorpspruit, with hardening of surfaces and urban discharges (e.g. surcharging sewers) resulting in increased surface runoff and flood flows. This has led to erosion within the Dorpspruit and an increase in channel competency (size) to accommodate the increased flows. Urban runoff is furthermore affected by a range of contaminants that lead to water quality impairment. On site this was evidenced by large litter loads within the river channel. Poorly functioning waste water infrastructure further impacts on water quality as leaking and surcharging sewers enter the Dorpspruit, with a clear sewage smell evident during the field survey.

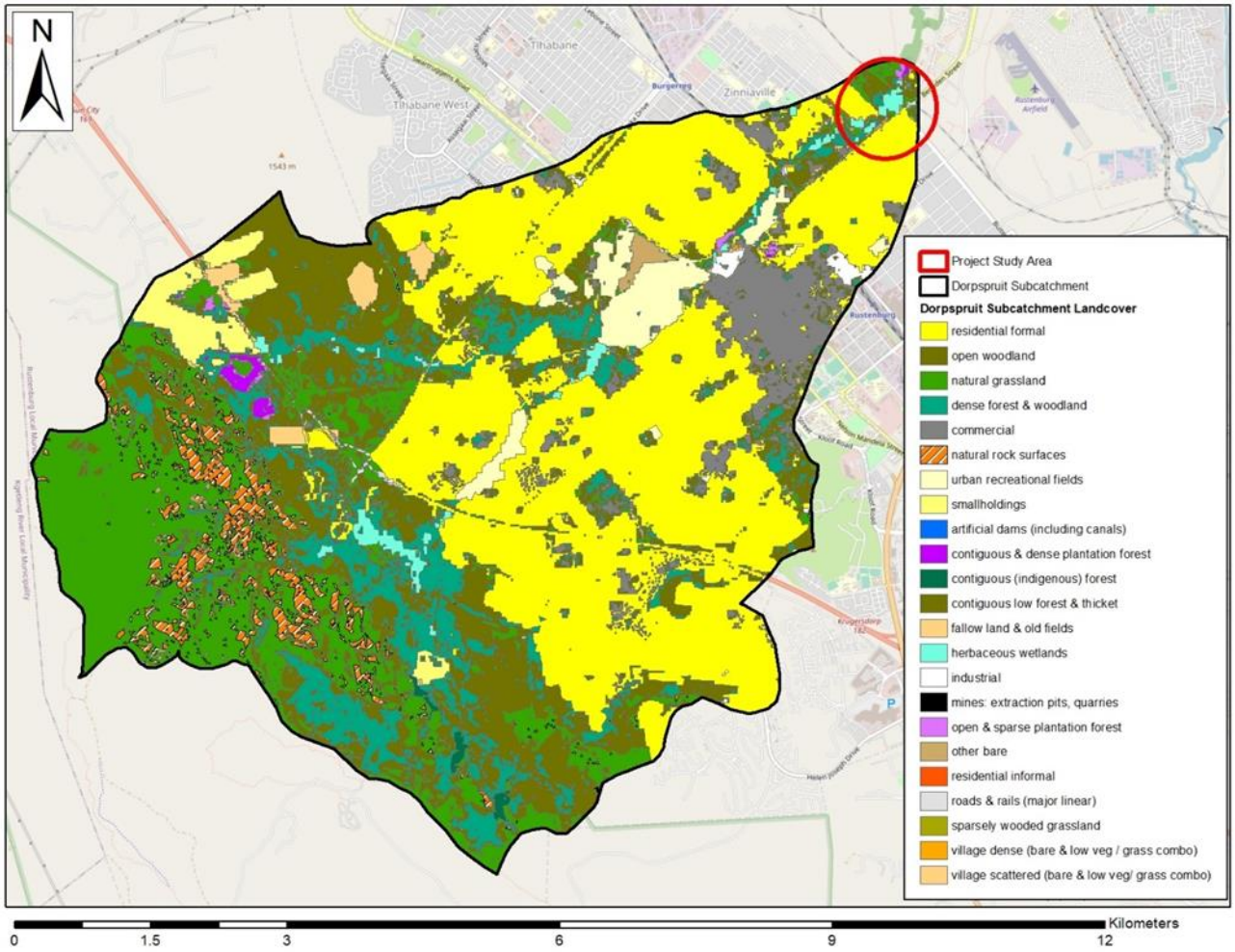


Figure 5-15 Map showing land uses within the Dorpspruit sub-catchment

Table 5-3 Summary of land use types and extent within the Dorpspruit sub-catchment (WCS Scientific, 2022)

Land Use Type	Area	%
Residential formal	1799.7	35%
Open woodland	1071.4	21%
Natural grassland	908.4	18%
Dense forest & woodland	476.1	9%
Commercial	235.8	5%
Natural rock surfaces	144.6	3%
Urban recreational fields	138.0	3%
Smallholdings	97.0	2%
All other land uses	211.8	4%

Based on the discussion it is clear that the Dorpspruit and associated riparian habitat on site has been significantly impacted on and modified by various activities. **The PES assessment revealed that the system is considered largely modified (PES category D), within an impact score of 43.1 %, indicating a borderline category D/E (largely to seriously modified) system**

5.6.4 Functional Assessment

In order to assess the ecosystem services provided by the affected section of the Dorpspruit riparian zone in greater details, the recently updated WET-EcoServices Version 2 assessment methodology was utilised to assess the affected riparian habitat. The method considers riparian habitatsin terms of 16 ecosystem services across groupings of Regulating and Supporting Services, Provisioning Services, and Cultural Services. Results of the assessment indicate the Supply and Demand for ecosystem services, with Supply indicating the ability of the focus riparian habitat to perform a specific ecosystem service, while Demand indicates the need for a particular ecosystem service based on within-habitat and surrounding land uses and impacts.

The results of the assessment(**Table 5-4**) revealed both the supply (ability of a watercourse to provide a specific ecosystem service) and demand for a range of ecosystem services. The nature of the affected reach of riparian habitat, which is strongly channelled and characterised by a relatively short retention time of flows within the reach limits the ability of the riparian zone to contribute towards certain of the ecosystem services assessed (e.g. the various water quality maintenance functions). Low scores in this regard are thus not unsurprising.

However, it is furthermore clear from the results that the degradation of habitat along the affected reach of the Dorpspruit has compromised the ability of the riparian habitat to provide ecosystem services, with most scores being either Very Low or Low.

It is considered that the most important function provided by the riparian habitat on site is as a refuge and movement corridor for wildlife within an extensively transformed landscape. The linear nature of riparian habitats allow them to function as ecological corridors, while within the largely urbanised and transformed sub-catchment the Dorpspruit riparian habitat provides virtually the only remaining natural habitat (especially the upstream reach). Activities that further fragment the riparian habitat through removal of indigenous vegetation cover place this ecosystem service at risk.

Table 5-4 Results of the WET EcoServices assessment for the affected reach of the Dorpspruit riparian habitat (WCS Scientific, 2022)

		Present State			
ECOSYSTEM SERVICE		**Supply**	**Demand**	**Importance Score**	**Importance**
REGULATING AND SUPPORTING SERVICES	Flood attenuation	2.4	1.3	1.5	Moderately Low
	Stream flow regulation	-	-	-	Very Low
	Sediment trapping	1.3	1.0	0.3	Very Low
	Erosion control	1.6	0.9	0.5	Very Low
	Phosphate assimilation	1.3	1.5	0.6	Very Low
	Nitrate assimilation	1.5	1.5	0.8	Very Low
	Toxicant assimilation	1.4	1.5	0.7	Very Low
	Carbon storage	1.3	2.7	1.2	Low

		Present State			
ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance
	Biodiversity maintenance	1.7	2.0	1.2	Low
PROVISIONING SERVICES	Water for human use	2.0	3.3	2.2	Moderate
	Harvestable resources	1.5	0.7	0.3	Very Low
	Food for livestock	2.0	0.3	0.7	Very Low
	Cultivated foods	2.8	0.0	1.3	Low
CULTURAL SERVICES	Tourism and Recreation	0.8	0.0	0.0	Very Low
	Education and Research	1.0	0.0	0.0	Very Low
	Cultural and Spiritual	2.0	0.0	0.5	Very Low

5.7 Aquatic Biomonitoring

Aquatic biomonitoring is undertaken by Sibanye-Stillwater for the ecosystems associated with the Rustenburg Platinum Mine (SRPM) mining areas as per the conditions of the Water Use License, with the Dorpspruit river system forming part of this assessment.

A summary of the results of the 2021 assessment (specifically for Dorpspruit), undertaken by the Biodiversity Company has been provided in this section. **Figure 5-16** provides the sampling points for the Dorpspruit.

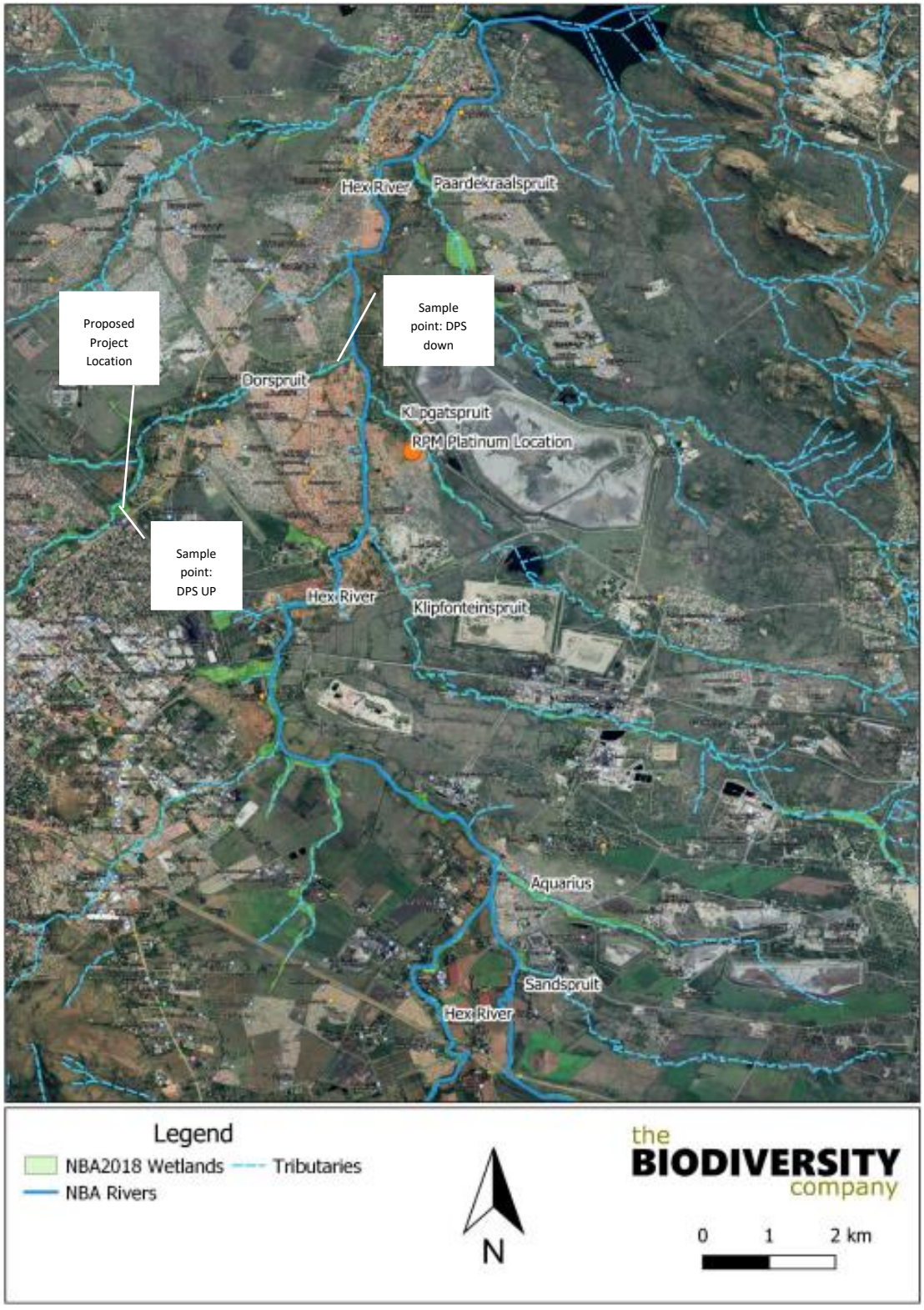


Figure 5-16 Locality Map illustrating the sampling points on the Dorspruit (TBC, 2021)

5.7.1 Water Quality

According to the aquatic biomonitoring undertaken by the Biodiversity Company (2021), elevated levels of Electrical Conductivity were detected, possibly due to the continued sewage effluent and solid waste disposal

within the river **(Table 5-5** & **Table 5-6**). For the purposes of this project, the lines highlighted with a red block is relevant to the Dorpspruit.

Table 5-5 In situ water quality results for the high flow survey (March 2021) (TBC, 2021)

Site	pH	Conductivity (mS/m)	DO (mg/l)	Temperature (°C)
WUL/TWQR	6.5-8.5**	80**	>5.00*	5-30*
H1	7.67	15.7	6.62	20.6
H-US-Sand	8.05	29.1	6.38	20.6
H-DS-Sand	7.78	91.7	5.60	20.8
Hex-00	7.51	98.8	6.33	19.3
H3	7.65	81.5	7.20	20.8
Hex01	7.72	74.0	6.01	19.8
Sand	7.67	214	4.41	20.6
K007	7.36	311	6.84	23.0
KF	7.73	302	4.16	20.6
KFD	7.60	443	4.70	22.0
H-US KF	7.66	90.3	8.10	20.4
H-DS KF	Monitoring data not available			
KGT	7.78	322	2.90	23.2
Hex03	7.94	108.6	3.20	22.3
Hex04	7.79	125	3.34	21.5
PDK-HUP	7.45	127	4.30	22.0
Hex4B	7.69	128	1.70	22.5
DPS Up	7.92	83.6	7.50	25.1
DPS Down	7.56	232	5.00	24.1

Levels exceeding recommended guideline levels are indicated in red

Table 5-6 In situ water quality results for the low flow survey (July/Sept 2021) (TBC, 2021)

Site	pH	Conductivity (mS/m)	DO (mg/l)	Temperature (°C)
WUL**/TWQR*	6.5-8.5**	80**	>5.00*	5-30*
H1	5.80	29.3	-	10.6
H-US-Sand	7.34	71.4	4.04	17.9
Hex-00	8.03	120	7.14	20.7
H3	7.79	79.7	10.2	11.7
Hex01	6.70	90.8	11.8	11.2
Sand	7.34	714	4.04	17.4
K007	7.07	164	-	8.3
KF	7.41	124	12.0	13.4
KFD	6.99	112	5.73	24.8
H-US KF	7.42	103	3.70	23.5
H-DS-KF	7.84	104	4.20	23.0
KGT	8.35	135	9.50	26.1
Hex03	7.23	116	0.97	19.5
Hex04	7.46	307	1.99	18.9
PDK-HUP	7.43	132	7.41	21.7
Hex4B	7.46	138	3.58	18.9
DPS Up	6.58	55.0	-	15.8
DPS Down	7.65	566	6.38	23.1

Levels exceeding recommended guideline levels are indicated in red

5.7.2 Integrated Habitat Assessment System

The Integrated Habitat Assessment System (IHAS) assess the availability of the habitat biotopes at each site and expresses the availability and sustainability of habitat for macroinvertebrates, this is a determined as a percentage, where 100% represents “ideal” habitat availability. The IHIA indicated that the instream habitat assessment revealed that the Dorpspruit is seriously Modified-Class E: The riparian habitat integrity of the Dorpspruit was determined to be largely modified (class D).

The central factors negatively effecting the watercourse were attributed to urban and industrial development and the location of an impoundment adjacent to the Rustenburg Correctional Services influencing the

physical and functional characteristics of the Dorpspruit. Cumulative impacts within the catchment were largely responsible for the large scale modification of the riparian habitats. Channel modification through urban development had resulted in the incision of the watercourse and the subsequent reduction of flood inundation of the riparian areas which has resulted in the alteration of the physical hydrology of the watercourse. Upstream impoundments had further compounded these impacts. Flow alterations as a result of increased runoff and discharge from local water users had added to the alteration of natural flow regime compounded by the impoundment adjacent to the Rustenburg Correctional Services. Alien vegetation, particularly non-woody weeds, had negatively impacted on the riparian vegetation condition. Solid waste dumping, burning and livestock disturbance were also noted within the riparian zone and have resulted in further modification to the watercourse. Catchment activities has negatively affected the water quality of the Dorpspruit with fluctuating dissolved solids considered modified from reference conditions.

5.7.3 South African Scoring System

The South African Scoring System version 5 (SASS5) is the current index being used to assess the status of riverine macroinvertebrates in South Africa. The index is based on the presence of aquatic invertebrate families and the perceived sensitivity to water quality changes of these families. Different families exhibit different sensitivities to pollution, these sensitivities range from highly tolerant families (e.g. Chironomidae) to highly sensitive families (e.g. Perlidae). SASS results are expressed both as an index score (SASS score) and the Average Score Per recorded Taxon (ASPT value). All SASS5 and ASPT scores are compared with the SASS5 Data Interpretation Guidelines (Dallas, 2007) for the Bushveld Basin Ecoregion. This method seeks to develop biological bands depicting the various ecological states and is derived from data contained within the Rivers Database and supplemented with other data not yet in the database. **Table 5-7** and **Table 5-8** provides the aquatic macroinvertebrate results. For the purposes of this project, the lines highlighted with a red block is relevant to the Dorpspruit.

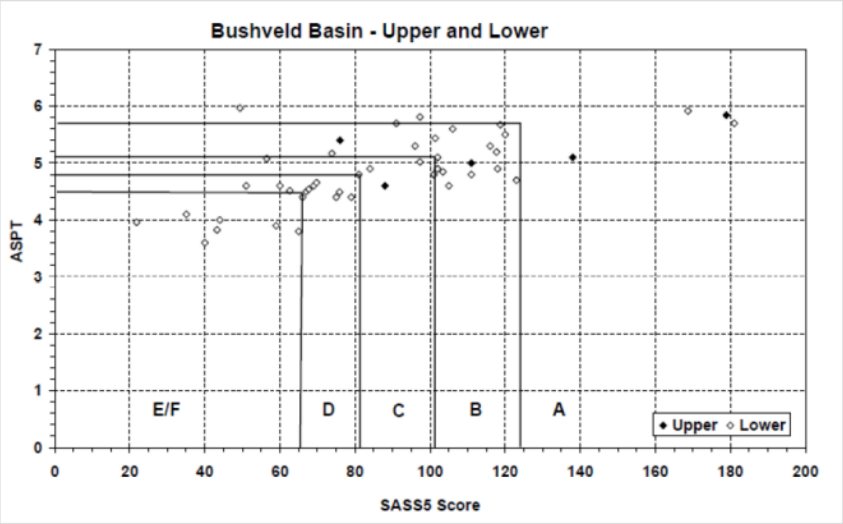


Figure 5-17 Guidelines used for the interpretation and classification of the SASS5 scores –Dallas 2007 (TBC, 2021)

Table 5-7 Macroinvertebrate assessment results recorded during the high flow survey (March 2021) (TBC, 2021)

Site	SASS Score	No. of Taxa	ASPT*	Category (Dallas, 2007)
H1	111	21	5.3	B
H-US-Sand	81	18	4.5	C
Hex-00	109	22	5.5	B
H3	97	19	5.1	C
Hex01	78	19	4.1	D
Sand	86	20	4.3	C
K007	76	18	4.2	D
KF	48	14	3.4	E/F
KFD	110	24	4.6	B
H-US KF	Sewage			
Hex03	97	19	5.1	C
Hex04	21	7	3.0	E/F
PDK-HUP	Overgrown with hyacinth			
Hex4b	20	6	3.3	E/F
DPS Down	85	18	4.7	C
DPS Up	92	19	4.8	C

Table 5-8 Macroinvertebrate assessment results recorded during the low flow survey (July/Sep 2021)

Site	SASS Score	No. of Taxa	ASPT*	Category (Dallas, 2007)
H1	99	18	5.5	B
Hex-00	101	24	4.2	B/C
H3	80	18	4.4	C
Hex01	19	6	3.2	E/F
Sand	27	7	3.9	E/F
K007	22	5	4.4	E/F
KF	41	12	3.4	E/F
KFD	54	13	4.2	E/F
H-US KF	Sewage			
Hex03	Sewage			
Hex04	16	6	2.7	E/F
PDK-UP	Overgrown with hyacinth			
Hex4b	14	5	2.8	E/F
DPS Down	43	13	3.3	E/F
DPS Up	18	6	3.0	E/F

As provided in **Table 5-7**, results recorded in the high flow survey translate to a C Category in terms of the Dallas Bands, meaning “moderately modified – moderately impaired. Moderate diversity of Taxa”). The high flow survey (**Table 5-8**) depicts an E/F category meaning “ seriously modified – Severely impaired. Only tolerant taxa present this is possibly due to the influx of sewage in the Dorpspruit.

5.8 Air quality

Main sources of air pollution in the study area include the following:

- Vehicle tailpipe emissions:
    - Atmospheric pollutants emitted from motor vehicles include hydrocarbons, CO, NOx, SO_2 and particulates;
- Wind-blown dust:
    - Wind erosion of exposed, open areas;
- Informal housing
    - Combustion pollutants such as CO, and $N0_2$ generated through burning wood and coal for cooking and heating purposes

5.9 Noise

As previously explained, the project area is situated adjacent to the R510 (Beneden Street) and Buiten Street interchange as well as an unnamed road towards the south-west of the site. Noise pollution is evident in the project area through road traffic noise.

5.10 Visual

The visual aesthetes of the project area have already been impacted on by the following:

- Dumping of solid waste
- Extensive erosion
- Gas pipeline
- Electricity pylon and powerline
- Informal housing

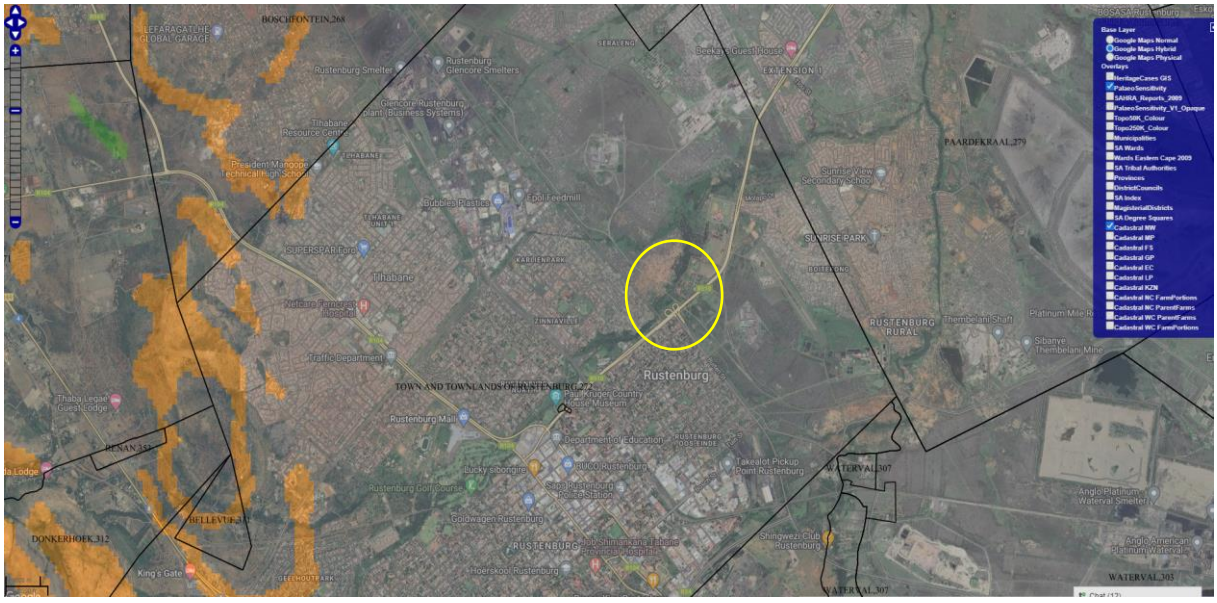
5.11 Heritage and palaeontology

5.11.1 Heritage

A Heritage Impact Assessment has not been commissioned as part of the proposed project. Refer to **Section 4.1.5** for the legal requirements pertaining to the Heritage Impact Assessment.

5.11.2 Palaeontology

According to the SAHRA Paleontological map the paleontological sensitivity of the study area is insignificant/Zero and no palaeontological studies are required. Refer to **Figure 5-18**.



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

Figure 5-18 Paleontological sensitivity of the study area as indicated on the SAHRA Palaeontological sensitivity map

5.12 Social

5.12.1 Demographic parameters

As stated previously, the proposed project is located in the Rustenburg Local Municipality. Information on socio-economic aspects was obtained from the Rustenburg Local Municipality's Integrated Development Plan (2022-2027).

With 719 000 people, the Rustenburg Local Municipality housed 1.2% of South Africa's total population in 2020. Between 2010 and 2020 the population growth averaged 3.03% per annum which is about double than the growth rate of South Africa as a whole (1.59%). Based on the present age-gender structure and the present fertility, mortality and migration rates, Rustenburg's population is projected to grow at an average annual rate of 1.7% from 719 000 in 2020 to 782 000 in 2022.

Rustenburg Local Municipality's male/female split in population was 120.9 males per 100 females in 2020. In 2020, the Rustenburg Local Municipality's population consisted of 90.32% African (649 000), 7.65% White (55 000), 0.92% Coloured (6 630) and 1.11% Asian (8 000) people.

In 2010, the unemployment rate for Rustenburg was 21.7% and increased overtime to 30.8% in 2020. Rustenburg Local Municipality employs a total number of 216 000 people within its local municipality. In Rustenburg Local Municipality the economic sectors that recorded the largest number of employment in

2020 were the mining sector with a total of 68 200 employed people or 31.6% of total employment in the local municipality.

5.12.2 Free basic water

Rustenburg Local Municipality has a total number of 76 800 (or 31.14%) households with piped water inside the dwelling, a total of 130 000 (52.66%) households had piped water inside the yard and a total number of 1 700 (0.69%) households had no formal piped water.

5.12.3 Sanitation

Rustenburg Local Municipality has a total number of 153 000 flush toilets (61.92% of total households), 29 700 Ventilation Improved Pit (VIP) (12.02% of total households) and 57 900 (23.47%) of total households pit toilets. Households by type of sanitation

5.12.4 Electricity

Rustenburg Local Municipality has a total number of 2 300 (0.93%) households with electricity for lighting only, a total of 212 000 (86.06%) households had electricity for lighting and other purposes and a total number of 32 100 (13.01%) households did not use electricity.

6 ALTERNATIVES CONSIDERED

6.1.1 Introduction

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. According to the above-mentioned, an alternative is defined as "in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

(a) property on which or location where it is proposed to undertake the activity;
(b) type of activity to be undertaken
(c) design or layout of the activity;
(d) technology to be used in the activity;
(e) operational aspects of the activity; and

Includes the option of not implementing the activity."

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. **Table 6-1** provides details of the alternatives considered.

Table 6-1 Alternatives considered for the proposed project

Alternative aspects	Reason for consideration or not
Property/location	Location alternatives were not considered for this assessment as the proposed project is specifically related to the stabilisation of the eroded Dorpspruit riverbank to prevent the risk of failure to the adjacent gas pipeline and electricity pylon.
Type of activity	The following two activity alternatives were considered: • Realignment of existing infrastructure • Erosion protection of the Dorpspruit riverbank
Design or layout	Options for the layout of the temporary material laydown area were considered.
Technology	Groynes and rip rap rock armoured channel were considered
Operational aspects	Not considered, as operational aspects are not applicable to the rock armoured channel.
No-go alternative	The no-go alternative was considered.

6.1.2 Alternative Assessment

6.1.2.1 Activity Alternatives

Activity alternatives are provided in **Table 6-1**.

Table 6-2 Activity alternatives (advantages and disadvantages)

Activity	Advantages	Disadvantages
Realignment of existing infrastructure **(not preferred)**	The re-alignment of the gas pipeline and the electricity pylon will not result in an impact on the Dorpspruit, as construction activities will not be undertaken within the active channel. These impacts include the following:	• The status of the eroded Dorpspruit river bank remains • The exacerbation of erosion continues

Activity	Advantages	Disadvantages
	• Temporary diversion of the river flow • Mobilisation of sediment • Spillages and leaks • Disturbance and loss of riparian habitat The risk of infrastructure failure will be eliminated and the health and safety of mine workers will not be compromised.	• Limited space within the existing servitude to re-route the infrastructure
Erosion protection of the Dorpspruit riverbank **(Preferred)**	The erosion protection measures will address the erosion problem that presently exists on the Dorpspruit riverbank and the risk of infrastructure failure will be eliminated. The health and safety of mine workers will not be compromised.	The construction of erosion protection measures could result in the following impacts: • Temporary diversion of the river flow • Mobilisation of sediment • Disturbance and loss of riparian habitat

As provided in **Table 6-1**, the preferred activity alternative was the erosion protection of the Dorpspruit riverbank.

6.1.2.2 Technology Alternatives

An Options Analysis was undertaken by HEES, 2022 as part of the conceptual design component. The following two options were assessed:

- Option 1 Groynes
- Option 2 Rip rap armoured channel **(Preferred)**

Table 6-3 Technology alternatives (HEES, 2022)

Option	Description	Advantages/Disadvantages
Option 1: Groynes	• A groyne is a wall-like structure constructed from the riverbank of a river some distance into a river, more or less perpendicular to the flow direction, with the objective of causing the water to flow some distance from the riverbank where the structures are built. • A groyne roughens the bank on which it is constructed and in doing so, creates a zone of lower flow velocity where the tendency for erosion is less and deposition greater. Typically eddy currents form in the pools between groynes where the water flows upstream along the bank. • By encouraging the deposition of sediment, groynes cause riverbanks to be restored rather than eroded. • Groynes are expensive to build and maintain but in combination with the re-establishment of indigenous	• High probability for vandalism – impact integrity of groyne • The integrity of groyne structure over time cannot be guaranteed - results obtained from groyne structures is variable and could perhaps not result in the desired outcome. Too many hydraulic uncertainties • Will require regular maintenance to address scour damage

Option	Description	Advantages/Disadvantages
	vegetation, can provide sustainable and ecologically acceptable solutions	
Option 2: Rip rap armoured channel **(Preferred)**	• Rip Rap armouring is often used to provide a stable lining to resist the erosion of stormwater channels due to swift flowing water or in curved channels because of the availability of the materials, relative ease of construction and low cost. • With Rip Rap armouring, layers of loose angular rock is placed on top of a geotextile membrane and the ability of these rock layers to deform and to remain effective even when limited undermining occur is a major advantage. • Rock diameter to be used are determined in such a manner that at least 50% of the individual rocks in mass should be able to resist being moved by the flowing water from the bed or sides of the channel. • It is common practice in South Africa to fill the voids between the large Rip Rap rocks with smaller size rocks and soil. This practice also encourage the reestablishment of vegetation on the channel banks and further makes it possible for animals to cross such an obstruction with ease.	• Low probability for vandalism • Hydraulic stable erosion protection alternative • Limited maintenance after extreme events

As provided in **Table 6-3,** due to the location of the Dorpspruit river being next to an informal settlement and easy access to the river, the use of groyne structures are not preferred as there is a high probability of vandalism of the groyne steel wire The groynes are also unattractive and can become a safety hazard for swimmers who might get trapped between the groyne and the riverbank. The **preferred alternative is Option 2: Rip rap armoured channel.** Detailed designs have been compiled for the rip rap rock armoured channel, which is provided in **Appendix E**.

6.1.2.3 Layout Alternatives

Layout alternatives were considered for the temporary material laydown area. The alternatives considered has been provided in **Figure 6-1**. The advantages and disadvantages for each alternative option has been discussed in **Table 6-4**.

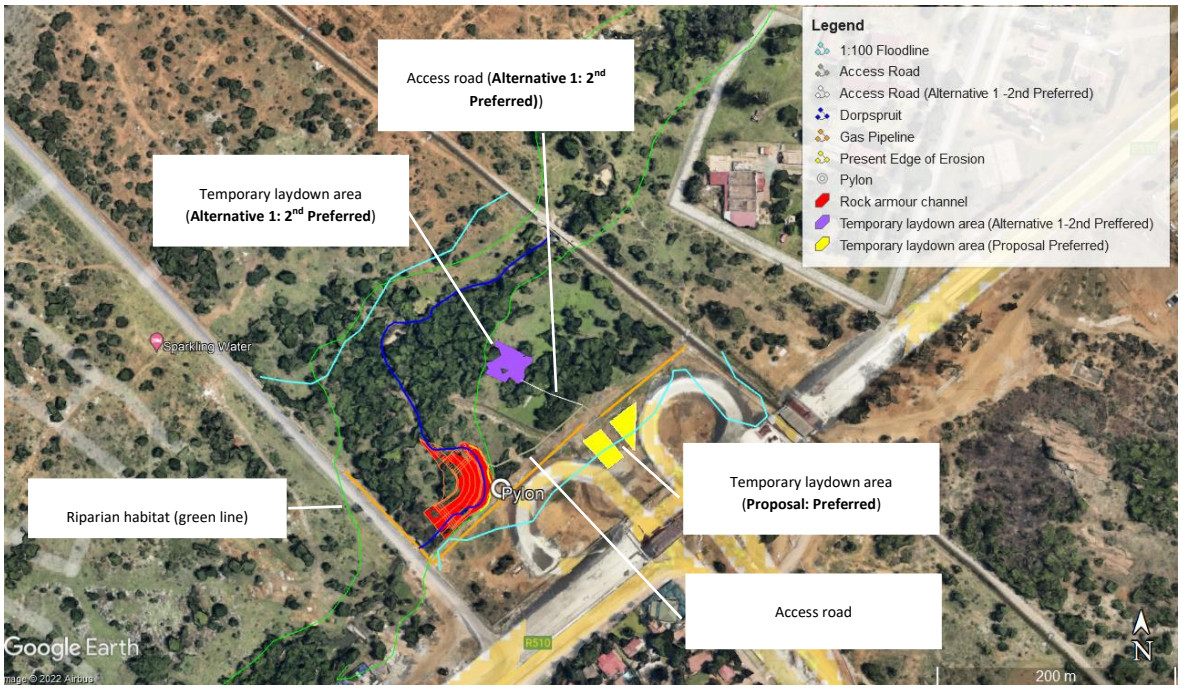


Figure 6-1 Google Earth image showing the alternative and preferred laydown area

Table 6-4 Layout alternatives (advantages and disadvantages)

Layout	Advantages	Disadvantages
Temporary laydown area **(Proposal Preferred)**	• Will be established in a pre-disturbed area • Situated within close proximity to the site access which is through Buiten street • Does not require the removal of any trees • Situated out of the riparian area	• Situated within close proximity to the R510 and Buiten Street interchange, however permission from the North West Department of Public Roads has been obtained.
Temporary laydown area (Alternative 1: second preferred)	No advantages could be linked to this alternative.	• Situated within 25m from the delineated riparian area • Situated in an area with limited disturbance • Requires the removal of indigenous vegetation and trees • The site is not easily accessible and an additional access road of approximately 60m will be required to

Layout	Advantages	Disadvantages
		access the temporary laydown area.

As provided in **Table 6-4,** the Temporary laydown area (Proposal) is preferred and consent from the North West Department of Public Roads has been obtained and provided in **Appendix D5**.

6.2 No-go option

The 'no-go' alternative is sometimes referred to as the 'no-action' alternative and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. The 'no-go' alternative is also regarded as a type of alternative but is discussed separately to emphasize its importance in the Environmental Impact Assessment process. Should the project not be implemented, there is a high risk of infrastructure failure as the riverbank continues to erode towards the electricity pylon and gas pipeline. Such infrastructure failure could result in health and safety risks of mine workers. Furthermore, should erosion measures not be implemented, this in turn will result in more aggressive erosion processes that further increases the tempo that the riverbank will alter its course. At some point the river channel will probably meet up with the stormwater channel and follow the stormwater channel temporarily back to the river. It is even possible that this erosion process will progress past the stormwater channel over time.

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Methodology to be used

The significance of the identified impacts will be determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and will be assessed according to methodology prescribed in the following section.

Table 7-1 Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating Scale and Description/criteria
MAGNITUDE of negative impact (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low** : Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity > 60 years. **3 - Medium term**: Impact might occur during the operational phase/life of the activity – 60 years. **2 - Short term**: Impact might occur during the construction phase - < 3 years. **1 - Immediate**
EXTENT (or spatial scale/influence of impact)	**5 - International**: Beyond National boundaries. **4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary. **0 -** None

Evaluation Component	Rating Scale and Description/criteria
IRREPLACEABLE loss of resources	**5 – Definite** loss of irreplaceable resources. **4 – High** potential for loss of irreplaceable resources. **3 – Moderate** potential for loss of irreplaceable resources. **2 – Low** potential for loss of irreplaceable resources. **1 – Very low** potential for loss of irreplaceable resources. **0 - None**
REVERSIBILITY of impact	**5 –** Impact **cannot** be reversed. **4 – Low** potential that impact might be reversed. **3 – Moderate** potential that impact might be reversed. **2 – High** potential that impact might be reversed. **1 –** Impact **will be** reversible. **0 –** No impact.
PROBABILITY (of occurrence)	**5 - Definite:** >95% chance of the potential impact occurring. **4 - High probability:** 75% - 95% chance of the potential impact occurring. **3 - Medium probability:** 25% - 75% chance of the potential impact occurring **2 - Low probability:** 5% - 25% chance of the potential impact occurring. **1 - Improbable:** <5% chance of the potential impact occurring.
Evaluation Component	**Rating Scale and Description/criteria**
CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Medium****:* The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. ***Low****:* The activity is localised and might have a negligible cumulative impact. ***None****:* No cumulative impact on the environment.

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per **Table 7-2** below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

Table 7-2 Scale used for the evaluation of the Environmental Significance Ratings

Significance Score	Environmental Significance	Description/criteria
125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.

Significance Score	Environmental Significance	Description/criteria
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project

7.2 Identified impacts

Most of the potential impacts identified for this project will take place during the construction phase of the project. The construction phase is expected to last approximately 7 months and therefore most of the impacts associated with this project is temporary in nature. As the proposed infrastructure will be permanent features, impacts during closure have not been assessed as part of the basic assessment process.

Several potential impacts are associated with the construction activities for this project. These impacts can be categorised as general construction related impacts as well as construction impacts specifically related to this site. General best practice rules to construction should be followed at all times. In addition to this, specific mitigation measures and recommendations are included to avoid or minimise the potential impacts identified. Potential impacts identified during the construction phase of the project is assessed in **Table 7-3.**

During the operational phase, potential impacts identified are associated with maintenance activities, and impacts are generally low even before the implementation of mitigation measures. However, the designs of the rip rap armoured channel require limited maintenance, which includes regular inspections to detect any signs of erosion, and dislodged stones. It is important to ensure that the rip rap channel is well maintained and consistent with the designs to provide the desired function. Potential impacts identified during the operational phase of the project is assessed **Table 7-4.**

Table 7-3 Identified impacts during the construction phase of the Dorpspruit riverbank rehabilitation

Construction Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Soils																				
Loss of soils due to erosion from cleared surfaces and compaction	Clearance of vegetation for construction of the rip rap rock armoured channel and temporary access road	6	2	1	3	3	3	45	M	Low	Negative	Vegetation clearing must be limited to as small an area as possible. No vegetation clearing beyond the western limit of the final rock armoured channel footprint. Construction activities must be undertaken during the dry season during low flows, if possible. A single access route to site must be identified and demarcated, with a preference in using the existing access and service roads. Access must be from the eastern river bank. Topsoil should be stripped and stockpiled for use during rehabilitation of the site after construction is completed.	2	2	1	1	1	2	14	L
Contamination of soils resources due to construction activities	Establishment of contractor laydown areas and haulage vehicles (vehicles transporting the rip rap from the material laydown area to the Dorpspruit)	4	2	1	3	3	4	52	M	Low	Negative	The material laydown area must be located outside delineated riparian habitat within previously disturbed areas. The laydown areas should be at least 25m from the delineated riparian area. The laydown area should be ripped and revegetated upon completion of use. Number of vehicles accessing site must be limited to as few as possible and only absolutely necessary vehicles and machinery to access site. Staff transport and LDV's to park on road verge or open area off site (southern side of tar road). All vehicles must be inspected for leaks and have an up-to-date service record prior to accessing the construction site. No servicing or cleaning of machinery and equipment on site. Ensure earth moving equipment such as TLBs, Graders, Loaders, etc. are in good working order and stored outside of the project area, within designated areas. Prevent any spills from occurring. Machines must be parked within hard park areas or dedicated storage areas with drip trays and must be checked daily for fluid leaks. Spill kits must be available on site to clean up any spills of hydrocarbons or other contaminants. Develop leak/spill procedure to clean up/remedy hydrocarbon spills. Temporary ablution facilities to be provided on site. Following completion of construction any access tracks/routes utilised that fall outside the footprint of already existing access/service tracks, as well as the laydown area must be rehabilitated. This must include removal of all waste, scarifying of compacted soils, landscaping/filling of ruts, and revegetation with locally occurring indigenous grass species.	2	2	1	1	1	2	14	L
Biodiversity – Flora and Fauna																				
Loss of natural vegetation and disturbance of riparian habitat	Vegetation clearing for laydown area, rip rap rock armoured channel and access road	6	2	2	2	2	5	70	M	Low	Negative	Clearing of vegetation should be limited to the footprint of the laydown area, access road, and rip rap rock armoured channel. No additional areas are allowed to be cleared beyond this footprint. No vegetation clearing beyond the western limit of the final rock armoured channel footprint. No indigenous trees to be felled/cleared unless such trees fall within the direct construction footprint. All invasive alien trees should be removed. Ensure re-vegetation of disturbed areas following completion of construction activities. Re-vegetation must take place within 1 week after completion of construction activities. Only indigenous and locally occurring species to be used during re-vegetation. Implement vegetation monitoring following completion of construction to ensure successful establishment of indigenous vegetation. Waste management as per Sibanye-Stillwater procedure must be followed and must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	4	2	1	2	1	5	50	M

Construction Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Spread and/or establishment of alien and/or invasive species	Vegetation clearing for laydown area, rip rap rock armoured channel and access road	6	2	2	2	2	4	56	M	Low	Negative	All alien invasive vegetation must be cleared and controlled on site. Cleared alien invasive vegetation to be disposed off at registered landfill. All vegetation cleared on site must be removed from site to a registered landfill. Alien trees that are felled must have their stumps removed or treated with a suitable herbicide Cleared areas must be rehabilitated with indigenous vegetation.	4	2	1	2	1	3	30	L
Loss of faunal habitat due to the disturbance within the riparian habitat	Vegetation clearing for laydown area, rip rap rock armoured channel and access road	6	2	2	2	2	4	56	M	Low	Negative	Construction impacts associated with the proposed project must be contained within the footprint of the demarcated areas as indicated on the final approved project layout plan. Intentional killing of any faunal species (in particular invertebrates and snakes) should be avoided by means of awareness programmes presented to the contractor. Any person found deliberately harassing any animal in any way should face disciplinary measures, following the possible dismissal from the site	4	2	1	2	1	3	30	L
Surface water (Dorpspruit)																				
Increase in turbidity and sedimentation through the mobilisation of sediment	Temporary diversion of the Dorpspruit Excavations within the Dorpspruit Infilling the banks of the Dorpspruit with excavated material	6	2	3	2	1	4	56	M	Medium	Negative	Construction activities must be undertaken during the dry season during low flows, if possible. Driving through flowing water must be avoided as far as possible. No disturbance to the riparian zone downstream of the outlet of the rock armoured channel. Temporary diversion channel must be excavated within the footprint of the final rock armoured channel. Sediment management measures must be installed to minimise mobilisation of exposed sediments and reduce turbidity. Hay bales and/or bidim fences or suitable alternatives to be used as sediment fences. Flow must be diverted away from active excavations. As far as possible, no excavations to be done in flowing water. A monitoring point, ATS08 Temp (25°38'47.93"S 27°15'13.27"E) should be monitored on a weekly basis for the standard set of analyses (incl. nutrients (PO_4 as P, NO_3 as N and NH_4 as N), SS, pH, EC, TDS, salts (Cl, Na, Ca, Mg and SO_4) and metals (particularly Fe, Mn, Cu and Ni) during the construction activities to inform impacts and mitigation measures. The channel must be inspected weekly up- and downstream during construction and any evidence of changes in erosion and sedimentation must be reported and mitigation measures must be investigated and implemented as necessary. Provision of adequate sanitation facilities located outside of the watercourse area. 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. Experienced site supervision must be present at all times to ensure compliance with construction method statement and recommended mitigation measures.	4	2	1	2	1	3	30	L
Alteration and concentration of flow		6	2	3	2	1	4	56	M	Medium	Negative		4	2	1	2	1	3	30	L
Increase erosion downstream		6	2	3	2	1	4	56	M	Medium	Negative		4	2	1	2	1	3	30	L
Water quality impact due to construction activities may result in the discharge of solvents and other industrial chemicals		6	2	3	2	1	4	56	M	Medium	Negative		4	2	1	2	1	3	30	L
Damage to Dorpspruit banks	Earthworks and shaping of the new channel	6	2	3	2	1	4	56	M	Medium	Negative	Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated riparian zone. Ensure that movement corridors enable fauna to migrate through the system Re-vegetation subsequent to construction activities shall be undertaken in line with the Plant Species Plan which forms part of the EMPr.	4	2	1	2	1	3	30	L

Construction Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Loss and disturbance of watercourse habitat and fringe vegetation		6	2	3	2	1	4	56	M	Medium	Negative		4	2	1	2	1	3	30	L
Increase in turbidity and sedimentation through the mobilisation of sediment	Placement of rock in the channel	6	2	3	2	1	4	56	M	Medium	Negative	Required rock must be responsibly sourced, ideally utilised from waste rock sources to reduce the waste rock storage area and need to source from third parties. Only uncontaminated hard rock to be used Rock must be adequately sized (as per the engineering) design to minimise mobilisation of rock during high flows. Only uncontaminated hard rock to be used, classification of the rock must be undertaken in terms of LCT and TCT values as well as the acid generation potential. Different size gradients will allow for biotope creation improved from the current status quo which is largely gravel, sand and mud due to the significant erosion and subsequent deposition. A single access route to site must be identified and demarcated. No turning circles within the riparian zone or river channel. Number of vehicles accessing site must be limited to as few as possible and only absolutely necessary vehicles and machinery to access site. Staff transport and LDV's to park on road verge or open area off site (southern side of tar road). The river channel must be accessed from the eastern side of the river. The channel must be inspected weekly up- and downstream during construction and any evidence of changes in erosion and sedimentation must be reported and mitigation measures must be investigated and implemented as necessary Driving through flowing water must be avoided as far as possible. All leftover rock to be removed from site. Only in situ or alternatively uncontaminated soil to be used for shaping the channel and infilling erosion. Landscaping of the channel banks must be undertaken to tie in seamlessly with the rock armoured channel. Rock armoured channel outlet must tie in seamlessly with the river bed downstream of the armoured channel. Ensure re-vegetation of disturbed areas as soon as possible (within 1 week) following completion of construction activities. Only indigenous and locally occurring species to be used during re-vegetation. Control of alien vegetation, specifically alien trees, following completion of construction (for a minimum period of 3 summer seasons). Following completion of construction activities, a suitably qualified ecologist should undertake an audit of the affected area and provide rehabilitation recommendations "if deemed necessary". Biomonitoring should continue at the sites in the Dorpspruit and be inspected by the specialists during each annual assessment.	2	2	1	1	1	2	14	L
Spillages and leaks from machinery and equipment		6	2	3	2	1	4	56	M	Medium	Negative		2	2	1	1	1	2	14	L
Water quality impact due to foreign material		6	2	3	2	1	4	56	M	Medium	Negative		2	2	1	1	1	2	14	L
Loss of aquatic biodiversity	Placement of rock in the channel Temporary diversion of the Dorpspruit Excavations within the Dorpspruit	6	2	3	2	1	4	56	M	Medium	Negative	Construction should take place in winter when water flow is low and most of the species have migrated to other areas rich in water (if possible). Aquatic biomonitoring to continue to be undertaken as per the SRPM Water Use License.	2	2	1	1	1	2	14	L

Construction Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
	Infilling the banks of the Dorsppruit with excavated material																			
Heritage																				
Impact on cultural heritage resources	Construction Activities As the activities will take place mostly within the watercourse, there are no impacts expected on heritage sites.	4	5	3	5	5	1	22	L	Low	Negative	Should features of paleontological (fossils) or archaeological significance (graves) be encountered during construction work, work must be immediately stopped and reported to a paleontologist or heritage practitioner so that an evaluation of finds can be made. The Contractor must be trained to recognise any heritage feature. Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on site	4	5	3	1	1	1	14	L
Noise																				
General rise in ambient noise levels	Noise generated from the construction vehicles and the construction activities. Increase noise levels will be experienced on site and are within the vicinity of the site.	4	2	2	1	1	4	40	M	Low	Negative	Construction may only occur during the day. Should construction have to continue after hours, all residents affected must be notified. All machinery and equipment must be maintained in good working order. The Contractor shall take preventative measures where practical to minimize complaints regarding noise and vibration nuisance from sources. All equipment shall be turned off when not in use. Assess and manage all noise complaints.	2	2	2	1	1	2	16	L
Air Quality																				
Change in ambient air quality	Vehicular movement and disturbance associated with construction activities may lead to generation of duct and exhaust gases from construction vehicles working on site will compromise the ambient air quality.	4	2	1	1	1	4	36	L	Low	Negative	The Contractor must provide and maintain a method statement for dust control. The method statement must provide information on the proposed source of water to be utilized and the details of the licenses and permits required. The construction site must be watered during the dry and windy conditions to control dust fallout Dust production must be controlled by regular watering of access roads and working areas, should the need arise. Other dust suppressant methods must also be considered to conserve water. Construction vehicles must adhere to low speeds to avoid the generation of dust on the construction site. All construction vehicles must be maintained to avoid adverse impacts on air quality as a result of a lack of maintenance.	2	2	1	1	1	2	14	L
Visual and Aesthetic impacts																				
Change in visual character of the site	Construction sites are generally unsightly and can affect an area's sense of place especially due to excavations, waste, rubble, storage of construction material etc.	4	2	2	1	1	4	40	M	Low	Negative	Clearly demarcate the construction site to limit the area of disturbance. Locate construction site and stockpiles in the least visible area. Remove all waste, including cleared vegetation from site as soon as possible unless the material will be reused on site. A dedicated area for the placement of waste must be identified and demarcated. The landscape must be rehabilitated in such a way that it corresponds to the surrounding landscape.	2	2	1	1	1	2	14	L
Traffic Impacts																				

Construction Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Impact on road conditions and traffic flow	Anticipated impact on traffic owing to construction vehicles and heavy vehicles delivering materials to site	4	2	1	1	1	4	36	L	Low	Negative	Construction vehicles are not to be parked on the roads thereby blocking the way to the neighboring properties. Clear signs should be displayed and entrance to the site indicating a construction site and turning construction vehicles. Ensure an appropriate access procedure to avoid backlog of traffic at the entry point to the site	2	2	1	1	1	2	14	L
Social																				
Benefits resulting from employment and income opportunities created by the riverbank stabilisation	During the construction phase, permanent and temporary employment opportunities will be created for the local residents.	4	2	2	2	1	3	33	L	Low	Positive	Develop a clear and concise employment policy prioritizing local employment Employ local works if qualified applicants with the appropriate skills are available. Purchase goods and services at a local level if available. Where possible, labour-based methods of construction should be used (eg for the placement of rocks)	4	2	2	2	1	3	33	L

Table 7-4 Identified impacts during the operational phase of the Dorpspruit riverbank rehabilitation

Operational Phase																				
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Soils																				
Failure of intervention leading to increased erosion	Large-scale failure of intervention, repair/rebuilding of intervention	4	4	2	2	2	2	28	L	Low	Positive	Ensure that rip rap rock armoured channel is properly maintained in order to minimise soil erosion. Any damage must be repaired within 1 month of being noted.	2	2	1	1	1	1	7	L
Biodiversity (Flora and Fauna)																				
Disturbance and loss of biodiversity and habitat	Inspections, repair and maintenance of rock armoured channel	4	4	2	2	2	2	28	L	Low	Negative	Herbaceous vegetation (grass and reeds) should be allowed to establish within the rock armoured channel and should not be removed.	2	2	1	1	1	1	7	L
Establishment of alien and/or invasive species	Inspections, repair and maintenance of rock armoured channel	4	4	2	2	2	2	28	L	Low	Negative	Alien/invasive vegetation must be cleared and destroyed immediately. Ensure that re-vegetation of cleared areas is established and free of alien/invasive species.	2	2	1	1	1	1	7	L
Surface water (Dorpspruit)																				
Water Quality impact Spillages and leaks from machinery and equipment Sediment mobilisation and increased risk of erosion	Inspections, repair and maintenance of rock armoured channel	4	4	2	2	2	2	28	L	Low	Negative	Rock armoured channel must be inspected at least twice per year, at the start of the wet season (October) and again in the middle of the wet season (January) as well as after every bank-full flood event. For the first rainy season inspections should occur on a monthly basis and issues raised, investigated, tracked and managed as per the existing Environmental Management System. Any damage must be repaired within 1 month of being noted. Monitoring of the downstream channel banks must be undertaken to ensure that accelerated erosion does not occur in the immediate downstream reach (up to the downstream railway bridge as a minimum). A water quality monitoring point should be established downstream for continued monthly monitoring post construction (ATS08B 25°38'42.00"S 27°15'16.53"E), as well as upstream (ATS08 25°38'53.00"S 27°15'10.00"E). ATS08 Temp should be maintained as a monthly monitoring point for the first rainy season after construction and thereafter based on the monitoring outcomes can be discontinued or maintained. Vegetation monitoring must be undertaken following completion of construction activities for a minimum period of 3 summer seasons to ensure establishment of suitable vegetation cover and species. At the end of the third season an assessment of the Present Ecological State should be undertaken for the affected reach.	2	2	1	2	1	1	8	L
Heritage																				
No additional impacts are expected during the operational phase.																				
Noise																				
No additional impacts are expected during the operational phase.																				

Operational Phase																					
POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/ REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance				Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	TOTAL	Significance
Air Quality																					
No additional impacts are expected during the operational phase.																					
Visual and Aesthetic impacts																					
No additional impacts are expected during the operational phase.																					
Traffic																					
No additional impacts are expected during the operational phase.																					
Social																					
Protection of Infrastructure	Maintenance of rock armoured channel	2	2	1	2	1	2	16	L	Low	Positive	Ensure that the infrastructure is well-maintained in working order.	2	2	1	2	1	1	8	L

7.3 Cumulative impacts

According to the NEMA EIA Regulations, 2014, cumulative impact in relation to an activity means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Construction and operational activities from the proposed project can result in several effects on the natural and social environment. Although many of these are direct, the environmental effects of individual activities can combine and interact with other activities in time and space which results in cumulative impacts. Effects from different activities could potentially accumulate to cause additional effects that may not be apparent when assessing the individual activities

Table 7-5 provides a summary of the potential cumulative impacts of the proposed project.

Table 7-5 Cumulative impacts

Aspect	Cumulative impact	Significance
Soil erosion	The construction of the rip rap channel will prevent further erosion of the riverbank, as the proposed infrastructure will improve the channels capacity to effectively manage stormwater	Low (-)
Biodiversity (Fauna & Flora)	Construction of the proposed development will temporarily disturb vegetation and faunal habitat in the development footprint areas however this will be addressed following rehabilitation.	Low (-)
Surface water (Dorpspruit)	Construction activities may result in cumulative impact to the watercourses within the local catchments and beyond. Should mitigation measure not be implemented unstable channel conditions may result in unintended changes to downstream hydrology.	Low (-)
Air quality	Cumulative dust generation in the area will increase due to construction activities, but will be limited to the construction phase only and is therefore considered a temporary impact. By implementing the proposed management measures, this impact will be well managed and will not have a lasting impact on the surrounding community.	Low (-)
Noise	Noise generated by the construction activities will add to the cumulative noise level. Construction activities, mainly earthmoving activities and movement of construction vehicles will add to the cumulative noise levels in the area. Noise pollution is evident in the project area through road traffic noise.	Low (-)
Heritage	As the proposed project will not impact on heritage features due to the proposed rip rap rock armoured channel being constructed within the Dorpspruit, no cumulative impact is expected.	Low (-)
Visual and Aesthetic impacts	The potential for cumulative impacts is low as construction will be temporary and there will be no negative legacies of the development left behind.	Low (-)
Traffic	Possible traffic congestion or delays if no mitigation measures are Implemented.	Low (-)

8 PUBLIC PARTICIPATION PROCESS

The NEMA (1998) EIA Regulations, 2014, as amended, prescribe that the Basic Assessment process must include the undertaking of public participation in accordance with the Chapter 6 of the Regulations. The purpose of the Public Participation Process is to provide all potential and / or registered Interested and Affected Parties (I&APs hereafter), including the competent authority and any other stakeholder or organ of state, an opportunity to become involved in the Basic Assessment process and provide comments during the various phases of the project. Involvement by I&APs is critical, as it contributes to a better understanding of the proposed project among I&APs, raises important issues that need to be assessed and provides local insight that will enhance the Basic Assessment process. This Section of the report provides details on the Public Participation Process followed during the Basic Assessment for the proposed project.

8.1 Pre-application Meeting with the Competent Authority

A pre-application meeting was held with the competent authority, the North West Department of Economic Development, Environment, Conservation and Tourism on the 17th of August 2022. During this meeting, the proposed project was introduced, and attendees were given the opportunity to raise any comments or concerns about the proposed project. The meeting was also used to discuss the authorisation requirements and whether a NEMA Section 30A: Emergency situation will be applicable due to the nature of the project. Minutes of the pre-application meeting as well as further correspondence with the Department is available in **Appendix D1.**

8.2 Identification of Interested and Affected Parties

Interested and Affected Parties (I&APs) were identified and notified through various means of online tools. Other activities that form part of the initial public participation phase include the placement of Site Notices, distribution of Background Information Documents as electronic versions by e-mail.

8.3 Project announcement

The proposed project was announced as follows:

- Distribution of Background Information Documents (BID) via email to the competent authority, commenting authorities and all identified stakeholders (refer to list in **Appendix D3**) on 1st September 2022. Refer to **Appendix D4** for a copy of the BID and **Appendix D5** for emails sent;
- Hard copy versions of the Background Information Document were distributed to adjacent landowners on 1 September 2022.
- Placing site notices on site and within close proximity of site. Refer to **Appendix D6** for a proof of site notices placed; and

8.4 Newspaper Advertisement

A newspaper advertisement was placed in the Rustenburg Herald on the 14th of October 2022 advertising the availability of the Draft BAR for public comment. The tear sheet is provided in **Appendix D7**.

8.5 Availability of the Draft Basic Assessment Report

The Draft BAR is currently available for public comment for a period of 30 days from 20th October 2022 to 21 November 2022. The availability of the report for comment was advertised in the Rustenburg Herald on 14th October 2022. The report is available at the following public places:

- Rustenburg Public Library - c/o Thabo Mbeki and Heystek streets, Rustenburg

- Alta van Dyk Environmental Consultants Office.

The Draft BAR is also available electronically on the AVDE website:

https://www.altavandykenvironmental.co.za/public-documents/

In addition, the Draft BAR is available on the data free app ULWAZI: https://ulwazi.datafree.co.

Comments received during the comment period of the Draft BAR will be included in the Comment and Response Report (CRR) and will be submitted with the Final BAR to the DEDECT for decision making. The comments and response report is provided in **Appendix D2**.

8.6 Final Basic Assessment Report

All comments obtained from stakeholders during the pre-application, announcement and Draft BAR comment periods, will be captured and addressed in the CRR. The CRR will be submitted as an Appendix to the Final BAR, to be submitted to the competent authority for review.

8.7 Decision

Once a decision regarding the environmental authorisation has been received from DEDECT, all registered stakeholders will be informed via email and SMS/WhatsApp text.

8.8 Legal requirements for public participation

Table 8-1 provides a review of the legal requirements for public participation in terms of the NEMA EIA Regulations.

Table 8-1: Legal requirements for public participation

NEMA Regulation	Public Participation Regulation	Process followed
39 (1)	If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.	The proponent and the landowner is not the same with regards to this application. The landowner is the Rustenburg Local Municipality and landowner consent has been obtained. Refer to **Appendix D9**.
40(1)(a)	The public participation process to which the- (a) basic assessment report and EMPr, and where applicable the closure, submitted in terms of regulation 19; and (b) scoping report submitted in terms of regulation 21 and the environmental impact assessment report and EMPr submitted in terms of regulation 23; was subjected to must give all potential or registered interested and affected parties, including the competent authority, a period of at least 30 days to submit comments on each of the basic assessment report EMPr, scoping report and environmental impact	The Draft BAR is currently available for public comment for a period of 30 days, from 20 October 2022 to 21st November 2022.

NEMA Regulation	Public Participation Regulation	Process followed
	assessment report, and where applicable the closure plan, as well as the report contemplated in regulation 32, if such reports or plans are submitted at different times.	
40(2)	The public participation process contemplated in this regulation must provide access to all information that reasonably has or may have the potential to influence any decision with regard to an application unless access to that information is protected by law and must include consultation with- (a) the competent authority; (b) every State department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation (c) all organs of state which have jurisdiction in respect of the activity to which the application relate; and (d) all potential , or where relevant, registered interested and affected parties.	The following state departments have been informed of the proposed project and is provided with an opportunity to comment on the Draft BAR: • North West Department of Mineral Resources and Energy (DMRE) • DWS • South African Heritage Resources Agency • North West Department of Agriculture and Rural Development • Department of Rural Development and Land Reform • Rustenburg Local Municipality • Bojanala District Municipally • North West Department of Public Works and Roads Refer to **Appendix D5 & D8** for correspondence.
40(3)	Potential or registered interested and affected parties, including the competent authority, may be provided with an opportunity to comment on reports and plans contemplated in subregulation (1) prior to submission of an application but must provided with and opportunity to comment on such reports once an application has been submitted to the competent authority.	
41 (2) (a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of— (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) any alternative site;	A2 notice boards were placed on site and within close proximity of site Refer to **Appendix D6** for proof of site notices.
41 (2) (b)	Giving writing notice to	
(i)	The occupiers of the site	BIDs were distributed to adjacent communities on the 1st of September 2021. BID's were also distributed electronically. Refer to **Appendix D4** for a copy of the BID, and **Appendix D5** for emails sent.
(ii)	Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken	

NEMA Regulation	Public Participation Regulation	Process followed
(iii)	The municipal councillor of the ward	A BID was emailed to Cllr Snyders who is the Councillor for Ward 43. Refer to **Appendix D5**.
(iv)	The municipality which has jurisdiction in the area	A BID was emailed to the following departments within the municipality: • Environmental • Planning and Human Settlement • Public Safety • Roads Management Refer to **Appendix D5**.
(v)	Organ of state having jurisdiction in respect of any aspect of the activity	BIDs were distributed via email to the following authorities: • DMRE • DWS • South African Heritage Resources Agency • North West Department of Agriculture and Rural Development • Department of Rural Development and Land Reform • Rustenburg Local Municipality • Bojanala District Municipally • North West Department of Public Works and Roads Refer to **Appendix D5**.
(vi)	Any other party as required by the competent authority	Not Applicable
41 (2) (c)	Placing an advertisement in one local newspaper	An advertisement was placed in the Rustenburg Herald on 14th October 2022 to announce the availability of the Draft BAR. Refer to **Appendix D7.**
41 (2) (d)	Placing an advertisement in at least one provincial or national newspaper, if the activity may have an impact that extends beyond the boundaries of the metropolitan or district municipality.	Not applicable. The activity does not have an impact that extends beyond the boundaries of the metropolitan.
41 (2) (e)	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage	None required to date.

NEMA Regulation	Public Participation Regulation	Process followed
41 (3)	A notice, notice board or advertisement must: (a) give details of the application or proposed application which is subjected to public participation; and (b) state: (i) whether a basic assessment or S&EIR procedures are being applied to the application (ii) the nature and location of the activity to which the application relates (iii) where further information on the application can be obtained the manner in which and the person to whom representations in respect of the application or proposed application may be made	A2 notice boards were placed on site and within close proximity of site Refer to **Appendix D6** for proof of site notices.

9 CONCLUSION AND RECOMMENDATIONS

Sibanye-Stillwater's infrastructure (gas pipeline and electricity pylon) functions as support infrastructure for the mining operations. The infrastructure is currently at risk due to the erosion of the eastern bank of the Dorpspruit. The eroded section of river channel will be addressed through the slight re-alignment of the current channel to a location closer to its original route through the provision of a rock armoured channel.

This Basic Assessment has identified and assessed the impacts that may emanate from the proposed construction of the rip rap rock armoured channel. Based on the summary of this Basic Assessment, it is a conclusion of this report that the proposed project will have moderate to low impacts on the bio-physical environment provided all mitigation measures detailed in this report as well as the EMPr are adhered to. Positive socio-economic impact such as employment opportunities will be realised.

In the undertaking of the of any Basic Assessment process, Public Participation is a legislative requirement as set out in the NEMA EIA Regulations. The Public Participation process involved sourcing of comments from I&APs. Consultation with all the key stakeholders was also undertaken to inform them about the proposed project. This Draft BAR will be issued out for a 30-day comment period, all comments received will be captured and addressed in the Final Basic Assessment Report.

9.1 Environmental Impact Statement

The Environmental Impact Statement is based on the following:

- Information provided by the client
- Principal findings made by the specialist
- The impact assessment as provided in the report
- The assumption that mitigation measures as provided in the report and the EMPr will be effectively implemented.

The findings of the Riparian Assessment undertaken by WCS Scientific revealed the following:

Hydrology

The proposed river protection measures will take place directly within the active channel of the perennial Dorpspruit River. Impacts to the river hydrology are therefore unavoidable. Construction will require the temporary confinement and diversion of flows within the active channel. The slight re-alignment of the river channel to an earlier flow path will very marginally shorten the overall flow path of the affected reach of the Dorpspruit, though this is unlikely to result in any measurable change. The re-shaped and rock-lined river channel that will be created will also differ in cross-sectional area and surface roughness from the current scenario. This is unlikely to have a significant impact on downstream reaches during normal flow, and based on the engineering designs the rip rap rock armoured channel will also result in similar flow velocities during high flows when compared to the current scenario.

In terms of the flow inputs to the Dorpspruit and associated riparian habitat, the proposed project activity is very localised in terms of the contributing sub-catchment and located within the river channel near the catchment outlet. No impact to flow inputs is thus expected as a result of the proposed river protection measures

Interflow, although not considered an important flow driver of the riparian habitat on site, will not be impacted by the proposed river protection measures. The project activities will take place within the active channel and any interflow that may occur on site will continue to feed into the river channel.

Shallow groundwater likely plays a role in supporting baseflow within the Dorpspruit. However, the proposed river protection measures taking place within the active channel of the Dorpspruit will not impact

on groundwater. Any discharge of groundwater occurring into the affected reach of the river channel will continue to do so. Should the affected reach be a losing reach, then the loss of surface water to groundwater would also still continue with the river protection measures in place.

Geomorphology

The proposed river protection measures will be constructed within the active channel of the river and will re-shape the river bed and banks for approximately 100 meters of the Dorpspruit, changing the channel form and impacting on river geomorphology. During construction, mobilisation of sediments from disturbed and unprotected river bed and bank sediments is likely to mobilise and be transported into downstream reaches. This will increase the overall sediment load of the Dorpspruit. As construction will take place during the dry season (low flow period), if possible, the sediment transport capacity of the flow may well be exceeded, resulting in such sediment being deposited in immediate downstream reaches, resulting in the smothering of instream vegetation and riffle/gravel habitats. Under the current scenario, erosion of the eastern river bank occurs, contributing to the sediment load within the Dorpspruit. Once river protection measures have been installed, the erosion of river banks within this reach of the Dorpspruit will be prevented, decreasing the overall sediment load of the river.

Water Quality

Construction activities could lead to an impact on water quality in one (or all) of three ways:

- Mobilisation of sediments from disturbed river bed and bank sediments resulting from construction earthworks, leading to increase turbidity and suspended solid loads;
- Mobilisation of contaminants associated with the rock material placed within the rock armoured channel; and
- Leaks and spillages from machinery used on site.

All of the above impacts are likely to be short-term in nature and will act on a river system with already significantly impaired water quality and aquatic biota. Few, if any, sensitive fish or aquatic macro-invertebrates are expected to occur within the affected reach of the Dorpspruit under current conditions, limiting the significance of this impact

During the operational phase, should the river protection measures fail and result in further erosion of the river bad or banks, the impact of increased sediment mobilisation into downstream reaches could persist over a longer timeframe

Vegetation

Construction of the river protection measures will require the complete removal of all vegetation within the direct footprint of the project activities, with further removal and disturbance of vegetation likely to occur around the periphery of project activities and along access routes to the affected reach of river channel. Post-construction, vegetation re-establishment within the rock armoured channel is likely to be impaired, at least initially until pore space between rocks have been filled with sediment. Vegetation re-establishment will also be limited to herbaceous vegetation, with no large woody species allowed to become established within the rock armoured channel as these could damage the structure.

Under the current scenario, the active channel of the Dorpspruit is characterised by herbaceous vegetation dominated by alien and pioneer species. Despite being mostly alien and pioneer species, this instream vegetation provides important habitat to aquatic biota. A number of woody species also occur within the affected reach, including the indigenous species *Searsia lancea* and *Ziziphus mucronata*, and the alien invasive species *Morus alba* and *Tipuana tipu* – these individuals will be removed during construction.

A superimposed sensitivity map is provided in **Figure 9-1**.

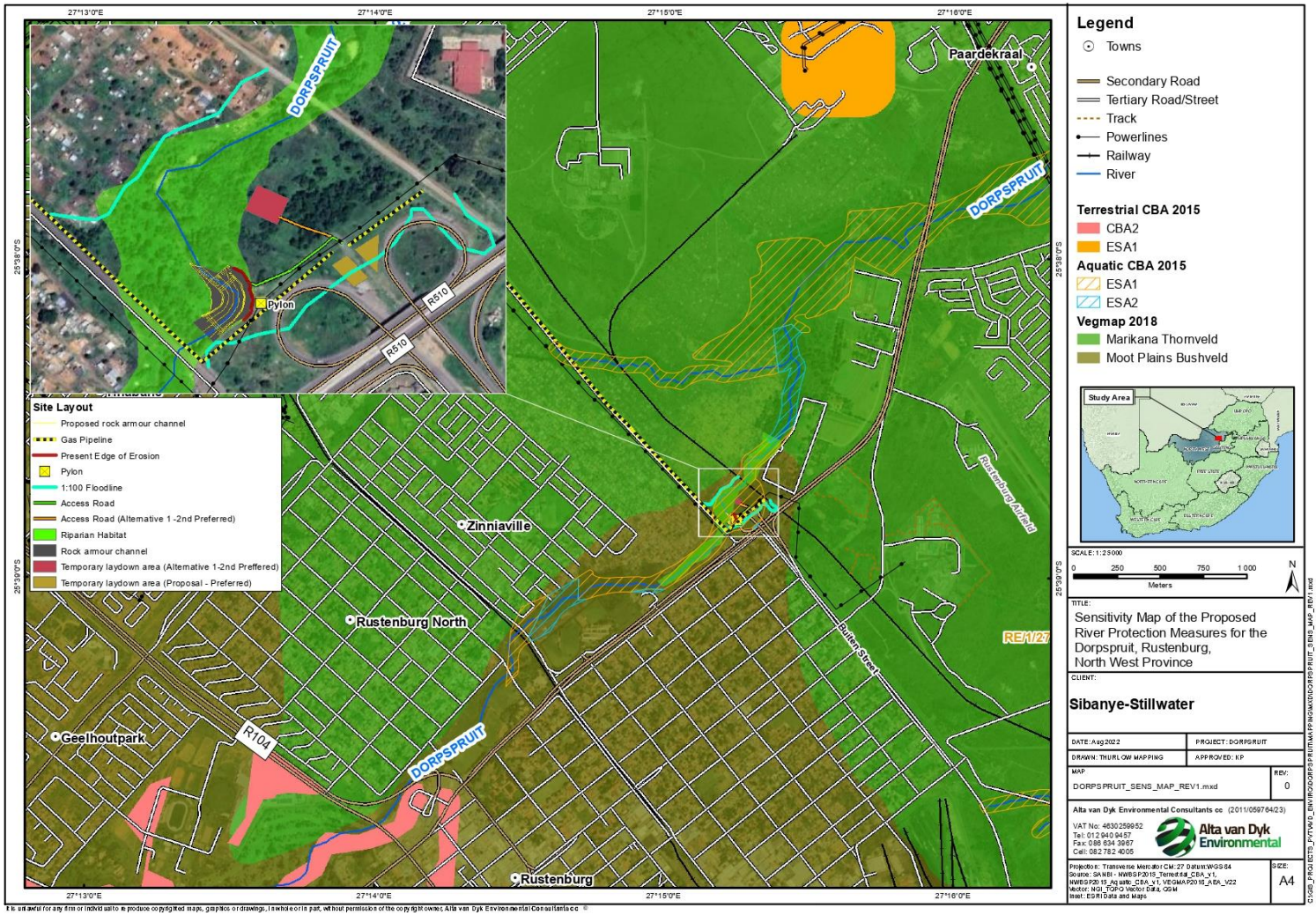


Figure 9-1 Composite Environmental Sensitivity Map

In proceeding within the project, it is therefore important that integrated environmental management be considered. Each of the impacts identified in this report can be mitigated by the measures as outlined in **Section 7** of this report as well as in the Environmental Management Programme attached as **Appendix F** of this Draft BAR.

This BAR has also considered the assessment of alternatives ranging from no-go alternatives, activity, layout and technology. Each were discussed in this BAR and the advantages and disadvantages presented. In terms of activity and technology alternatives, the construction of the rip rap rock armoured channel has been assessed as being the most feasible. In terms of the temporary laydown area the "Proposal" is the Preferred, and consent from the North West Department of Public Works and Roads has been obtained.

9.2 EAPs Recommendation

This BAR has provided a comprehensive assessment of the potential environmental impacts associated with the proposed activity. These impacts have been identified by the EAP and the specialist studies undertaken for the proposed development. The key findings of the Basic Assessment Process are discussed in this report. It is the recommendation of the EAP that the construction of the rip rap rock armoured channel be approved as this control is the most effective way of meeting the need and purpose of the proposed project. The impact assessment has revealed that the construction and operational phases of the proposed project will generate impacts of moderate to low significance after mitigation, but of positive significance from a social perspective.

The proposed project will ensure that critical infrastructure that support the mining operations will be safeguarded from failure. In addition, once river protection measures have been installed, the erosion of river banks within this reach of the Dorpspruit will be prevented, decreasing the overall sediment load of the river.

Taking into consideration the findings of the environmental impact assessment, the project benefits outweighs the negative impacts identified provided that mitigation measures are applied effectively. Impacts of high significance are not foreseen once proper mitigation measures have been implemented. It is therefore recommended that the DEDECT subject the proposed application to the following conditions:

a) An Environmental Control Officer must be appointed to monitor all construction activities and ensure the demarcation of all applicable areas and approve the locations of all infrastructure.
b) Adhere to all recommendations outlined in the specialist Reports, (Appendix E), the Environmental Management Programme in **Appendix F**, and the Plant Species Plan that forms part of the EMPr.
c) A single access route into the construction site (into the river channel) must be identified and demarcated. The river channel must be accessed from the eastern side of the river. No turning circles within the riparian zone or river channel.
d) Temporary diversion channel must be excavated within the footprint of the final rock armoured channel.
e) Vegetation clearing must be limited to as small an area as possible. No vegetation clearing beyond the western limit of the final rock armoured channel footprint.
f) Rock must be adequately sized to minimise mobilisation of rock during high flows (according to engineering designs).
g) A monitoring point, ATS08 Temp (25°38'47.93"S 27°15'13.27"E) should be monitored on a weekly basis for the standard set of analyses (incl. nutrients (PO_4 as P, NO_3 as N and NH_4 as N), SS, pH, EC, TDS, salts (Cl, Na, Ca, Mg and SO_4) and metals (particularly Fe, Mn, Cu and Ni) during the construction activities to inform impacts and mitigation measures.
h) The channel must be inspected weekly up- and downstream during construction and any evidence of changes in erosion and sedimentation must be reported and mitigation measures must be investigated and implemented as necessary.

i) Following completion of construction activities, a suitably qualified ecologist should undertake an audit of the affected area and provide rehabilitation recommendations, “if deemed necessary”. Biomonitoring should continue at the sites in the Dorpspruit and be inspected by the specialists during each annual assessment.

j) Vegetation monitoring must be undertaken following completion of construction activities for a minimum period of 3 summer seasons to ensure establishment of suitable vegetation cover and species. At the end of the third season an assessment of the Present Ecological State should be undertaken for the affected reach.

It is the recommendation of the EAP that the applicant, Sibanye-Stillwater RPM, be granted authorisation for the proposed stabilisation of the Dorpspruit riverbank subject to the conditions stipulated in the preceding section and that all Mitigation Measures provided in this report be strictly adhered to and closely monitored by an independent EAP to avoid adverse environmental Impacts.

9.3 Period which Environmental Authorisation is required

It is recommended that the period of validity for the Environmental Authorisation be stipulated as 5 years post Environmental Authorisation.

10 UNDERTAKING BY THE EAP

In accordance with Appendix 1 of the NEMA EIA Regulations, 2014, as amended, this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

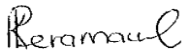
Section 3(1)(r)

An undertaking under oath or affirmation by the EAP in relation to-

(i) The correctness of the information provided in the reports;
(ii) The inclusion of comments and inputs from stakeholders and I&APs:
(iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and
(iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.

AVDE and the EAP managing this project hereby affirm that:

- To the best of our knowledge the information provided in the report is correct, and no attempt has been made to manipulate information to achieve a particular outcome. Some information, especially pertaining to the project description, was provided by the applicant and/or their sub-contractors.
- To the best of our knowledge, all comments and inputs from stakeholders and interested and affected parties have been captured in the report and no attempt has been made to manipulate such comment or input to achieve a particular outcome. Written submissions are appended to the report while other comments are recorded within the report. For the sake of brevity, not all comments are recorded verbatim and are mostly captured as issues, and in instances where many stakeholders have similar issues, they are grouped together, with a clear listing of who raised which issue(s).
- Information and responses provided by the EAP to interested and affected parties are clearly presented in the report. Where responses are provided by the applicant (not the EAP), these are clearly indicated.



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Signature of Environmental Assessment Practitioner

Alta van Dyk Environmental Consultants cc

Name of Company

Date : 12/10/2022

11 REFERENCES

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12 APPENDICES

APPENDIX A: CURRICULUM VITAE OF THE EAP

APPENDIX B: SCREENING TOOL REPORT

APPENDIX C: MAPS

APPENDIX D: PUBLIC PARTICPATION

APPENDIX D1: MINUTES OF PRE-APPLICATION MEETING AND CORRESPONDENCE - DEDECT

APPENDIX D2: COMMENT AND RESPONSE REPORT

APPENDIX D3: Stakeholder Register

APPENDIX D4: Background Information Document

APPENDIX D5: Notification Emails

APPENDIX D6: Site Notices

APPENDIX D7: Newspaper Advertisement

APPENDIX D8: Comments Received

APPENDIX D9: Landowner Consent

APPENDIX E: Specialist Studies

APPENDIX E1: Riparian Assessment

APPENDIX E2: Specialist declaration forms

APPENDIX F: Environmental Management Programme

APPENDIX G: Conceptual and Detailed Design