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Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP)

OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP): PROPOSED PHASE 2D RE-ALIGNMENT AS WELL AS THE PROPOSED MOOIHOEK BREAK PRESSURE RESERVOIR (BPR) AND ASSOCIATED INFRASTRUCTURE, IN THE FETAKGOMO TUBATSE LOCAL MUNICIPALITY, WITHIN THE SEKHUKHUNE DISTRICT MUNICIPALITY, IN THE LIMPOPO PROVINCE.

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NEMA requirements for Basic Assessment Reports ZUTARI		
Appendix 1	**Content as required by NEMA**	**Section**
3(a)	(i) details of the EAP who prepared the report; and	Control sheet, Section 1.2. Annexure A
	(ii) details of the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including -	Section 1.3 and Section 1.4.
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(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 at an appropriate scale, or, if it is -	Section 1 and Section 5.
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	NA
(d)	a description of the scope of the proposed activity, including -	Section 5
	(i) all listed and specified activities triggered;	Section 2.2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 5
(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 are to be considered in the assessment process; ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section 2
(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 5.9
(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 preferred alternative within the site, including -	Section 6
	(i) details of all the alternatives considered;	
	(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 4 and Annexure C
	(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 4.4, Annexure C
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 7
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 7
	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 3.2.2

	(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;	Section 5 and Section 6
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Section 6
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 6 and Section 8
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity 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; and (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 3.2
(j)	an assessment of each identified potentially significant impact and risk, including - (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (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;	Section 7
(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 7
(l)	an environmental impact statement which contains - (i) a summary of the key findings of the environmental impact assessment;	Section 7.5 and Section 8
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(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 7
(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 8.1
(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 8
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the	NA.

	activity will be concluded, and the post construction monitoring requirements finalized.	
(r)	an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; (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 or affected parties;	Annexure A
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information required by the competent authority; and	Email correspondence from the DFFE form part of Annexure B.
(2)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

ABBREVIATIONS

AEL	Atmospheric Emissions License
AIP	Alien Invasive Plant
AMSL	Above Mean Sea Level
ATS	Air Traffic Service
BA	Basic Assessment
BAR	Basic Assessment Report
BAS	Best Attainable State
BPR	Break Pressure Reservoir
CA	Competent Authority
CAA	Civil Aviation Authority
CARA	Conservation of Agricultural Resources Act, No. 43 of 1983
CBA	Critical Biodiversity Area
CB	Critical Biodiversity
CC	Corner Coordinate
CoGHSTA	Cooperative Governance, Human Settlements and Traditional Affairs
COLTO	Committee of Land and Transport Officers
CR	Critically Endangered
CRR	Comments and Responses Report
CV	Curricula vitae
DFFE	National Department of Forestry, Fisheries and the Environment
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DMRE	Department of Mineral Resources and Energy
DTM	Digital Terrain Model
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners' Association of South Africa
ECA	Environmental Conservation Act, No. 73 of 1989
ECO	Environmental Compliance Officer
EI	Ecological Importance
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Monitor
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EO	Environmental Officer
EPL	Ecosystem Protection Level
ES	Ecological Sensitivity
ESA	Ecological Support Area
ESS5	Environmental and Social Standard 5
ETS	Ecosystem Threat Status
FAR	Flying Area
FL	Flight Level
FTLM	Fetakgomo Tubatse Local Municipality
FPO	Fire Protection Officers
FPA	Fire Protection Association
GA	General Authorisation
GDP	Gross Domestic Product
GG	Government Gazette
GIS	Geographic Information Systems
GISSA	Geo-Information Society of South Africa
GLC	Ground Level Concentration
GN	Government Notice / General Notice
GRP	Grave Relocation Process
Ha	Hectares
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment

I&APs	Interested and Affected Parties
IAIAsa	International Association for Impact Assessment South Africa
IDP	Integrated Development Plan
IECA	International Erosion Control Association
IEIM	Integrated Environmental Information Management
IEM	Integrated Environmental Management
IFC	International Finance Corporation
ILP	Institute for Lighting Professionals
IPILRA	Interim Protection of Informal Land Rights Act, No. 31 of 1996
IS	Information Science
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KOP	Key Observation Point
KZN	KwaZulu-Natal
LC	Least Concern
LED_1	Local Economic Development
LED_2	Light Emitting Diode
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LEMA	Limpopo Environmental Management Act, No. 7 of 2003
LIHRA	Limpopo Provincial Heritage Resources Authority
LT	Least Threatened
LOS	Levels of Service
LVIA	Landscape and Visual Impact Assessment
LWUA	Lebalelo Water User Association
MCA	Multi-Criteria Analysis
MDGs	Millennium Development Goals
MPRDA	Mineral and Petroleum Resources Development Act, No. 28 of 2002
MTPA	Mpumalanga Tourism and Parks Agency
NBA	National Biodiversity Assessment
NCR	Noise Control Regulations
NDP	National Development Plan
NEC	New Engineering Contract
NEMA	National Environmental Management Act, No. 107 of 1998
NEM: AQA	National Environmental Management: Air Quality Act, No. 39 of 2004
NEM:BA	National Environmental Management: Biodiversity Act, No. 10 of 2004
NEM:PAA	National Environmental Management: Protected Areas Act, No. 57 of 2003
NEM:WA	National Environmental Management: Waste Act, No. 59 of 2008
NFA	National Forests Act, No. 84 of 1998
NFEPA	National Freshwater Ecosystems Priority Areas
NHRA	National Heritage Resources Act, No. 25 of 1999
NIP	National Infrastructure Plan
NMT	Non-Motorised Transport
NNR	No Natural Remaining
NPAES	National Protected Areas Expansion Strategy (2008)
NRTA	National Road Traffic Act, No. 93 of 1996
NSR	Noise Sensitive Receptor
NT	Near Threatened
NWA	National Water Act, No. 36 of 1998
OLS	Obstacle Limitation Surface
OMMP-BRWSP	Olifants Management Model Programme Bulk Raw Water Study Phase
ONA	Other Natural Areas
ORWRDP-2	Olifants River Water Resources Development Project
PA	Protected Areas
PDA	Palaeontological Desktop Assessment
PES	Present Ecological State

PFA	Project Focus Area
PLC	Programmable Logic Controllers
PM	Particulate Matter
PPP	Public Participation Process
PS	Performance Standard
PSDF	Provincial Spatial Development Framework
PWL	Sound Power Level
QDS	Quarter Degree Square
RAL	Roads Agency Limpopo
RAP	Resettlement Action Plan
REC	Recommended Ecological Category
RMO	Recommended Management Objective
RoD	Record of Decision
RQS	Resources Quality Services
RRoD	Revised Record of Decision
SAAQIS	South African Air Quality Information System
SAATCA	South African Auditor and Training Certification Authority
SABS	South African Bureau of Standards
SACAA	South African Civil Aviation Authority
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANRAL	South African National Road Agency
SANS	South African National Standards
SCADA	Supervisory control and data acquisition
SDF	Spatial Development Framework
SDGs	Sustainable Development Goals
SDM	Sekhukhune District Municpality
SED	Socio-economic Development
SHE	Safety, Health, and Environmental
SIA	Social Impact Assessments
SIP	Strategic integrated Projects
SKA	Square Kilometre Array
SMME	Small, Micro, and Medium Enterprises
spp	Species
SPLUMA	Spatial Planning and Land Use Management Act, No. 16 of 2013
SQR	Sub-quaternary Catchment Reach
SSV	Site Sensitivity Verification
STI	Sexually Transmitted Infections
SuD	Sustainable Urban Drainage
SWMP	Stormwater Management Plan
SWSA	Strategic Water Source Area
TCTA	Trans-Caledon Tunnel Authority
TIA	Traffic Impact Assessment
ToR	Terms of Reference
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
VAC	Visual absorption capacity
VIA	Visual Impact Assessment
VU	Vulnerable (VU)
WCMR	Waste classification and Management Regulations
WMA	Water Management Area
WML	Waste Management License
WRC	Water Resources Commission
WSA	Water Service Authority
WTW	Water Treatment Works
WUL	Water Use Licence
WULA	Water Use License Application
ZNJV	Zutari Ndodana Joint Venture
ZoR	Zones of Regulation
ZVI	Zone of Visual Influence

1 INTRODUCTION

The Lebalelo Water User Association (LWUA) appointed the Zutari Ndodana Joint Venture (ZNJV) for the provision of professional services for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP).

1.1 PROJECT OVERVIEW

Phase 2 of the Olifants River Water Resources Development Project (ORWRDP-2) is a Department of Water and Sanitation (DWS) project, which underwent an environmental impact assessment (EIA) process and obtained a positive Record of Decision (RoD) from the Department of Environmental Affairs (DEA)[1] in 2006 in terms of the Environmental Conservation Act, No. 73 of 1989 (ECA). After many appeals by large organisations, including the Kruger National Park, the Minister decided to grant the Revised RoD (RRoD) (ref: **03/2/4** and **12/12/20/553**), dated 16 October 2006 (refer to **Annexure J**).

The approved ORWRDP-2 consists of various phases as defined below (refer to **Figure** 1-1**)**. These were previously implemented by the Trans-Caledon Tunnel Authority (TCTA). The phases are designed and implemented in a phased manner, depending on need and availability of finances. For this reason, phase specific Environmental Management Programmes (EMPrs) are developed and submitted for approval to the Competent Authority (CA).

a. **Phase 2A:** Construction of De Hoop Dam
b. **Phase 2B:** Pipeline from Flag Boshielo Dam to Pruissen near Mokopane (72 km)
c. **Phase 2B+:** Consists of a raw water pipeline from Pruissen Reservior to the proposed Sekuruwe Water Treatment Works (WTW), including offtakes to the proposed Mokopane WTW and two commerical user offtakes.
d. **Phase 2C**: Pipeline from De Hoop Dam to Mooihoek
e. **Phase 2D:** Pipeline from Steelpoort to Mooihoek (24 km)
f. **Phase 2E**: Pipeline from Mooihoek to Havercroft Junction (14 km)
g. **Phase 2F:** Pipeline from Havercroft Junction to Olifantspoort (44 km)
h. **Phase 2G**: Possible second pipeline parallel to Phase 2B
i. **Phase 2H**: Changes and additions to the current Phase 2H (Lebalelo Network); and
j. **Phase 2I**: Pipeline from the De Hoop Dam to the proposed Eskom Tubatse Pump-storage Hydro-electric Scheme.

The ORWRDP-2 has since been reconstituted to become the OMMP-BRWSP in recent years, with the LWUA acting as the implementing agent for the following portions of the project, with the focus of this Basic Assessment Report (BAR) being on Phase 2D:

k. Phase 2B
l. Phase 2B+
m. Phase 2D[2]; and
n. Phase 2F

Furthermore, since inception, the project has acquired the status of strategic importance, and recently on 05 March 2023 the project was classified as a Strategic Integrated Project (SIP) under the SIP 19 (i.e., Water and Sanitation Infrastructure Portfolio). As such, it is critical that the project must be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act, No. 23 of 2014. The purpose of this piece of legislation is to provide facilitation and coordination of public infrastructure development which is of economic significance or social importance in South Africa and to ensure that infrastructure development in the country is given priority in planning, approval, and implementation.

[1] Now referred to as the Department of Forestry, Fisheries and the Environment (DFFE).
[2] Changes in this phase will be administratively implemented as Phase 2H.

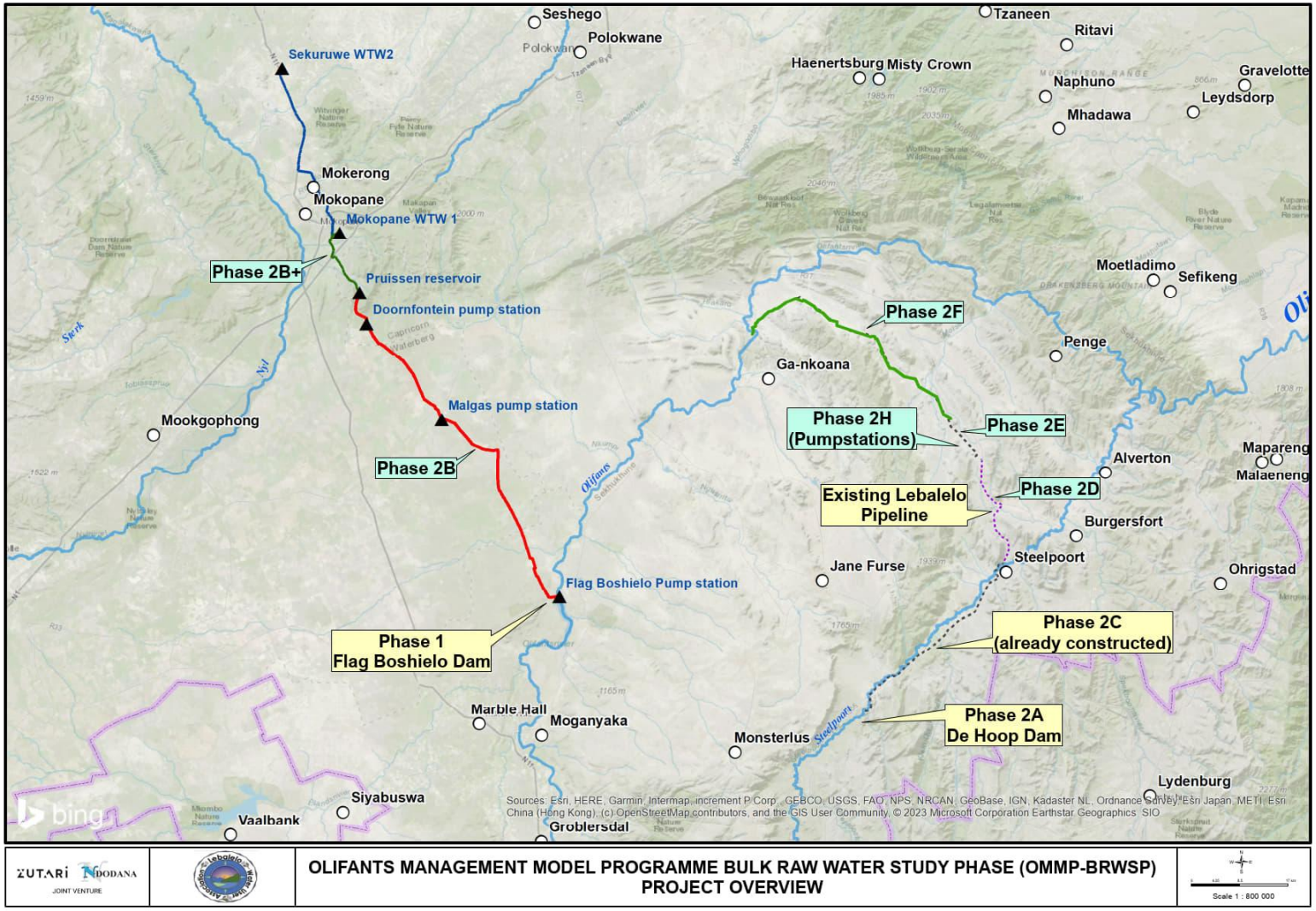


Figure 1-1: Map indicating the alignment of the different pipelines for the various Phases. The Northern Limb includes Phases 2B and 2B+ while the Eastern Limb consists of the phases in the east section of the project (i.e., Phases 2H, 2F, 2E and 2D).

1.2 DESCRIPTION OF PHASE 2D

This comprises a 24 km long pipeline with a diameter of 1,200 mm from Steelpoort Pump Station to Mooihoek, including a new Break Pressure Reservoir (BPR) on portion 8 of the farm Groothoek 256 KT, situated on land owned by Pulana Maroga Traditional Authority. Phase 2D incorporates the existing Lebalelo Scheme, currently consisting of a gravity pipeline from Mooihoek to Steelpoort, through which the flow will be reversed to reduce the capacity required in the new Phase 2D pipeline. The Steelpoort Pump Station essentially comprises two pump stations in one structure: pumps serving the existing Lebalelo pipeline, as well as pump sets pumping into the proposed Phase 2D pipeline towards Mooihoek.

The approved 2016 EMPr (ref: **14/12/16/3/1/9/21**) (see **Annexure J**) included the development of the new Ga-Mathipa reservoir close to the existing Mooihoek reservoir. Due to scope changes, cost elements, and the proposed phased approach of developments for the Phase 2D projects, the construction of the Ga-Mathipa reservoir will be shelved. Instead, the new proposal includes the construction of the BPR on portion 8 of the farm Groothoek 256 KT.

Phase 2D specifically affects the Fetakgomo Tubatse Local Municipality (FTLM). A general layout of all the project phases and pipeline alignments is illustrated in **Figure** 1-1 above. Phase 2D, is the easterly pipeline alignment indicated by the dotted purple line. For this application, LWUA, on behalf of the DWS, seeks authorisation for the raw water pipeline segment from the Mooihoek Reservoir to the proposed Mooihoek[3] BPR (approximately 2.79 km in length), the BPR itself, and associated infrastructure. This includes a section in the center of the alignment, approximately 1 km in length, which has been encroached upon since the EA was granted in 2016. Additionally, authorisation is requested for the required access and internal roads necessary for the construction and operation of the entire Phase 2D alignment.

The proposed current Phase 2D changes are illustrated in more detail in **Figure** 1-2, **Figure** 1-3, **Figure** 1-4 and **Figure** 1-5[4] below.

[3] Referenced as the *Groothoek BPR* in the specialist reports compiled to support this assessment.

[4] This deviation, by itself, does not trigger any listed activities.

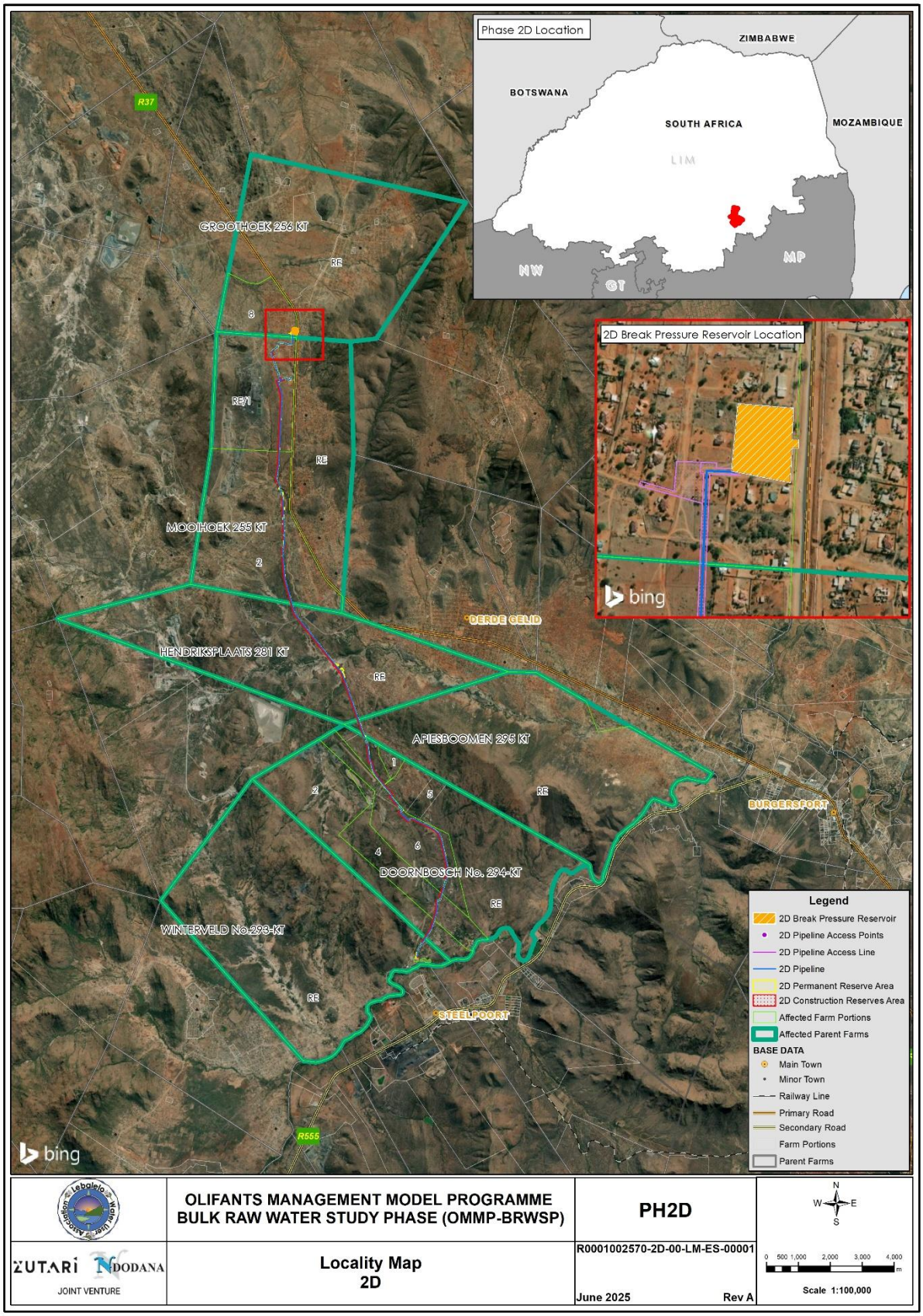


Figure 1-2: Locality Map of the current Phase 2D pipeline alignment.

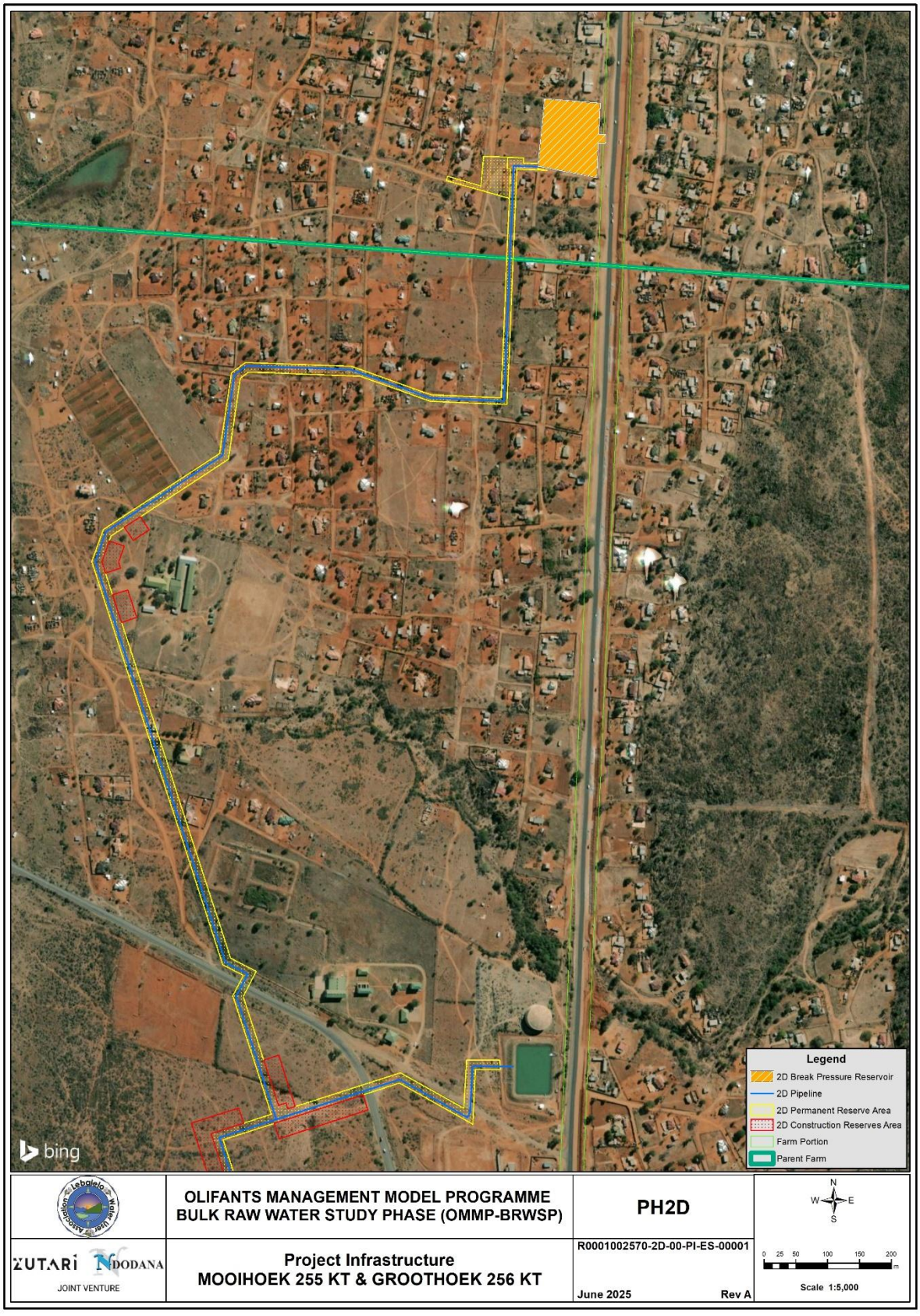


Figure 1-3: Map indicating the proposed infrastructure changes in Phase 2D (northern section).

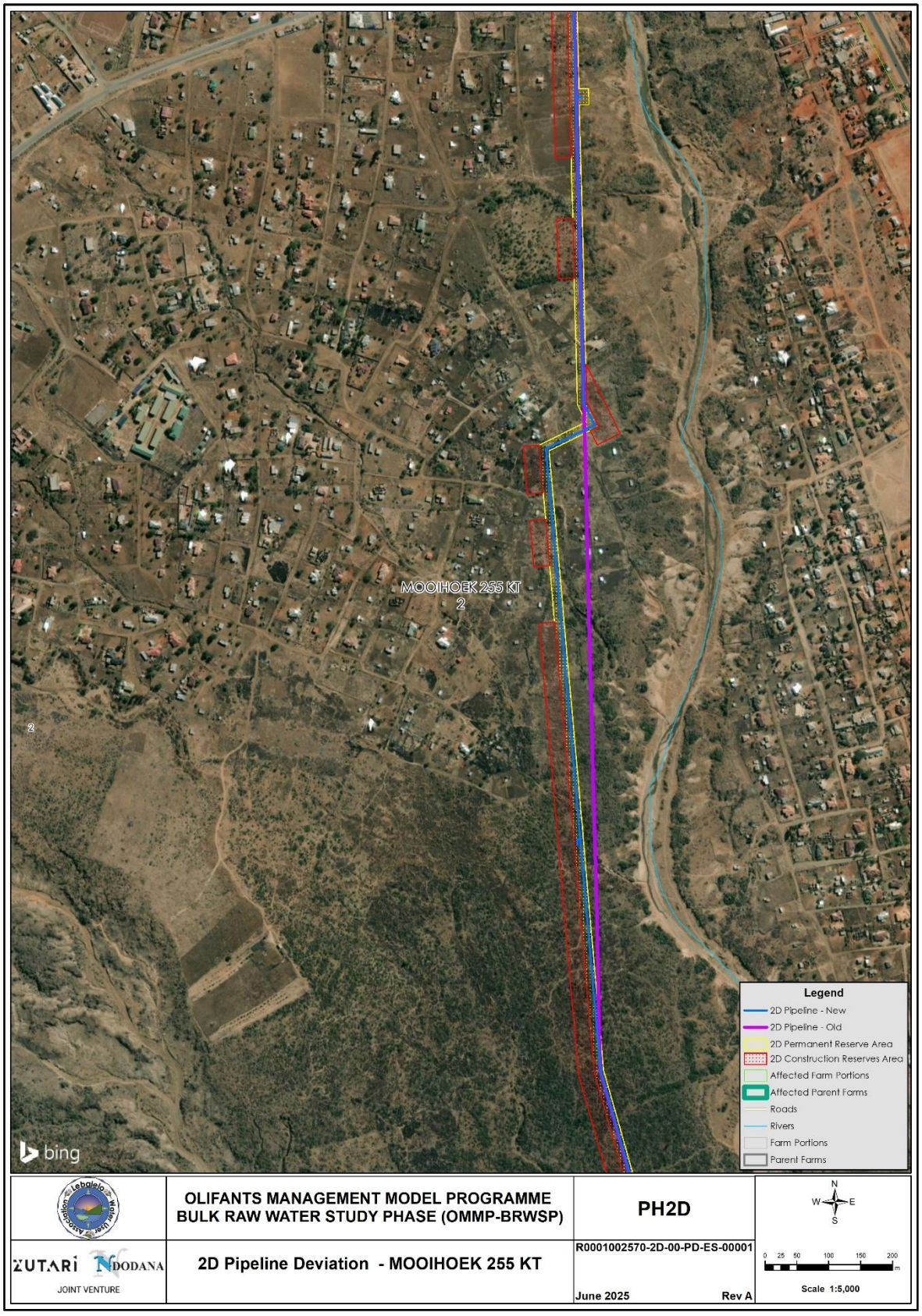


Figure 1-4: Map indicating the proposed infrastructure changes in Phase 2D (central section).

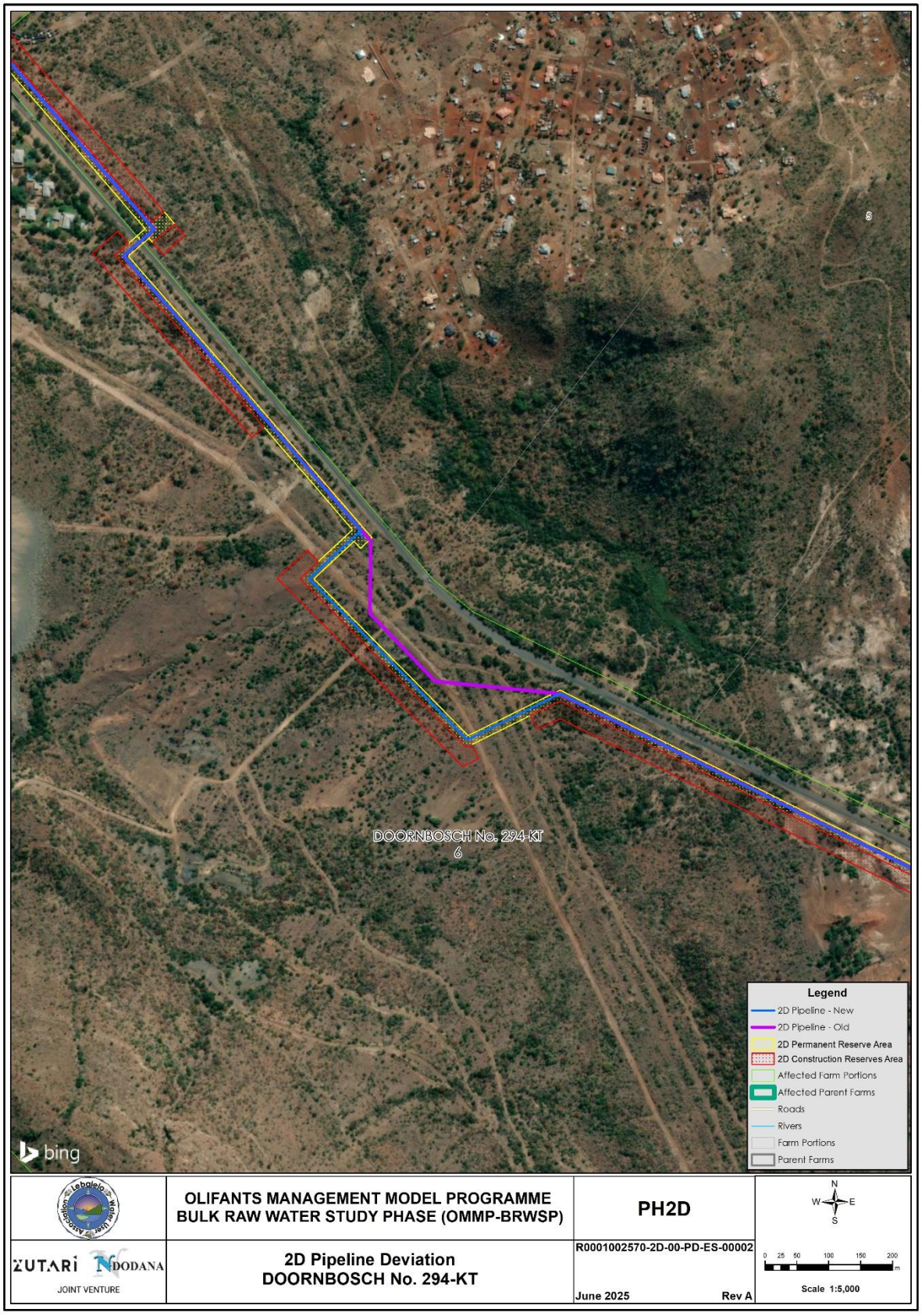


Figure 1-5: Map indicating the proposed infrastructure changes in Phase 2D (southern section).

1.3 REQUIREMENTS OF AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Section 24 of South Africa's National Environmental Management Act, No. 107 of 1998 (NEMA) pertains to Environmental Authorisation (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the CA. The EIA Regulations of 2014 [General Notice (GN) R982 of 2014] published under NEMA prescribe the process to be followed when applying for EA, while the Listing Notices [Listing Notice 1 (GN R983 of 2014), Listing Notice 2 (GN R984 of 2014), and Listing Notice 3 (GN R985 of 2014)] contain those activities that may not commence without an EA.

Several listed activities outlined in the NEMA Listing Notice 1 and Listing Notice 3 are expected to be triggered by the construction of the newly proposed infrastructure of Phase 2D, along with the associated access and internal roads. Consequently, these activities require authorisation by means of a Basic Assessment (BA) process as outlined in Regulations 19 - 20 of the EIA Regulations of 2014 (GN R982 of 2014).

The CA is the DFFE, as the Applicant, the DWS, is a Government Parastatal company [an entity of public-private collaboration under the National Water Act, No. 36 of 1998 (NWA)] established in terms of Section 92(1) of the NWA. The implementing agent, LWUA, was established in terms of Section 92(1)(a) of the NWA, as per the notice published in Government Gazette (GG) No. 89/23053. The Limpopo Department of Economic Development, Environment and Tourism (LEDET) will be the commenting authority.

1.4 LEGAL REQUIREMENTS AS PER THE EIA REGULATIONS, 2014 FOR THE UNDERTAKING OF AN IMPACT ASSESSMENT REPORT

This BAR has been prepared in accordance with the requirements of the EIA Regulations of 2014 (GN R982 of 2014). This chapter of the BAR includes the following information required in terms of Appendix 1: Content of the BAR of these regulations.

Requirement	Relevant Section
(a)(i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry put the BA procedures; including a curriculum vitae	See **section 1.8** The Curricula vitae (CVs) of the ZNJV Environmental team have been included as **Annexure A**.
(b) the location of the activity, including (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the properties.	**Section 1.5**. The details of the affected properties, property names and numbers, and SG-codes are included in **Table** 1-4**.**
(c) a plan which locates the proposed activity or activities for at an appropriate scale, or, if it is (i) a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	See the locality in **Figure** 1-2 and **Figure** 1-3**,** Figure 1-4**, Figure** 1-5 and **Section 1.5.**

The BA process entails several phases, which are discussed in **Section 3.1**. The purpose of this BAR[5] is to set out and assess the environmental outcomes, impacts and residual risks of the proposed activity. Accordingly, the BAR includes the following chapters:
Section 1 – Introduction, context and overview.
Section 2 – Legal framework.

[5] Appendix 1 of the EIA Regulations (GN R982 of 2014) lists the content required in a Basic Assessment Report. This has been listed for cross checking purposes on the page preceding the table of contents.

Section 3 – EIA methodology and description of the BA process.
Section 4 – Public participation process (PPP) indicating the methodologies used in notifying the potential interested and affected parties (I&APs) and the PPP stages, with estimated dates.
Section 5 – Detailed project description and provisional layout with additional details on the project components and requirements.
Section 6 – Alternatives. Motivation and description for the approach to alternatives.
Section 7 – Baseline description of the environment i.e. the current state of the environment, and an assessment of the project's potential environmental impacts.
Section 8 – Conclusion and recommendations. This section provides the Environmental Assessment Practitioner's (EAP) concluding remarks, a recommended way forward in terms of the application for EA, and proposed conditions of the EA.

1.5 PROJECT LOCATION

Phase 2D is situated within the FTLM, which forms part of the Sekhukhune District Municipality (SDM) in Limpopo Province. The pipeline route begins in Ward 2 of the municipality, passing through Wards 5, 31, 12, 7, 11, and terminating in Ward 19.

Key settlements along the route, from north to south, within a 2.5 km radius of the pipeline include Ga-Mathipa, Motlolo, Ga-Ragopola, Mohlopi, Moponong, Kampeng, Gowe, Mooihoek, Makgemeng, Doornbosch, Mangabane, and Mahlakwana. These settlements are situated across much of the land between the R37 and the Steelpoort Mountains. Additionally, there are extensive subsistence agricultural fields cultivated by local residents on the western side of the R37. Commercial farming in the area is limited. The route also crosses the jurisdiction of a single tribal authority, that of Pulana Maroga. Mining operations in the area include Samancor Chrome and Modikwa Platinum Mine, a joint venture between Implats and African Rainbow Minerals.

The primary access routes for Phase 2D will be the D1296, D4167, D4170, D4169, and R37. The R37 is a national road under the jurisdiction of the South African National Roads Agency (SANRAL), while the other roads are provincial roads maintained by the Roads Agency Limpopo (RAL).

The project description was disseminated to the 13 project specialists and informed the impact assessment in **section** Error! Reference source not found.. For this BA process, only one location p roject alternative (the preferred alternative), including the access roads for the authorised Phase 2D alignment, was assessed. However, other alternatives that were considered during the prefeasibility assessment, such as the pipeline route, technology for installing the pipeline, and the sizing of the BPR, are discussed in **section 6**. The no-go alternative is also assessed.

The tables below provide general site information, including the coordinates of the proposed infrastructure and the affected farm portions.

Table 1-1: General Site information

Province	Limpopo Province
District Municipality	Sekhukhune District Municipality
Local Municipality	Fetakgomo Tubatse Local Municipality
Ward Number	2, 31, 12, 7, 11, 19
Closest towns	Steelpoort
Current zoning	**Common Zoning**: Agricultural and Industrial zones **Land-use**: Mining, Industries, Rural residential, and/or communal land mostly under traditional authority.

Table 1-2: Coordinates of Project related infrastructure (corner points or start, middle, end)

Feature	**Latitude (S)**			**Longitude (E)**		
	Deg	**Min**	**Sec**	**Deg**	**Min**	**Sec**
Phase 2D Authorised alignment (2016 EMPr, ref: 14/12/16/3/1/9/21)						
Start Point	24°	42'	56.00"	30°	11'	58.82"
Middle Point	24°	38'	08.05"	30°	10'	32.39"

End Point	24°	32'	48.24"	30°	08'	53.07"
Raw Water Pipeline Segment from the Mooihoek Reservoir to the proposed Mooihoek BPR						
Start Point	24°	33'	06.60"	30°	09'	33.79"
Middle Point	24°	32'	39.42"	30°	09'	10.85"
End Point	24°	32'	20.62"	30°	09'	35.95"
Proposed Mooihoek BPR						
Corner Coordinate (CC) 1	24°	32'	17.08"	30°	09'	35.14"
CC 2	24°	32'	17.30"	30°	09'	38.23"
CC 3	24°	32'	21.09"	30°	09'	38.10"
CC4	24°	32'	20.51"	30°	09'	34.81"
Middle Point	24°	32'	18.89"	30°	09'	36.50"
Raw Water Pipeline Segment in the central section						
Start Point	24°	35'	58.42"	30°	09'	26.47"
Middle Point	24°	36'	32.09"	30°	09'	27.68"
End Point	24°	36'	12.68"	30°	09'	25.63"
Proposed Access Roads[6]						
Access 01b	24°	42'	55.60"	30°	11'	57.24"
Access 01a	24°	42'	46.85"	30°	12'	01.81"
Access 09	24°	42'	03.10"	30°	12'	20.10"
Access 03a	24°	41'	04.22"	30°	12'	27.75"
Access 04a	24°	40'	29.27"	30°	11'	44.69"
Access 10	24°	40'	11.81"	30°	11'	28.30"
Access 11	24°	40'	02.02"	30°	11'	19.20"
Access 12	24°	39'	37.83"	30°	11'	04.53"
Access 01	24°	39'	07.36"	30°	11'	01.23"
Access 03	24°	37'	25.60"	30°	10'	0.22"
Access 04	24°	37'	12.78"	30°	09'	43.59"
Access 08	24°	35'	35.47"	30°	09'	25.54"
Access 13	24°	34'	51.43"	30°	09'	33.35"
Access 05	24°	34'	11.46"	30°	09'	34.65"
Access 06	24°	33'	07.59"	30°	09'	25.64"
Access 07	24°	33'	02.58"	30°	09'	18.69"

The table below includes the length and width details of the proposed access roads.

Table 1-3: Access roads details.

Access Road No.	Main Road Name – Branching off	Access Rd Width (m)	Access Rd Length (m)
Access 01b	No name	7	20
Access 01a	-	7	21.2
Access 09	No name	7	33.105
Access 03a	D1296	7	21.483
Access 04a	D1296	7	124.243
Access 10	D4169	7	30
Access 11	D1296	7	10
Access 12	D4169	7	30.02
Access 01	D1296	7	136.557
Access 03	No name	7	108
Access 04	D1270	7	32.119
Access 08	D4169	7	30.193
Access 13	37	7	404.808
Access 05	37	7	260
Access 06	D955	7	40.874
Access 07	D955	7	30

[6] These are the coordinates for the points where the proposed access road intersects with the proposed pipeline.

Table 1-4: Description of affected farm portions/properties

2D Affected Properties					
ID	**Parent Farm Name**	**Parcel No**	**Portion No**	**Pipeline & Servitudes**	**Access Route**
T0KT00000000029400001	DOORNBOSCH No. 294-KT	294	1	Yes	Yes
T0KT00000000029300000	WINTERVELD No.293-KT	293	0	Yes	Yes
T0KT00000000025500002	MOOIHOEK 255 KT	255	2	Yes	Yes
T0KT00000000025500001	MOOIHOEK 255 KT	255	1	Yes	Yes
T0KT00000000028100000	HENDRIKSPLAATS 281 KT	281	0	Yes	Yes
T0KT00000000029400002	DOORNBOSCH No. 294-KT	294	2	Yes	
T0KT00000000029400004	DOORNBOSCH No. 294-KT	294	4	Yes	Yes
T0KT00000000029300002	WINTERVELD No.293-KT	293	2	Yes	
T0KT00000000029400006	DOORNBOSCH No. 294-KT	294	6	Yes	Yes
T0KT00000000029500000	APIESBOOMEN 295 KT	295	0	Yes	Yes
T0KT00000000025600008	GROOTHOEK 256 KT	256	8	Yes	Yes
T0KT00000000029400000	DOORNBOSCH No. 294-KT	294	Parent Farm	Yes	Yes
T0KT00000000025600001	GROOTHOEK 256 KT	256	1		Yes
T0KT00000000025500003	MOOIHOEK 255 KT	255	3		Yes
T0KT00000000025500004	MOOIHOEK 255 KT	255	4		Yes

Note: The grey rows represent the affected properties associated with the proposed major scope changes in Phase 2D, specifically the BPR and the Raw Water Pipeline segment from the Mooihoek reservoir to the proposed Mooihoek BPR, as well as the deviation in the central section of the existing pipeline alignment.

1.6 ENVIRONMENTAL IMPACT ASSESSMENT PROJECT TEAM

ZNJV has selected a team of experienced specialists and multi-disciplinary practitioners to execute this project (see **Table** 1-5**)**. Full Curricula Vitae (CVs) of the EAP and project team are available in **Annexure A**. Specialist CVs are included in the respective specialist reports in **Annexure D**.

Table 1-5: BA Project Team

Role	Consultant	Company
EIA and Project Management		
Project Leader & Lead EAP	Deon Esterhuizen	ZNJV
Project Staff (EAP)	Natanya Whitehorn	ZNJV
Project Staff (EAP)	Zinzi Portia Xakayi	ZNJV
Sub-consulting Specialists		
Agricultural Compliance Statement	Johann Lanz	Soilsza
Heritage and Archaeology	Polke Birkholtz	PSG Heritage
Palaeontology	Elize Butler	Banzai Environmental
Freshwater Biodiversity Assessment	Paul Da Cruz	Scientific Aquatic Services
Terrestrial Biodiversity Assessment	Willem de Frey and Lukas Niemand	EkoInfo CC Environmental Consultancy
Social Impact Assessment	Valentina Kruger	Zutari
Visual and Landscape Assessment	Elmie Weideman	Create Landscape
Civil Aviation Compliance Statement	Hein Reid	Parivision
Defence Compliance Statement		
Air Quality Impact Assessment	Uno Neveling	EHRCON
Traffic Impact Assessment	Vera Mpofu	Zutari
Noise Impact Assessment	Morné de Jager	Enviro Acoustic Research
Hydrology Impact Assessment	Ivan Jenkins	Zutari

1.7 INDEPENDENCE

The NEMA EIA Regulations of 2014 (GN R982 of 2014) provide general requirements for EAPs and specialists to reduce the potential for bias in the environmental process. The first requirement is that the EAP should be independent [Regulation 13(1)(a) of GN R982 of 2014].

Neither ZNJV nor any of its sub-consultants are subsidiaries or affiliated to the OMMP-BRWSP nor is the OMMP-BRWSP a subsidiary of ZNJV. Furthermore, ZNJV does not have any interests in secondary developments that may arise out of the authorisation of the proposed development. The EAP and specialists' declarations of independence are appended respectively in **Annexures I and D.**

1.8 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER, THE EIA PROJECT TEAM AND THEIR EXPERTISE TO CONDUCT THE BA PROCESS

Annexure A includes the CVs for the environmental team from ZNJV. The ZNJV environmental team for this project includes Deon Esterhuizen, Natanya Whitehorn and Zinzi Portia Xakayi. Their experience and capabilities are summarised below.

DEON ESTERHUIZEN has 30 years' experience in water related projects, which include water resource management, water quality management, water use registration and licensing of water users, including project management of multi-disciplinary studies. He also has extensive experience in a wide-range of environmentally related projects, processes and applications for private, commercial and industrial clients, in addition to local, provincial and national government departments.

He is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP **registration no. 400154/09**) and is registered as a professional EAP with the Environmental Assessment Practitioners' Association of South Africa (EAPASA **registration no. 2022/5762**).

NATANYA WHITEHORN is as an EAP at Zutari. She specialises in environmental auditing and her expertise consists of risk assessment, environmental monitoring and social impact assessments (SIAs), including the study of human interaction with one another and the natural environment. She has experience in fieldwork for impact assessments, environmental monitoring as well as the PPP, where, she has facilitated and translated at various landowner, stakeholder and public meetings and also gained experience in environmental compliance monitoring by working on a large construction project. Further significant experience includes her role as Project Manager (Environmental Lead) on various integrated environmental management (IEM) processes such as environmental impact assessments (EIAs), BARs and the development of environmental management plans (EMPs).

She has previous working experience in geo-informatics and geographic information systems (GIS). She has more than a decade of experience working with GIS, which she has gained whilst working on projects for the government, local authorities as well as the private sector. She has also gained skills in spatial representation and interpretation through her involvement in the engineering environment. Natanya has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap with extension (XTools, ET Geowizards, ET Geotools), ArcView 3.2 and Planet GIS. She has research experience on biodiversity, natural resources management, and human developmental issues and tutoring experience at a tertiary institution in the field of Information Science (IS).

Natanya obtained a Bachelor's degree (Honours) in Geography, majoring in Geo-Informatics and Strategic Environmental Planning, form the University of Johannesburg, South Africa, in 2002. She has also completed a South African Auditor and Training Certification Authority (SAATCA) Certified International Organization for Standardization (ISO) 14001 Lead Auditors Course. She is a member of the International Association for Impact Assessment South Africa (IAIAsa) as well as the Geo-Information Society of South Africa (GISSA).

She is registered with EAPASA (**registration no. 2019/1526**).

ZINZI PORTIA XAKAYI is a proficient EAP at Zutari with extensive experience in diverse environmental projects. Her responsibilities include the compilation of EMPrs, BARs, EIA Reports, Environmental Screening Reports, Part 1 and Part 2 EA amendment applications and conducting Water Use Licence (WUL) applications. With a background in geo-informatics and GIS, Zinzi brings two years of invaluable experience gained in the private sector. Her specialization in spatial analysis, data processing, and mapping is complemented by technical skills such as data evaluation, digitizing, editing, and converting spatial and non-spatial data using tools like Esri ArcMap, GeoMedia, and QGIS.

Since joining Zutari, Zinzi has played a role in renewable energy projects, contributing to the compilation of BARs, EIAs, EMPrs, and conducting PPP. Her expertise extends to feasibility screenings for photovoltaic (solar PV) projects in Limpopo, and she serves as an environmental compliance officer (ECO) for green building projects in Gauteng, where she conducts monthly audits and compiles ECO audit reports.

Furthermore, Zinzi has experience in managing projects, which includes conducting client meetings, meeting with various departments and competent authorities, sourcing information, collaborating with project teams, compiling technical and financial proposals, and preparing reports. She takes an active role in coordinating PPP and engaging with stakeholders.

She is registered as a candidate with the SACNASP (**registration no. 155265**) and is registered as a professional EAP with EAPASA (**registration no. 2022/6136**).

1.9 ASSUMPTIONS, LIMITATIONS AND GAPS IN KNOWLEDGE

In undertaking the investigation and compiling the BAR, the following has been assumed:
The information provided by LWUA, on behalf of DWS, is accurate and no information that could change the outcome of the BA process has been withheld.
All information provided by the appointed specialists is complete, accurate and true.
The scope of this investigation is limited to assessing the environmental impacts associated with the proposed construction of Phase 2D and its associated infrastructure.
The BA process is based on best practice guidelines which were available at the time of writing this report.
Additional permits or authorisations required for the development in terms of other legislation will be dealt with by the developer outside this process.

Any gaps that have been encountered by the specialists are identified in their respective assessments (**Annexure D**).

2 LEGAL AND PLANNING CONTEXT

There are a host of legal and policy documents and guidelines to consider when undertaking such a project. These have been detailed in the sections that follow.

2.1 RELEVANT LEGISLATION

An overview of the relevant legislation is provided in **Table** 2-1 and further detail is provided in subsections to follow.

Table 2-1: Relevant legislation

Legal Requirements		
Legislation considered	**Relevant Organ of State / authority**	**Aspect of Project**
The Republic of South Africa Constitution Act, No. 108 of 1996 ("the Constitution")	The Constitutional Court	The environmental right contained in Section 24 of the Constitution provides that everyone is entitled to an environment that is not harmful to his or her well-being.
National Development Plan: A Vision for 2030	National Government	The South African Government through the Presidency has published a National Development Plan (NDP). The Plan aims to eliminate poverty and reduce inequality by 2030. The Plan has the target of developing people's capabilities to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety. It proposes the following strategies to address the above goals: 1. Creating jobs and improving livelihoods; 2. Expanding infrastructure; 3. Transition to a low-carbon economy; 4. Transforming urban and rural spaces; 5. Improving education and training; 6. Providing quality health care;

		7. Fighting corruption and enhancing accountability; and 8. Transforming society and uniting the nation. Important, one of the enabling milestones was to ensure that all South Africans have access to clean running water in their homes by 2023. One of the proposed critical actions is public infrastructure investment at 10% of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans focus on transport, energy and water.
Fetakgomo Tubatse Local Municipality: Integrated Development Plan (IDP), Final 2024/2025	FTLM	The IDP outlines the strategies and goals for future development within the FTLM. The Municipality's IDP emphasises the urgent need for proper water treatment, particularly through the active monitoring of water sources, due to the high levels of contaminants present in the water used by rural communities. This is especially concerning as approximately 39% of households rely on rivers and other natural sources for water. Additionally, around 22.2% of households depend on piped water within their yards, while 21.5% rely on piped water at community standpipes.
Spatial Planning and Land Use Management Act, No. 16 of 2013 (SPLUMA)	FTLM	The land parcels on which the proposed BPR will be constructed will need to be verified to confirm if the current land use, according to the municipality's town planning scheme, is appropriate for the planned reservoir.
Aviation Act, No. 74 of 1962 **Civil Aviation Act, No. 13 of 2009 (CAA)**	South African Civil Aviation Authority (SACAA)	The DFFE Screening Tool report identifies the project area as a high-sensitivity site from a Civil Aviation perspective and, per the "Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations" (GN 320 of 20 March 2020) only a specialist compliance statement is required. The report further states that the project footprint falls within a dangerous and restricted airspace area, as demarcated, and is between 8 and 15 km from other civil aviation aerodromes. As these new changes entail the construction of a new BPR and associated pipeline, as well as access roads for the entire Phase 2D pipeline, the EAP does not consider it necessary for any further assessment as no tall structures that could pose constraints to flight are planned. The specialist further noted in their site sensitivity verification (SSV) report that the proposed infrastructure changes will not restrict flight operations, particularly with regard to restricted airspace or nearby civil aviation aerodromes. Additionally, it was noted that no consultation with the CAA is required concerning height restrictions, as the proposed structures will not exceed 10 m, remaining below the minimum altitudes of any obstacle limitation surfaces (OLS). The CAA will, however, still be consulted as a stakeholder. Additionally, the potential impacts of the proposed BPR on line-of-sight and glare will be assessed in the specialist compliance statement. **Note**: A conservative approach was adopted during the design of the BPR, with the maximum height currently considered to be 10 m.

Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to ensure that the natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating, and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the BA process, recommendations will be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. The DFFE Screening Tool report identified the proposed project footprint as having a high sensitivity from an agricultural perspective. Although the majority of the servitudes have been encroached upon by settlements, the Applicant must, as a precautionary measure, ensure the control of undesirable invasive alien plants listed in the regulations.
Environmental Conservation Act, No. 73 of 1989 (ECA)	DFFE	Noise impacts associated with the construction of the pipeline, the BPR and associated infrastructure are generally confined to the construction phase. In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in GG No. 13717 dated 10 January 1992) (NCR) were promulgated. The NCRs were revised under GN Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations, unless provincial NCRs exist. No approval is required under the national NCRs. Furthermore, noise mitigation measures are to be included in the EMPr. Refer to **Annexure D12** for a detailed assessment of noise impacts. **NB:** Phase 2D, as a component of the ORWRDP-2, received a positive RoD in 2006 in terms of ECA. A RRoD (ref no.: **03/2/4**) was granted on 16 October 2006 (refer to **Annexure J**).
Mineral and Petroleum Resources Development Act, No. 28 of 2002 (MPRDA)	Department of Mineral Resources and Energy (DMRE)	Section 53 of the MPRDA, states that any person who intends to use the surface of any land in a manner which may be contrary to the objectives of the MPRDA or is likely to impede such objects must apply to the Minister for approval in the prescribed manner. As per the requirements of the MPRDA, all mining activities, including the extraction of material from borrow pits and quarries also require authorisation from DMRE. No mining permits for borrow pits have been included in this application. Mining companies operating in the area include Samancor Chrome and Modikwa Platinum Mine, which is jointly owned by Implats and African Rainbow Minerals. Only two planned access roads fall within Samancor Chrome Ltd's property, Doornbosch No. 294 KT. No mining activities are planned for this site that would marginalise or impact the proposed project. **Note**: A Section 53 approval from the DMRE is currently underway, separate from this application. This process serves to confirm that the proposed activities will not result in the sterilisation of any mineral resources within the proposed project area.
National Environmental Management Act, No. 107 of 1998 (NEMA)	► DFFE – CA ► LEDET – Commenting Authority	NEMA establishes the principles for decision-making on matters affecting the environment. Section 2 of the Act sets out the National Environmental Management principles, which apply to the actions of organs of state that may significantly affect the environment.

		Section 28(1) states that "*every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring*". If such pollution or degradation cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution or degradation. Chapter 6 (IEM) includes sections that provide for making regulations to deal with EA of specified types of activities through EIA processes. Several listed activities in terms of NEMA Listing Notice 1 (GN R983 of 2014) and Listing Notice 3 (GN R985 of 2014), are anticipated to be triggered for the proposed activities of Phase 2D, and these need to be authorised. Based on the listed activities triggered, the application for EA will have to follow a BA process as set out in Regulations 19 - 20 of the EIA Regulations of 2014 (GN R982 of 2014).
National Environmental Management: Air Quality Act, No. 39 of 2004 (NEM:AQA)	Local Municipality (FTLM) or National Air control officer when affected ambient air is trans-boundary (trans-provincial).	The Act aims to regulate and protect the environment by providing reasonable measures for the prevention of air pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management, and control by all spheres of government; for specific air quality measures; and for matters incidental thereto. No activities that would require an Atmospheric Emissions License (AEL) are envisaged. Specific to the project are the regulations about the control of fugitive noise and dust emissions that may arise from the project activities.
National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)	DFFE	The act calls for the management of all biodiversity within South Africa. Phase 2D is situated in the Sekhukhune Centre of Endemism. This is considered a sensitive area as there are various species which only occur in this particular area. Red Data Species occur in these areas. Permit applications must be made to the relevant authority for the removal of any Red Data or Protected Species found in the proposed alignment and construction areas. These permit applications must be made in conjunction with requirements of the Limpopo Environmental Management Act, No. 7 of 2003 (LEMA) as well as the National Forests Act, No. 84 of 1998 (NFA). In this context, the DFFE screening tool report lists five plant species of conservation concern (SCC) whose presence or suitable habitat had to be verified during the site visit. The identities of two of these species cannot be disclosed due to the potential threat they face. One species is an herbaceous climber with a rootstock, and the other is a succulent shrub. The remaining three species are *Asparagus sekukuniensis, Polygala sekhukhuniensis,* and *Seersia batophylla*. Four of the five species are endemic to Sekhukhuneland, and all four are classified as threatened Red Data plants, specifically categorised as Vulnerable (VU).

		During the site visit, only one of the five species was verified: the shrub Seersia batophylla. This species was recorded in three of the surveyed plots. Removal and control of all alien invasive plant (AIP) species needs to be done in accordance with the Invasive Species Regulations, GN R598 of 2014: Alien and Invasive species regulations, 2014.
Limpopo Environmental Management Act, No. 7 of 2023 (LEMA)	LEDET	Flora rescue and relocation permits are required as discussed under NEM:BA. Plant permits for protected species under the LEMA must be obtained accordingly prior to removal or relocation.
National Environmental Management: Waste Act, No. 59 of 2008 (NEM:WA)	► LEDET – General Waste ► DFFE - Hazardous Waste	The NEM:WA provides for the regulation of waste and its responsible management and disposal. The List of Waste Management Activities specifies activities that require a Waste Management License (WML). These activities, together with the listed activities in terms of the NEMA EIA Regulations of 2014, may be authorised through an integrated EIA process. Due to the nature of the proposed activities, it is anticipated that a WML will not be required. The following notices should be considered: ► GN R634 of 2013: Waste classification and Management Regulations (WCMR). ► GN R635 and GN R636 of 2013: National Norms and Standards for Disposal of Waste to Landfill.
National Forests Act, No. 84 of 1998, as amended (NFA)	DFFE	The NFA provides protection to tree species that may not be cut, destroyed, damaged or removed unless a permit has been granted by the DFFE. In this context, the following national protected trees were observed within the proposed temporary disturbance servitude and surrounding landscape: 1. *Sclerocarya b*irrea subsp. *caffra* (Marula tree). 2. *Balanites maughamii* subsp. *maughamii* (Torchwood). Both of these species have a wide potential distribution in the landscape, which explains their Least Concern (LC) conservation status in terms of the International Union for Conservation of Nature (IUCN) Red Data[7] list on national level. Tree permit applications will be compiled for removing and/or relocating any protected trees.
National Heritage Resources Act, No. 25 of 1999 (NHRA)	► South African Heritage Resources Agency (SAHRA) ► Limpopo Provincial Heritage Resources Authority (LIHRA) – provincial heritage authority	In terms of the NHRA, any person who intends to undertake "*any development which will change the character of a site exceeding 5,000 m^2 in extent, or involving three or more existing erven or subdivisions thereof*", "*the construction of a road, powerline, pipeline exceeding 300 m in length*" or "*the rezoning of site larger than 10,000m^2 in extent*..." must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency (LIHRA in this case). These agencies would, in turn, indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.

[7] http://redlist.sanbi.org/

		Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Since the major deviation, which connects the raw water pipeline segment from the Mooihoek reservoir to the proposed Mooihoek BPR, is expected to span approximately 2,794.2 m (with deviations in the central and southern sections anticipated to be around 1,000 m and 400 m, respectively), a HIA will be required. Additionally, site investigations have revealed an active graveyard located greater than 5 m away from the proposed pipeline at coordinates 24°33'0.66"S, 30° 9'35.01"E. Another graveyard is situated along the proposed access road at coordinates 24°34'54.99"S, 30° 9'26.32"E.
National Protected Areas Expansion Strategy (2008) (NPAES) & National Environmental Management: Protected Areas Act, No. 57 of 2003 (NEM:PAA)	DFFE	The NPAES for South Africa sets out targets for protected area expansion, identifies possible expansion areas and recommends a mechanism for protected area expansion. Protected areas in terms of the NEM:PAA are considered 'formal' protected areas in terms of the NPAES. The NPAES further identifies 'National Parks', 'informal protected areas' and 'focus areas'. Some of the proposed access roads, along with sections of the realignment, are situated within Terrestrial Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), and the endangered Sekhukhune Plains Bushveld.
National Road Traffic Act, No. 93 of 1996 (NRTA)	▶ SANRAL – national roads ▶ RAL ▶ Limpopo Department of Transport and Community Safety	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. SANRAL, RAL and the Limpopo Department of Transport and Community Safety should be provided with an opportunity to review and comment on the EIA process.
National Veld and Forest Fire Act, No. 101 of 1998	DFFE	The purpose of the Act is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. Fire protection has been considered in the EMPr. The Act sets out the responsibilities of landowners or persons in control of the land which includes: 1. Prepare firebreaks on their side of the boundary if there is a reasonable risk of wildfire. 2. Have such equipment, protective clothing and trained personnel for extinguishing fires as are: • prescribed (in the regulations) • if there are no regulations, reasonably required in the circumstances 3. Take all reasonable steps to notify the Fire Protection Officers (FPO) of the local Fire Protection Association (FPA) (if there is one) when a fire breaks out. 4. Do everything in their power to stop the spread of the fire.
National Water Act, No. 36 of 1998 (NWA)	DWS	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. Section 21 of the NWA

		specifies the water uses which require authorisation from the DWS in terms of the NWA before they may commence. Particular forms of development within a watercourse or wetland or within a specified distance of a wetland must be authorised through a General Authorisation (GA) or a WUL. LWUA is currently applying for a WUL to authorise the triggered water uses resulting from the construction of Phase 2D and the associated infrastructure, as required under Section 21 of the NWA. **Note:** There is a National Freshwater Ecosystems Priority Areas (NFEPA) wetland within 500 m of the location of the proposed BPR.
Fencing Act, No. 31 of 1963	FTLM	Section 17 requires that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora. The aim of the Fencing Act, No. 31 of 1963 is to consolidate the laws relating to fences and the fencing of farms and other holdings. A perimeter fence will be required to secure the proposed BPR and associated infrastructure.
Traditional Leadership and Governance Framework Amendment Act, No. 23 of 2009	► Limpopo Department of Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA) ► SDM	The Act provides for the establishment and recognition of Traditional Councils, defines the roles and powers of traditional leaders, and provides for dispute resolution and the establishment of a Commission on Traditional Leadership Disputes and Claims. The authority of the Tribal Authorities in the project area, in terms of acting on behalf of communities in their area of jurisdiction during land acquisition negotiations and granting access for construction work, therefore derives from the provisions of this Act. There is only one tribal authority whose area of jurisdiction is traversed by the route – that of Pulana Maroga. Therefore, the Pulana Maroga Tribal Authority will have to be consulted during the PPP and when construction commences.
Restitution of Land Rights Act, No. 22 of 1994	Commission on Restitution of Land Rights.	The Act provides a legal framework for the restitution of land to people who were forcibly removed from their land or dispossessed of it under previous discriminatory laws or practices. The Act allows for claims to be made by individuals, communities, or families who were dispossessed of their land after 19 June 1913. It establishes a Commission on Restitution of Land Rights to investigate and assess claims, and to recommend the restoration of land or alternative forms of compensation. The Act was amended in 2014 to extend the deadline for lodging claims to 30 June 2019 and to provide for the appointment of a Chief Land Claims Commissioner to oversee the process of restitution. The amendment also provides for the reopening of the lodgement period for certain claims that were previously rejected, as well as the introduction of a special dispensation for farm dwellers

		and labour tenants. There are parcels of land claimed by individuals on the footprint of the proposed Phase 2D infrastructure.
Prevention of Illegal Eviction from and Unlawful Occupation of Land Act, No. 19 of 1998	Department of Rural Development and Land Reform	As we are developing in peri urban areas and rural and informal settlements, we are to ensure we do not encourage illegal occupation on the project's land and also we do not develop on the land until a formal agreement has been implemented. Additionally, caution must be taken to ensure that no person is evicted illegally from occupying the project servitudes.

2.2 LISTED ACTIVITIES IN TERMS OF NEMA

The proposed project considered in this application triggers activities listed in the 2014 EIA Regulations (GN R982 of 2014) as indicated in **Table** 2-2.

Table 2-2: Listed activities triggered by the preferred alternative for the proposed project

Activity No(s):	Listed Activity	Description of how the proposed project applies to the listed activity relates
BA Activity(ies) as set out in Listing Notice 1 (GN983 of 2014) of the EIA Regulations, 2014		
LN1 Act 9 (i)(ii)	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.	The alternative pipeline to the proposed BPR, along with the deviation in the central section of the pipeline route, are each estimated to exceed 1,000 m in length (approximately 2,794.2 m and 1,000 m, respectively), with an internal diameter of 1.2 m. The daily water transfer through the pipeline will be 1.318 m³/s (equivalent to 1,318 l/s).
LN1 Act 12 (ii)(a)(c)	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	Access roads 03a, 04a, 09, and 10 (all located within a small sub-catchment of a tributary of the Steelpoort River, which joins the Steelpoort River northeast of the town of Steelpoort at Mohlakwana), as well as access roads 03, 04, 08, and 13, are situated within 32 m of a watercourse, delineated as non-perennial drainage lines by the freshwater biodiversity specialist. Collectively, these access roads are expected to exceed a physical footprint of 100 m² or more. Furthermore, as highlighted in the Hydrology Impact Assessment report, certain sections of the alignment - including the proposed access roads - intersect the floodlines and, in some instances, are located within 32 m of these floodlines. The BPR is also located within 32 m of the floodlines. The combined physical footprint of these deviations, as well as that of the BPR itself, is expected to exceed 100 m².
LN1 Act 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The proposed development, including associated infrastructure such as the pipeline and the BPR and the access proposed access roads, will be located within a watercourse or within 32 m of a watercourse. This may require infilling or excavation, and as such, the relevant listed activity may be triggered.
LN1 Act 24 (ii)	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or	The proposed development will require the development of new roads for construction and operation. The current access roads layout is conceptual. Detailed road networks will be designed later.

	(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;	However, roads are likely to have dimensions that fall within the ambit of the activity. The details of these roads, including their lengths and widths, are provided in **Table** 1-3**.** **NB:** The proposed access road alternatives, individually, do not exceed 8 m in width. However, collectively - when considering all access roads associated with this project - the combined width exceeds this threshold, thereby triggering the relevant listed activity. Each access road is proposed to have an individual width of 7 m.
LN1 Act 56 (ii)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre — (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres.	The project area is located within farms with existing farm roads. The Applicant may need to widen the identified access roads that are existing farm roads by more than 6 m. The details of these roads, including their lengths and widths, are provided in **Table** 1-3. Each access road is proposed to have an individual width of 7 m.
BA Activity(ies) as set out in Listing Notice 3 (GN985 of 2014) of the EIA Regulations, 2014		
LN3 Act 4(e)(i)(ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **e. Limpopo** i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.	The proposed development will require the development of new roads (construction and operational phase) that are wider than 4 m (the access road widths are anticipated to be 7 m wide). These roads will be located within Terrestrial CBAs, and will require vegetation clearance or disturbance within these areas. The southern section of the realigned pipeline, access points 01a, 01b, 03a, 06, 07, 09, 10, and 11 are indicated as CBA 1 and 2 areas.
LN3 Act 12 (e)(i)(ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **e. Limpopo** i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically	The proposed development *may* require vegetation clearance of indigenous vegetation within the Sekhukhune Plains Bushveld, which is classified as “Endangered” in the Revised National List of Ecosystems that are Threatened and in need of Protection (GN R2747 of 2022) under the NEM:BA. In addition, this vegetation clearance, in some sections of the pipeline, will

	endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; or iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	occur within CBA areas. The vegetation clearance may exceed 300 m². The southern section of the realigned pipeline, access points 01a, 01b, 03a, 06, 07, 09, 10, and 11 are indicated as CBA 1 and 2 areas. **NB**: The proposed BPR is situated in a soccer field that has already been disturbed. However, the presence of protected *Sclerocarya birrea subsp. caffra* (Marula tree) and *Balanites maughamii subsp. maughamii* (Torchwood), identified during the site investigation, will require a permit from DFFE and/or LEDET for their removal or disturbance.
LN3 Act 14 (ii)(a)(c)(e)(i)(ff)	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **e. Limpopo** i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.	Access roads 03a, 04a, 09, and 10, as well as access roads 03, 04, 08, and 13, are situated within 32 m of a watercourse, delineated as non-perennial drainage lines by the freshwater biodiversity specialist. Collectively, these access roads are expected to exceed a physical footprint of 10 m² or more. The pipeline and associated infrastructure (i.e., the southern section of the realigned pipeline, access points 01a, 01b, 03a, 06, 07, 09, 10, and 11 are indicated as CBA 1 and 2 areas) are located outside urban areas, with areas of the development site identified as Terrestrial CBAs. Furthermore, as highlighted in the Hydrology Impact Assessment report, certain sections of the alignment - including the proposed access roads - intersect the floodlines and, in some instances, are located within 32 m of these floodlines. The BPR is also located within 32 m of the floodlines. The combined physical footprint of these deviations, as well as that of the BPR itself, is expected to exceed 100 m².
LN3 Act 18(e)(i)(ee)(hh)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	There are existing roads along the proposed footprint of the proposed pipeline. These roads will be incorporated into the design as far as

	e. Limpopo i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (hh) Areas within a watercourse; or within 100 metres from the edge of a watercourse.	possible. Upgrades to these roads will be required. The roads may need to be widened by more than 4 m. The pipeline and associated infrastructure (i.e., the southern section of the realigned pipeline, access points 01a, 01b, 03a, 06, 07, 09, 10, and 11 are indicated as CBA 1 and 2 areas) are located outside urban areas, with areas of the development site identified as Terrestrial CBAs. Furthermore, access roads 03a, 04a, 09, and 10, as well as access roads 03, 04, 08, and 13, are situated within 32 m of a watercourse, delineated as non-perennial drainage lines by the freshwater biodiversity specialist.

2.3 NATIONAL WATER ACT (NO. 36 OF 1998) (NWA)

The NWA requires all water uses to be licensed with the CA, the DWS in this case. Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

In accordance with GN 509 of 2016, a regulated area of a watercourse in terms of water uses as listed in Section 21 (c) and 21 (i) is defined as:

- the outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

The ZNJV is currently undertaking a Water Use License Application (WULA) for the entire Phase 2D infrastructure, which includes the already authorised pipeline. The following water uses, as outlined in Section 21 of the Act, are triggered by the proposed project activities:

Table 2-3: Triggered water uses in terms of Section 21 of the NWA

Notice No.	Activity No.	Description of Water Use
NWA, No. 36 of 1998	Section 21 (b)	**Storage of water** • Storage of water at the Mooihoek BPR.
NWA, No. 36 of 1998	Section 21 (c)	**Impeding or diverting the flow of water in a watercourse** • Pipeline crossings of rivers, streams, and dongas.

		• Construction of soil conservation structures within a watercourse or the regulated area of a watercourse.
NWA, No. 36 of 1998	Section 21 (i)	**Altering the bed, banks, course, or characteristics of a watercourse.** • Pipeline crossings of rivers, streams, and dongas. • Construction of soil conservation structures within a watercourse or the regulated area of a watercourse.
NWA, No. 36 of 1998	Section 21 (f)	**Discharging of water containing waste into a surface water resource.** • Discharge of pipe pressure testing water through scours as well as for intermittent maintenance purposes.

2.4 NATIONAL HERITAGE RESOURCES ACT, NO. 25 OF 1998 (NHRA)

The NHRA provides an integrated system for the management of national heritage resources and empowers civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities that require the undertaking of a HIA.

Section 38: Heritage Resources Management

1. "*Subject to the provisions of subsection (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 30m in length.*
   b. *the construction of a bridge or similar structure exceeding 50m in length.*
   c. *any development or other activity which will change the character of a site –*
      i) exceeding 5,000m² 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 provisional heritage resource authority.
   d. *the re-zoning of a site exceeding 10 000 m2 in extent; or*
   e. *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.*

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development."

Section 38(8) does not require approval from the heritage authority if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38 (3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed development, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and SAHRA Permit Regulations (GN R668).

Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Since the major deviation, which connects the raw water pipeline segment from the Mooihoek reservoir to the

proposed Mooihoek BPR, is expected to span approximately 2,794.2 m (with deviations in the central and southern sections anticipated to be around 1,000 m and 400 m, respectively), a HIA will be required.

During this BA process, consultations will be conducted with SAHRA and the LIHRA, by the appointed Specialist.

2.5 DFFE SCREENING TOOL

The proposed alignment and infrastructure changes have been subjected to a screening according to the national web-based environmental screening tool of the DFFE (**https://screening.environment.gov.za/screeningtool/#/pages/welcome**). This screening tool must be used prior to any EA application and contains high-level information on environmental sensitivities. One of the primary purposes of this screening tool is to determine specialist studies required during either a BA or Scoping and EIR process in order to obtain EA (refer to **Table** 2-4). This tool identified the potential restrictions and sensitivities of Phase 2D as discussed in more detail in **section 7**.

Assessment protocols that set out the “procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of NEMA, when applying for environmental authorisation” were gazetted in GN 320 of 2020. These protocols in terms of reporting of the identified environmental themes should be met in terms of NEMA.

According to the DFFE Screening Tool report, the Phase 2D alignment footprint includes areas identified as Terrestrial CBAs, ESAs and the endangered Sekhukhune Plains Bushveld. Furthermore, the proposed infrastructure is found within the Olifants Environmental Management Framework (EMF) and requirements listed in this EMF must be incorporated and considered during the authorisation process. The EMF is meant as a guideline to assist the decision-making process by the CA and integrates frameworks, policies, and different government mandates.

Table 2-4: Site sensitivity verification table for Phase 2D[8]

THEME	VERY HIGH SENSITIVITY	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY	IDENTIFIED SPECIALIST ASSESSMENTS	IMPACT ASSESSMENT VS COMPLIANCE STATEMENT
Agriculture Theme		X			Agricultural Assessment	**Compliance Statement** The DFFE screening tool report identifies the area as a high-sensitivity site from an agricultural perspective and, per the "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources" (GN 320 of 20 March 2020), an Agricultural Agro-Ecosystem Specialists Assessment is required or necessary. Despite the above, a compliance statement is compiled for this theme. This is because the project involves linear infrastructure with minimal agricultural impact, and the level of agricultural assessment required by the agricultural protocol is an Agricultural Compliance Statement. Additionally, there are settlements along the proposed development footprint and no undeveloped land is being used for agricultural purposes, with the exception of the agricultural enterprise located on Farm Mooihoek 255 KT, Portion 1, at coordinates 24°32'33.97"S, 30°9'13.36"E, which is directly adjacent to the proposed pipeline realignment.
Animal Species Theme		X			Terrestrial Biodiversity Assessment	**Impact Assessment** Included as part of the Terrestrial Biodiversity Assessment.
Aquatic Biodiversity Theme	X				Aquatic Biodiversity Specialist Assessment	**Impact Assessment** The DFFE screening tool report identifies the area as a very high-sensitivity site from an aquatic biodiversity perspective and, per the "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity" (GN 320 of 20 March 2020) an Aquatic Biodiversity Specialist Assessment is required or necessary.

[8] This SSV assessment covers the entire Phase 2D alignment, as access roads included in the application are proposed along the full length of the alignment. Deviations in the alignment are proposed in the northern section, which constitutes the major deviation, as well as in the central and southern sections, with the southern section representing the smallest deviation compared to the other two.

THEME	VERY HIGH SENSITIVITY	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY	IDENTIFIED SPECIALIST ASSESSMENTS	IMPACT ASSESSMENT VS COMPLIANCE STATEMENT
Archaeological and Cultural Heritage Theme		X			Heritage Impact Assessment	**Impact Assessment** It is anticipated that the pipeline segment connecting the raw water pipeline segment from the Mooihoek reservoir to the proposed Mooihoek BPR is expected to span approximately 2,794.2 m (with deviations in the central and southern sections anticipated to be around 1,000 m and 400 m, respectively). In addition, site investigations revealed an active graveyard located greater than 5 m away from the proposed pipeline at coordinates 24°33'0.66"S, 30° 9'35.01"E. Another graveyard is situated along the proposed access road at coordinates 24°34'54.99"S, 30° 9'26.32"E.
Civil Aviation Theme		X			Civil Aviation Assessment	**Compliance Statement** The DFFE screening tool report identifies the area as a high-sensitivity site from a Civil Aviation perspective and, per the "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations" (GN 320 of 20 March 2020) only a compliance statement is necessary.
Defence Theme			X		Defence Assessment	**Compliance Statement** The DFFE screening tool identifies the area as a medium-sensitivity site from a Defence perspective and, per the "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Defence Installations" (GN 320 of 20 March 2020) a compliance statement is necessary.
Palaeontology Theme			X		Palaeontological Assessment	**Impact Assessment** The DFFE screening tool identifies the area as a high-sensitivity site from a palaeontological perspective. An impact assessment is necessary.
Plant Species Theme			X		Terrestrial Biodiversity Assessment	**Impact Assessment** Included as part of the Terrestrial Biodiversity Assessment.
Terrestrial Biodiversity Theme	X				Terrestrial Biodiversity Assessment	**Impact Assessment** The DFFE screening tool identifies the area as a very high-sensitivity site from a Terrestrial Biodiversity perspective and, per the "Protocol for the Specialist Assessment

THEME	VERY HIGH SENSITIVITY	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVITY	IDENTIFIED SPECIALIST ASSESSMENTS	IMPACT ASSESSMENT VS COMPLIANCE STATEMENT
						and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity" (GN 320 of 20 March 2020) a Terrestrial Biodiversity Specialist Assessment is necessary. This assessment will consider the Plant and Animal Species theme, as well as the International Finance Corporation (IFC) Performance Standard (PS) 6 and the delineation and assessment of critical habitats.

2.6 RELEVANT GUIDELINES

This BA process is informed by the series of national Environmental Guidelines where applicable and relevant:
Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010).
IEIM, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002).
IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002).
IEIM, Information Series 4: Specialist Studies (DEAT, 2002).
IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004).
IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
IEM Guideline Series 7: Public Participation in the EIA Process (DEA, 2012).
DEA (2017), Public Participation guideline in terms of NEMA.
Guideline for involving biodiversity specialists in EIA process (Brownlie. 2005).
Guideline for involving heritage specialists in the Environmental Impact Report (EIR) process (June Winter & Baumann, 2005).
Guideline for involving visual and aesthetic specialists in the EIR process (Oberholzer.2005).
Guideline for Environmental Management Plans (Lochner, 2005).
Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2011).
Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA, 2012).
Guideline on Public Participation, EIA Guideline and Information Document Series (DEA&DP, 2011).

3 EIA PROCESS AND METHODOLOGY

The formal BA process is outlined in **Figure** 3-1 with the stipulated timeframes. The formal BA process commences with the submission of the Application form and is immediately followed by the 30-day comment period on the draft BAR. A description of the activities which have been, and will be, undertaken during each phase is provided in the following sections.

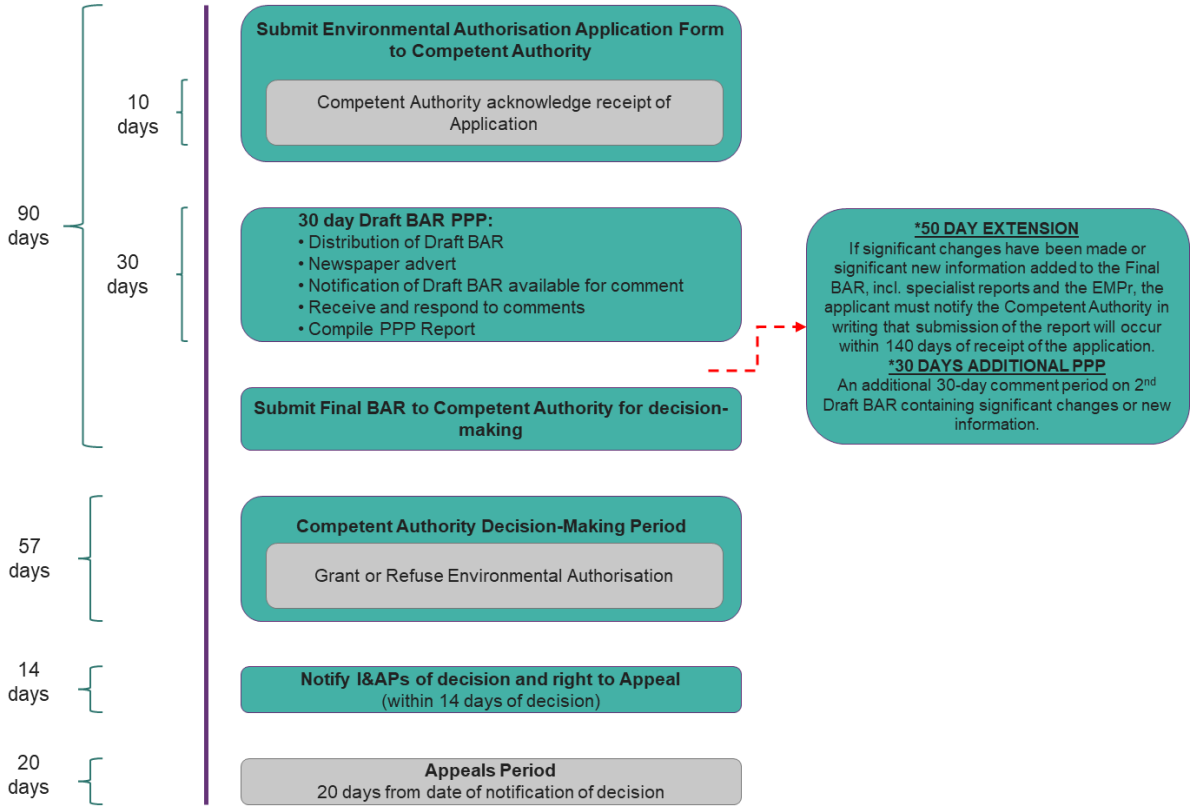


Figure 3-1: The BA process in terms of NEMA

As illustrated in **Figure** 3-1, one stage of public participation is included in a formal BA process, i.e., the comment period on the Draft BAR. More information on the PPP is included in **Section** Error! Reference s ource not found..

3.1 PHASES OF THE BA PROCESS

3.1.1 PRE-APPLICATION MEETING WITH DFFE

A combined pre-application meeting for Phases 2B (2024-07-0001), 2D (2024-07-0026) and 2F (2024-07-0027) was held between the DFFE and ZNJV (EAP team) on 24 July 2024. The meeting was held to discuss the appropriate requisite regulatory processes to follow in order to authorise the proposed scope changes in Phases 2B, 2D and 2F of the OMMP-BRWSP (refer to **Annexure B** for the pre-application meeting minutes). Discussions during the pre-application meeting informed the EAP's decision to undertake a BA process to authorise the proposed scope changes in Phase 2D.

3.1.2 SCREENING PHASE - SITE INVESTIGATION BY THE EAP AND THE SPECIALISTS

A screening exercise was undertaken by various project specialists, which entailed:

1. A site verification assessment was undertaken by the EAP to determine if the proposed expansion will trigger any listed activity in terms of the NEMA EIA Regulations of 2014 (GN R982 of 2014).
2. Specialists undertook desktop and site visits (where necessary) to ground truth the site DFFE sensitivity report and map the site features and areas.
3. Specialists identified and mapped all sensitive features and areas of the site and provided suitable buffers for these areas/features and all the sensitive areas (including buffers) were categorised into one of the following sensitivity categories, Very High, High, Medium, Low or not sensitive (or uncategorised).

3.1.3 BASIC ASSESSMENT PHASE

The objectives of the basic assessment process are to, through a consultative process -

a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b) identify the possible feasible and reasonable alternatives, including the activity, location, and technology alternatives;
c) describe the need and desirability of the proposed project and alternatives;
d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of the impact of the proposed activity and technology alternatives on these aspects to determine –
    i. the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and;
    ii. the degree to which these impacts –
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be avoided, managed or mitigated;
e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to identify and motivate a preferred site, activity and technology alternative;
    i. identify suitable measures to avoid, manage or mitigate identified impacts; and
    ii. identify residual risks that need to be managed and monitored.

Various methods and sources were utilised to identify the potential social and environmental aspects associated with the proposed project and to develop the Terms of References (ToRs) for the specialist studies. The sources of information for the preparation of this report include, inter alia, the following:

- Collection of information specific to the project, as provided by the Applicant;
- Project description;
- Basic methodology for the construction of the various project components;
- Basic methodology during operations and decommissioning;
- The expected timeframe for project development;
- Maps and figures, outlining the proposed facilities;
- Technical descriptions relating to the function and layout of project components;
- Other relevant BARs/ EIRs prepared for BAs/EIAs undertaken in the area;
- Environmental baseline literature and desktop spatial surveys for this site and surrounding areas;
- Environmental baseline surveys for this site and surrounding areas from site visits by specialists;
- Consultation with the project team (including specialists); and
- Consultation with I&APs, including authorities.

An application form for the project will be submitted to DFFE (to register the project on the Department's database). All comments received will be recorded and responded to in a Comments and Responses Report (CRR) (**Annexure C**), and the final BAR will be updated to address I&AP comments, where appropriate. This final BAR will be submitted to DFFE no later than 90 days from their receipt of the application form. The competent authority must then decide within 57[9] days of receipt of the final BAR and EMPr, and in writing –

a) Grant environmental authorisation in respect of all or part of the activity applied for; or
b) Refuse environmental authorisation.

The key dates of the formal BAR process are summarised below:

- Submit Application form and Draft BAR to DFFE – **25 August 2025**
- Place hard copies of the Draft BAR at the **Pulana Maroga Traditional Authority, the Mapodile Library,** and the **FTLM** and make a digital copy available online via the following link: **https://www.zutari.com/** ommp-brwsp-2d_2f-public-participation/ – **25 August 2025**
- Notification of potential I&APs, affected landowners, neighbouring landowners and state departments of availability of the Draft BAR for review and comment – **25 August 2025**
- Last day for I&AP to submit comment on Draft BAR – **03 October 2025**
- Submit Final BAR to DFFE – **October 2025**
- DFFE to provide decision on application – 57-days from date of submission of final BAR to issue decision.
- Notification of registered I&APs of DFFE decision and appeal process – upon receipt of DFFE decision.

3.2 METHODOLOGY

3.2.1 SPECIALIST ASSESSMENTS

To provide a scientific assessment that is transparent and robust, a clear methodology is required. Although each specialist required a methodology that was specific to their investigation (detailed in their reports in **Annexure D**), they were each given the following ToR:

[9] On 5 March 2023 the project was classified as a SIP under the SIP 19 (i.e., Water and Sanitation Infrastructure Portfolio). As such, it is critical that the project must be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act, No. 23 of 2014.

- Undertake a site investigation to determine the status quo and identify any sensitive features or no-go areas;
- Provide shapefiles of all sensitive features;
- Assess all impacts associated with the proposed project and the no go alternative;
- Make use of the ZNJV Impact Assessment Methodology (explained below in section 3.2.2) when assessing the impacts of the proposed project, as well as cumulative impacts (detailed below in section 3.2.3);
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts and improve positive impacts for each phase of the project. Indicate the level of significance of impacts pre- and post-mitigation;
- Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of environmental authorisation requirements, should the development be authorised;
- Comply with the content requirements for specialist reports listed in Appendix 6 of the 2014 EIA Regulations (GN R982 of 2014). These have been updated where required to consider the amendments made to the Regulations on 7 April 2017; and
- Comply with procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation (GN R320, of 20 March 2020).

3.2.2 IMPACT ASSESSMENT METHODOLOGY

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criterion based on a seven-point scale (refer to **Figure** 3-2); and the significance is auto-generated using a spreadsheet through the application of the calculations in **Table** 3-1. Specialists can comment where they disagree with the auto-calculated impact significance rating.

Figure 3-2: Calculation of Significance

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category. Negligible, minor, moderate or major, and the type would be either positive or negative.

Table 3-1: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	**1**	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	Impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	**1**	**Very limited**	Limited to specific isolated parts of the site
	2	**Limited**	Limited to the site and its immediate surroundings
	3	**Local**	Extending across the site and to nearby settlements
	4	**Municipal area**	Impacts felt at a municipal level
	5	**Regional**	Impacts felt at a regional level
	6	**National**	Impacts felt at a national level
	7	**International**	Impacts felt at an international level
Intensity	**1**	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	**1**	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in **Table** 3-2, **Table** 3-3, and **Table** 3-4, respectively.

Table 3-2: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 3-3: Definition of reversibility ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environment will be able to recover from the impact

Table 3-4: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

3.2.3 ASSESSMENT OF CUMULATIVE EFFECTS

Cumulative effects are commonly understood to be impacts from different projects that combine to result in significant change, which could be larger than the sum of all the individual impacts. Impacts contributing to such cumulative impacts are found in **section 7** of this BAR.

4 PUBLIC PARTICIPATION

PPP is a broad, inclusive, and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. During the BA process, the aim is to provide an opportunity for stakeholders to be (1) informed of projects occurring in their area which may affect them directly or indirectly and (2) provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and (3) to ensure that these are used to guide the new development, and planned operations, in a responsible manner that complements the local socio-economic environment, reduces environmental impact and enhances the benefits of the project.

South African legislation and guidelines (refer to **section 2**) have formalised the PPP for BA. PPP forms an integral component of this process and enables I&APs to identify issues, and concerns, and make suggestions during the BA process. This PPP is structured to provide I&APs with the opportunity to learn about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the BA process. These stages are described below.

Proof of Public Participation actions and documents will be included as **Annexure C** during the submission of the Final BAR. However, copies of Public Participation actions that have been employed have been included as **Annexure C** to the Report.

4.1 PUBLIC PARTICIPATION PROCESS

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations of 2014, the subsequent sections below summarise the key public participation activities implemented. Furthermore, an overview of the tools available to I&APs and stakeholders to access project information and interact with the public participation team for obtaining project information, resolving any queries, and meeting the requirements for public participation are also outlined below.

4.1.1 DRAFT BAR

- **Notifications:** the following methods of notification are used
  - **Written notice** - Written notices will be sent to registered I&APs. This notification will inform the reader of the availability of the draft BAR, where and when to access it and where to send a comment.
- **Information for review:** the draft BAR will be made accessible during the comment period as follows:
  - **Hardcopy:** Will be placed at the project site, **Pulana Maroga Traditional Authority, the Mapodile Library,** and the **FTLM**.

- **Electronic copy**: the draft BAR will be accessible via the following link:
  - Zutari webpage: **https://www.zutari.com/** ommp-brwsp-2d_2f-public-participation/

- **Comment period:** The draft BAR will be made available for comment for 30-days from **25 August to 03 October 2025**.
- **Comments and responses report:** all comments will be captured and responded to in the CRR. The CRR will be appended to the final BAR and will be submitted to the DFFE as part of the final application.

4.1.2 DECISION PHASE

- Following submission of the final BAR, the DFFE have 57 calendar days to issue a decision.
- Registered I&APs will be notified in writing within 14-days of the decision. I&APs will be informed of the right to appeal and the procedure to follow.
- I&AP will have 20 calendar days from the date of the written notification to lodge an appeal.

4.2 IDENTIFICATION OF STAKEHOLDERS

An existing database of I&APs of the OMMP-BRWSP was used to develop a stakeholder database for the proposed Phase 2D component. This database includes the details of the following affected parties:

- Landowners, adjacent landowners and occupiers;
- Relevant district and local municipal officials and ward councillor/s;
- Relevant national and provincial government departments; and
- Relevant environmental bodies or organisations.

Site notices, written notices and the newspaper advertisement will inform the reader of the opportunity and manner to register as an I&AP for the project. This I&AP database will be updated as new I&APs are identified throughout the project lifecycle. The list of I&APs is included in **Annexure C.**

4.3 AUTHORITY INVOLVEMENT

In terms of Section 24O (2) and (3) of the NEMA, the following state departments and/or parastatal bodies will be notified on the application and will be sent a copy of the draft BAR for comment.

- National, Provincial and local authorities, and parastatal organisations:
  - Department of Forestry, Fisheries and the Environment (DFFE)
  - Department of Water and Sanitation (DWS) (Limpopo Water Management Area)
  - Department of Mineral Resources and Energy (DMRE) (Limpopo Regional Office)
  - South African National Road Agency (SANRAL)
  - Roads Agency Limpopo (RAL)
  - Limpopo Department of Transport and Community Safety
  - Department of Agriculture, Land Reform and Rural Development (DALRRD)
  - South African Heritage Resources Agency (SAHRA)
  - Limpopo Provincial Heritage Resources Authority (LIHRA)
  - Fetakgomo Tubatse Local Municipality (FTLM)
  - South African Civil Aviation Authority (SACAA)
  - Limpopo Department of Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA)
  - Sekhukhune District Municipality (SDM)

4.4 SUMMARY OF COMMENTS AND RESPONSES

All comments received during the 30-day comment period will be responded to in a CRR and appended to the BAR. The CRR will be submitted with the final BAR to inform the decision-making.

The BAR, specialist reports, and EMPr will be updated where appropriate to accommodate issues raised in the draft BAR phase.

5 DESCRIPTION OF THE PROPOSED PROJECT

5.1 DESCRIPTION AND COMPONENTS OF THE PREFERRED ALTERNATIVE

This application involves an approximately 2.79 km pipeline extending from the Mooihoek reservoir to the proposed Mooihoek BPR (refer to **Figure** 5-1), as well as an approximately 1 km pipeline in the central section of the alignment on Portion 2 of the Farm Mooihoek 255 KT (refer to **Figure** 5-2). Additionally, a deviation in the southern section of the pipeline on Portion 0 of the Farm Doornbosch 294 KT, which does not independently trigger listed activities, is shown in **Figure** 5-3 below. The pipeline is anticipated to have a diameter of 1,200 mm and an estimated throughput of 1.318 m³/s (equivalent to 1,318 litres per second). A 40 m servitude is proposed, consisting of a temporary construction servitude of 25 m and a permanent servitude of 15 m.

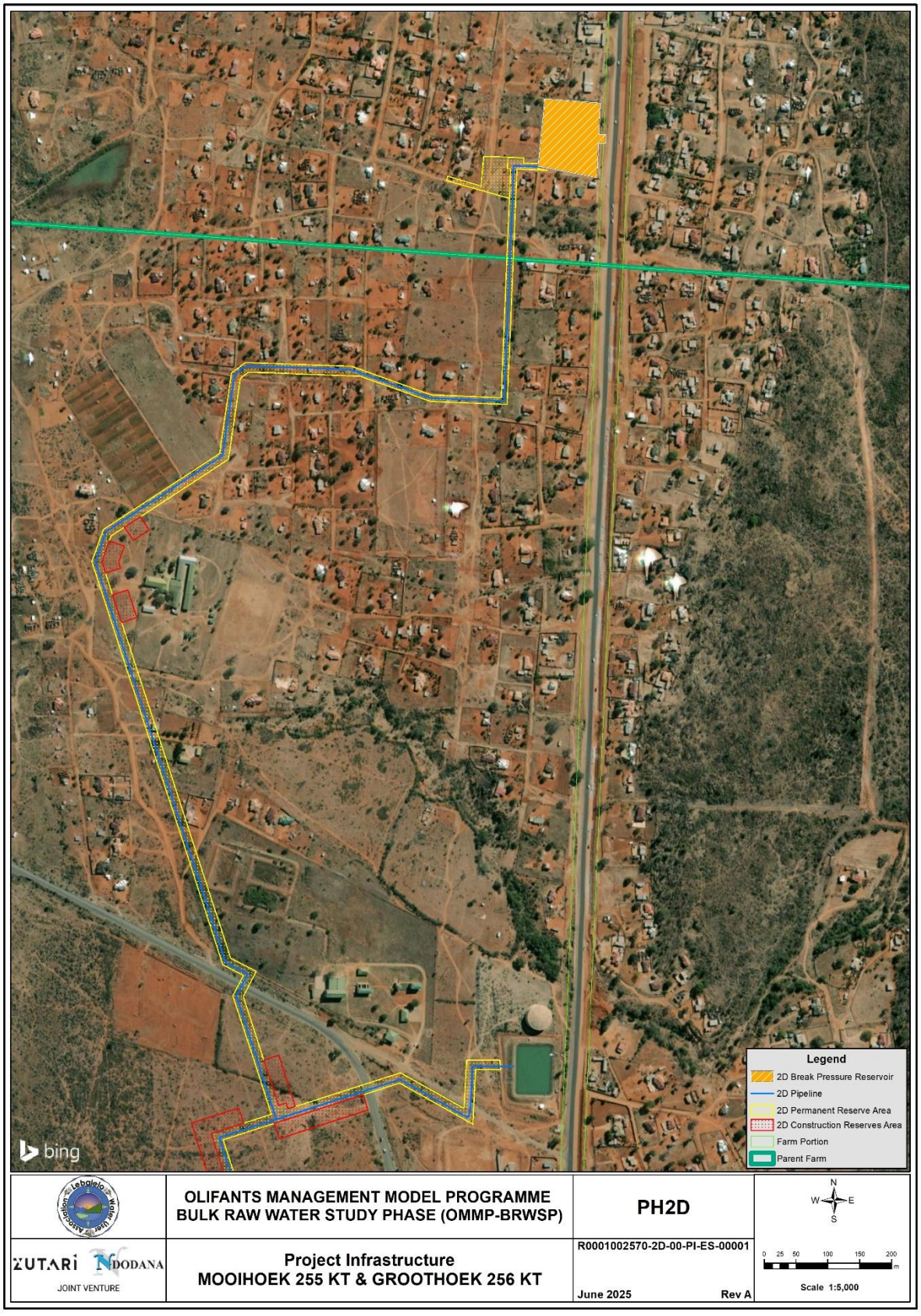


Figure 5-1: Proposed Project Infrastructure

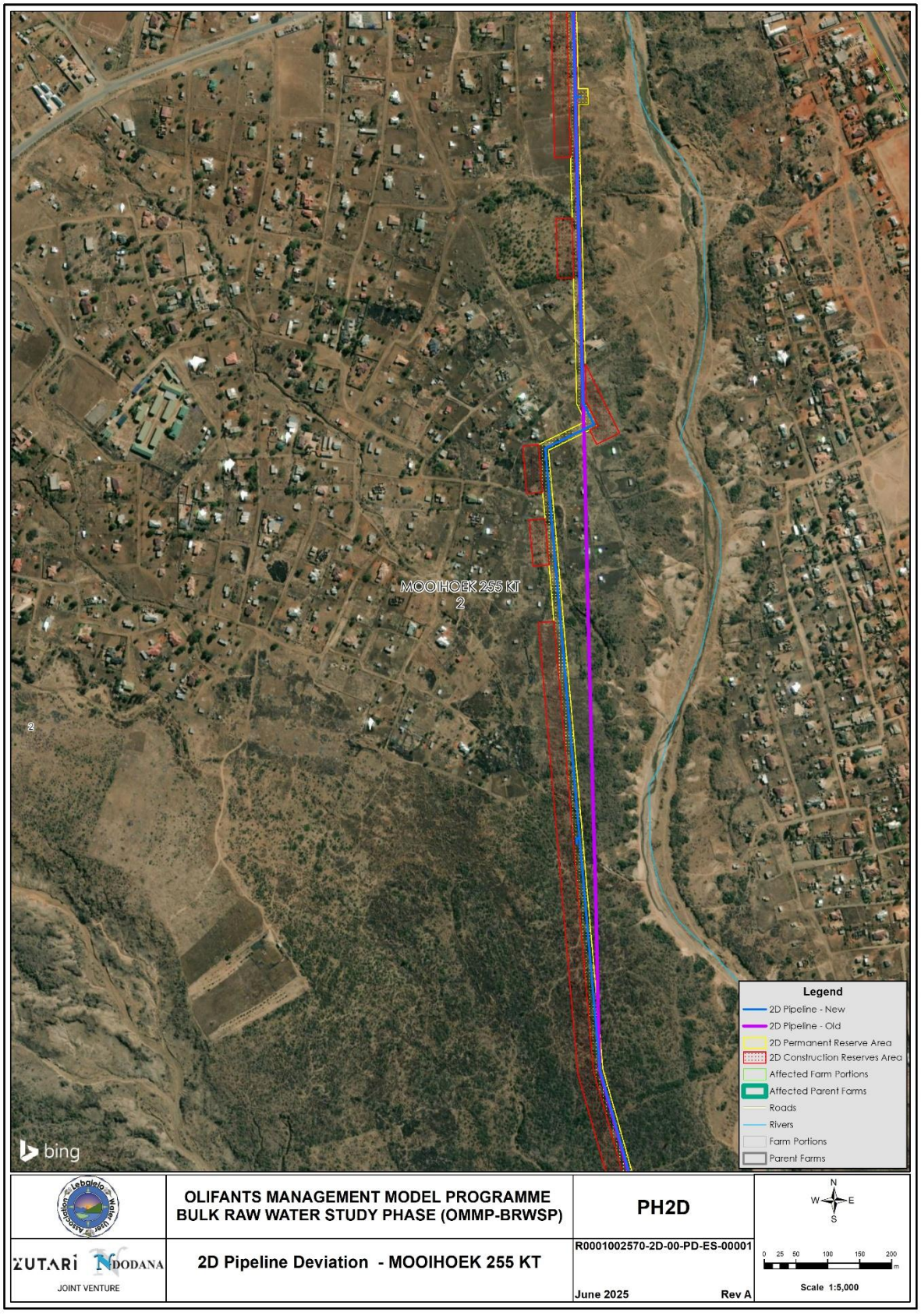


Figure 5-2: Central deviation on the Farm Mooihoek 255 KT.

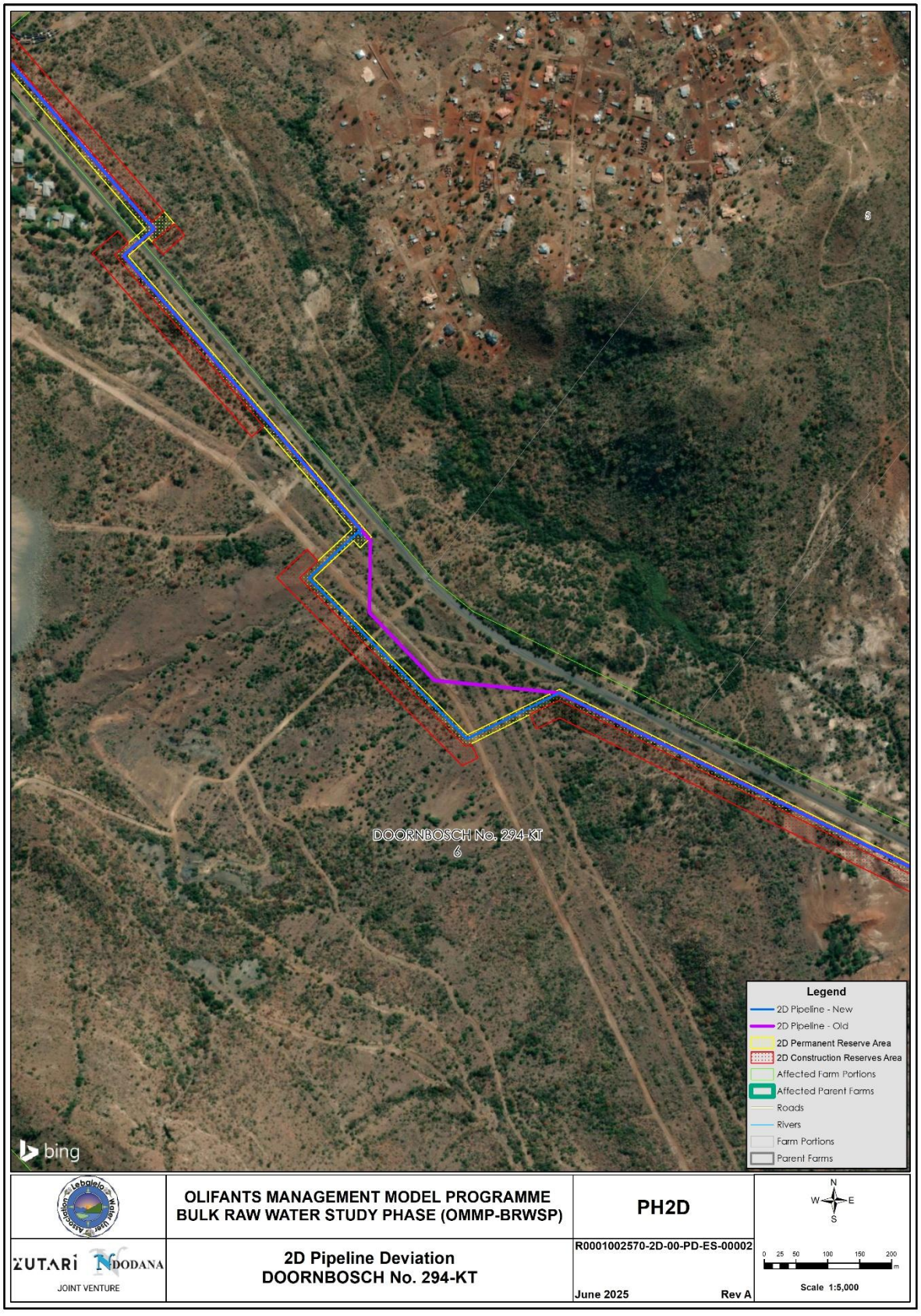


Figure 5-3: Southern section on the Farm Doornbosch 294 KT.

5.1.1 BREAK PRESSURE RESERVOIR

The table below contains general information pertaining to the proposed BPR. Please refer to **Annexure H** for the proposed site layout drawing.

Table 5-1: General Information on the BPR at the farm Groothoek 256 KT

Storage Name	Mooihoek Break Pressure Reservoir
Type of Facility	Break Pressure Tank
Storage Capacity (m^3)	16,500
Maximum height of wall (m)[10]	10
Areal extent (m^2)	3,000
Diameter of the reservoir (m)	62
Proposed water depth (m)	5.5
Type of wall	Reinforced Concrete Reservoir
Type of spillway and capacity	Overflow pipe, capacity equal to inflow (1950 l/s)
Type of outlet works and capacity	Concrete encased steel pipe
Instrumentation	Supervisory Control and Data Acquisition (SCADA) SYSTEM with Siemens Programmable Logic Controllers (PLCs); microwave radio link between the BPR and the main control room at Havercroft Pump Station. A level transducer will sense the level inside the BPR and will be used to control the level in the BPR by closing the relevant control valves and switching off the pumps at Steelpoort Pump Station.

5.1.2 ACCESS ROADS

The primary access routes for Phase 2D will be the D1296, D4167, D4170, D4169, and R37. The R37 is a national road under the jurisdiction of the SANRAL, while the other roads are provincial roads maintained by the RAL. The proposed access roads, required specifically during construction and potentially for operation during maintenance, are listed in **Table** 1-2 above and shown in **Figure** 5-4 below.

The access roads are 7 m wide, with lengths varying depending on the specific road segment (refer to **Table** 1-3).

The current status quo of each access road (16 in total) and associated access number is given in the table below.

Table 5-2: Existing status quo.

Existing status quo	Access number
Existing road/footpath	01-a; 09; 03-a;04-a; 11; 03; ;04;08;06;07
New road/ Green fields/Unused Road	01-b, 10;12

[10] A conservative approach was taken in designing the reservoir to allow the contractor some flexibility. As a result, a maximum height of 10 m was considered for this assessment.

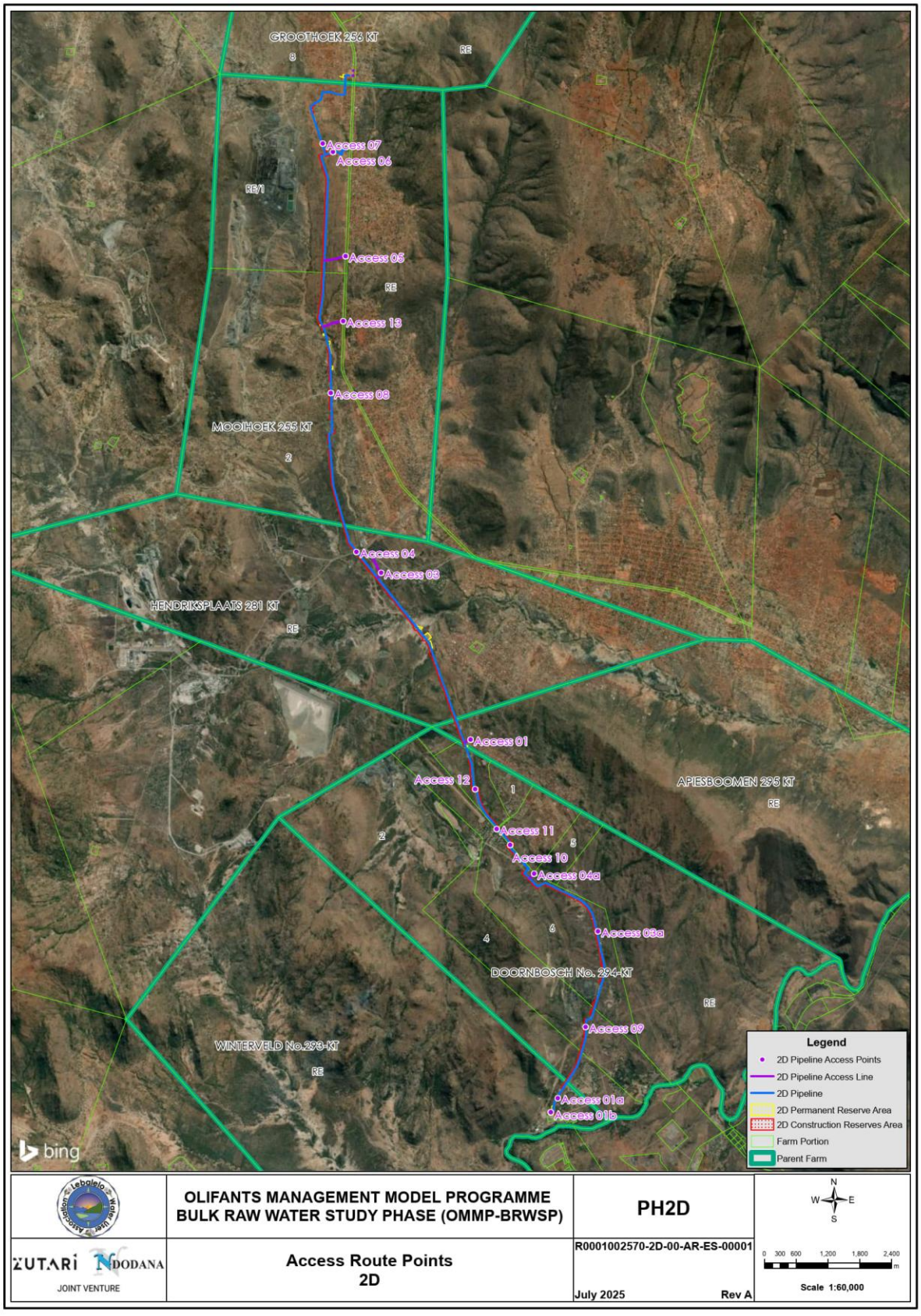


Figure 5-4: Access Route Points.

5.1.3 TEMPORARY CONSTRUCTION YARD

It has been proposed that the temporary construction servitudes be used as laydown areas during construction. Consequently, stockpiling and material handling are expected to occur in these areas.

5.2 SERVICES REQUIRED DURING CONSTRUCTION

5.2.1 EMPLOYMENT

The duration of the construction phase may vary depending on seasonal and environmental conditions at the time of construction. The project will employ semi-skilled and unskilled workers from within the FTLM. The Applicant is committed to optimising employment opportunities for local Black people, particularly Black women, and will preferentially hire local individuals through appropriate channels to minimise the potential influx of migrant job seekers.

5.2.2 WATER SUPPLY

Water will be required for construction activities, including wetting bedding material to achieve optimal compaction densities and for dust suppression along construction access roads. The only available water sources along the Phase 2D pipeline route are the Steelpoort River and groundwater. No other sources with sufficient capacity are available. As such, new water sources need to be identified, developed, and managed throughout the construction period.

These sources must be located in proximity to the construction sites and will generally be required at intervals of approximately 3.4 km along the pipeline route.

5.2.3 WASTE MANAGEMENT

- **General waste**

It is anticipated that some construction solid waste will be generated which would include (list is not exhaustive) building rubble, packaging material, scrap, overburden material and general litter from construction workers. Therefore, it is recommended that construction waste or rubble be collected and stored temporarily in designated containers for the different waste streams on site and disposed of at a licensed landfill site.

The EMPr will make recommendations regarding the reduction, reuse and recycling of solid waste.

- **Hazardous waste**

Hazardous substances pose significant risks to health, safety, and the environment if not properly handled, stored, transported, or disposed of. On this project, hazardous substances are primarily limited to fuels and oils, although other materials may also be involved. It is crucial to ensure that hazardous substances are transported, stored, handled, and used in a way that minimises risks to human health and the environment. Hazardous waste generated from construction activities will be stored in clearly labelled, sealed, animal-proof, and waterproof containers until it is collected for disposal at an approved facility, where a certificate of disposal can be issued, or returned to the suppliers for proper disposal or reuse.

- **Sewage**

During construction the normal sewage will be handled via temporary ablution facilities (such as portable toilets) that will be serviced by a contractor on a regular interval (i.e., as, and when needed).

5.2.4 AIR AND NOISE EMISSIONS

Air emissions: Temporary air emissions are expected during the construction phase due to the operation of construction machinery and the clearing of vegetation, which may result in wind-blown and fugitive dust emissions. However, emissions during the operational phase are anticipated to be minimal, owing to measures such as vehicle speed limits, re-vegetation, and soil landscaping. Dust generated during construction activities will primarily arise from equipment such as excavators, TLBs, and heavy vehicles (e.g., trucks) moving in and out of the construction area.
The national dust control regulations under the NEM: AQA were published in GG 34307 under GN 309 on 27 May 2011. According to these regulations:

- No person may conduct an activity that generates dust in quantities or concentrations that:
    - Have a detrimental effect on the environment, including health, social, economic, ecological, or cultural conditions, or contribute to the degradation of ambient air quality beyond the premises where the dust originates;
    - Cause the dust to remain visible in the ambient air beyond the premises where it originates;
    - Exceed 600 mg/m²/day averaged over 30 days in residential and light commercial areas, as measured using the reference method ASTM D1739; or
    - Exceed 1,200 mg/m²/day averaged over 30 days in areas other than residential and light commercial areas, also measured using ASTM D1739.

For a detailed Air Quality Assessment, refer to **Section 7.3**.

Noise emissions: The key temporary noise sources during the construction phase will be from the mobile machinery, vehicles, workers, and plant construction activities including high-speed ramming using percussion hammers. Some after-hours construction activities may be needed. With that said, surrounding property owners and residents of the directly affected villages along the pipeline should be informed if any unusually noisy activities (e.g., blasting) are planned, or if construction activities are scheduled to extend beyond normal working hours (typically 7 am to 5 pm).

For a detailed Noise Impact Assessment, refer to **section 7.13**.

5.2.5 STORMWATER

To avoid soil erosion, stormwater management of runoff from the proposed project infrastructure needs to be implemented. Erosion and sediment control measures must be implemented in accordance with South African published guidelines and best practices, such as the *Environmental Best Practice Specifications: Construction*, published by the Department of Water Affairs and Forestry (DWAF) in 2005 (refer to section 3.7). Stormwater management and mitigation measures are also included in the EMPr.

5.2.6 ENERGY EFFICIENCY

In terms of energy efficiency, the proposed water supply pipeline and associated infrastructure construction should be carried out during normal working hours to minimise the need for artificial lighting in open trenching and excavation activities. Additionally, the contractor will be advised to transport all construction materials to the site simultaneously, where possible, and to collect waste materials concurrently with other construction activities. These measures aim to reduce fuel consumption associated with transportation.

5.3 PROJECT PHASES

From a practical perspective the project lifecycle will likely be phased as follows:

- Pre-Construction
- Construction
- Operation
- Decommissioning

5.3.1 PRE-CONSTRUCTION

Pre-construction activities involve tasks that establish the site, both in terms of the construction activities, as well as the social and environmental management systems. During this time, efforts should be made to ensure that the planning of the project is completed effectively to ensure that there are no delays, and that no unnecessary environmental degradation occurs. The detailed design must align with the recommendations outlined in the BAR, the EMPr, and the EA, and should incorporate all design recommendations and mitigation measures arising from the BA process.

Before the mobilisation of the main contractor on site, the boundaries of the work areas and nearby no-go areas will be demarcated according to specialist recommendations, after which the Contractor may set up their construction yard, mobilise their staff and equipment on site.

Social risks must be addressed by implementing an appropriate grievance mechanism from the outset. Additionally, the Pulana Maroga Traditional Authority should be engaged from the beginning to prevent any social issues when the Contractor and workers are on site. Furthermore, all the Contractor's staff must undergo training to ensure they understand the environmental and social obligations.

5.3.2 CONSTRUCTION

The typical activities for the construction of a pipeline and associated infrastructure such as the proposed BPR are as follows:

- Establishment of access roads: During the construction period, internal roads need to be established; however, these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used, where possible.
- Site preparation: Vegetation would need to be cleared for the footprint of the BPR infrastructure, and pipeline as well as for the access roads to the site/internal roads and the laydown areas, etc. Topsoil stripped from the construction of access roads, pipelines, and the BPR would need to be stockpiled and used to rehabilitate areas of the construction footprint.
- Transportation of equipment and components to the site: The main components of Phase 2D would be transported by road to the site. Excavators, graders, trucks, and compacting equipment will need to be brought to the site.
- Establishment of workshops, temporary laydown areas, and equipment camps: Once all the equipment has been brought to the site, dedicated laydown and equipment camps will be established within the temporary construction servitudes. Fuel will most likely be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.
- Open trench excavations: Open trench excavations will be the primary method for installing the pipeline and BPR. The construction activities will involve the excavation of trenches along the designated pipeline route to accommodate the pipeline, as well as the excavation required for the construction of the BPR. This process will include site preparation, clearing, and excavation to the required depth and width for both the pipeline and reservoir foundation. Additional activities will involve the installation of pipes, backfilling of trenches, and compaction to ensure stability.

The construction of the BPR will also require excavation for its foundation, followed by the construction of the reservoir's structure. Material handling, transport, and stockpiling will be conducted in designated laydown areas. Environmental management practices will be implemented to minimise disruption to the surrounding area, including dust control and proper waste disposal. These activities will be carried out in phases, with careful coordination to ensure minimal disruption to local communities and the environment. All excavation work will comply with safety and environmental regulations, with necessary mitigation measures in place.

- Site rehabilitation: Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

5.3.3 OPERATION

During operation of the bulk raw water pipeline and the BPR, activities primarily focus on the monitoring, maintenance, and efficient management of water supply. Regular inspections will be conducted to ensure the pipeline and reservoir are functioning as intended, with checks for any signs of leaks, blockages, or structural issues. The BPR will require periodic assessment of pressure levels and operational settings to ensure optimal performance.

Routine maintenance activities may include cleaning of the pipeline, clearing of debris, and ensuring the functionality of associated valves, pumps, and control systems. Additionally, water quality monitoring will be carried out to ensure compliance with regulatory standards. Maintenance of access roads and emergency preparedness will also be important operational tasks.

Overall, the operational phase focuses on ensuring the reliable and sustainable delivery of water, as well as minimising disruptions to service through regular upkeep and prompt response to any operational issues.

5.3.4 DECOMMISSIONING

The decommissioning phase for this project is not foreseeable in the near future, as access to clean potable water remains an ongoing necessity. However, should the facility undergo expansion or significant upgrading in the future, an EA may be required at that time, in accordance with the prevailing legislation.

5.4 PROJECT NEED AND DESIRABILITY

The OMMP-BRWSP (and previously the ORWRDP) was initiated to reduce the water demands on the Flag Boshielo Dam in the Limpopo province, which is the key water resource in the region. The project also aimed to meet the increasing water demand of the City of Polokwane, as well as allowing the respective Water Service Authorities (WSAs) to have surplus water to meet their water demands. The project bulk infrastructure plan allows for the construction of raw water pipeline systems to the identified target areas.

The revised scope of the project will prioritise the following key aspects (of the OMMP-BRWSP):
Abstract the LWUA scheme water primarily from the De Hoop dam instead of the Olifants River to relieve pressure on the already over-allocated Flag Boshielo Dam;
Re-sequence the construction of OMMP-BRWSP bulk raw water infrastructure to meet revised water needs;
Support existing potable WSAs and develop potable water infrastructure in defined areas in the Northern and Eastern Limb to address immediate and long-term social water needs of the WSAs.

Phase 2 of the project consists of four major components, namely, bulk water pipeline from De Hoop to Steelpoort; bulk distribution system comprising pipelines and pump stations from Steelpoort linking with the existing Olifants-Sand transfer scheme; bulk distribution system from the Flag Boshielo dam to Mokopane; and acquisition of the LWUA infrastructure for incorporation into the project. A bulk distribution system means that the Flag Boshielo and De Hoop dams will be able to function as a single system, thereby enabling a higher water supply level to the target areas.

Importantly, the WSAs have been unable to realise the ambitions (i.e. to reduce water demands on the Flag Boshielo Dam, meet the increasing water demands of the City of Polokwane, and allowing the respective WSAs to have surplus water to meet their water demands) of the project on their own and the DWS has since appointed the LWUA to implement the most critical aspects of the scheme on their behalf. The DWS along with other stakeholders are working together to meet the following objectives:
Delivering raw water and potable water to the region;
Meeting the required water demand in the region; and
Realising the socio-economic development (SED) expectations in the region.

In addition, it is critical for the project to proceed urgently to stabilise the region. Moreover, the need for clean drinking water is well documented and reasons for access to potable water include, and not limited to:
Safe drinking water that is not harmful to human health;
Reduce the reliance of rural communities (generally low-income households) on raw surface or groundwater water (i.e., often unsafe for human consumption);
Improved livelihood and quality of life;
Prevent, combat, or reduce the risk of contracting waterborne diseases;
Safe and readily available water is important to public health, whether it is used for drinking, domestic use, food production, or recreational; and
Provision of adequate (clean) water supply infrastructure means less expenditure on health, as people are less likely to fall ill and incur medical costs (as a result of contracting waterborne disease), and importantly are better able to remain economically productive.

5.4.1 REGIONAL CONTEXT (FTLM IDP, 2024)

The SDM is the water authority responsible for bulk water supply, reticulation, and sanitation management. The FTLM plays a role in identifying water backlogs and sanitation challenges within its jurisdiction, liaising with the district municipality, and facilitating service delivery.

The water infrastructure within the municipality is primarily concentrated along the R37 and R555 roads. Approximately one-third (36%) of the population lacks access to water, which is largely due to the limited reach of water infrastructure in rural areas, compounded by South Africa’s general water scarcity. Additionally, there has been a lack of operation and maintenance of existing water infrastructure, exacerbated by reduced fiscal and labour capacity. This has left infrastructure in relatively well-serviced areas unable to meet the demand created by an influx of people seeking employment and services. Specifically, 34.40% of the population in FTLM has no access to piped water, 24.20% have access to piped water inside their dwellings, 21.80% have access to piped water within their yards, and 19.60% have access to water at communal stands.

In its IDP, FTLM has emphasised the need to engage with the LWUA and SDM, in consultation with the Office of the OMM, to mitigate potential failures associated with attempts to export raw water through dry villages.

The table below highlights the water challenges across the wards that the pipeline traverses.

Table 5-3: Water related challenges across the wards that the pipeline traverses.

Ward No	Challenges
2	All villages do not have proper water infrastructure.
7	• Mooihoek need maintenance and extensions. • Frans, Gowe,Legonong,Kampeng,Boitumelo and Holong need connection. • Tsidintsi no infrastructure. • Mashibishane no infrastructure and electrification of borehole.
11	All villages do not have proper water infrastructure.
12	Boreholes are needed at Mamphahlane, Hwashi Difagate, Swale, Komana, Mpuru Sekiti, Mahubane, Sehlaku, Molongwane, and Balotsaneng.
19	Most section experienced water shortage.
31	No water in all villages.

5.4.2 NEED AND DESIRABILITY CHECKLIST

Specific need and desirability questions raised by the national and Department of Environmental Affairs and Development Planning (DEA&DP) need and desirability guidelines are addressed in **Table** 5-4 below

Table 5-4: Need and desirability checklist

Need and Desirability (Timing)	
Question	**Response**
1. Is the activity permitted in terms of the property's existing land use rights?	Yes, the activity will be permitted in terms of the property's existing land use rights. **Note:** Segments of the pipeline and associated servitudes still traverse private properties. In such cases, LWUA, on behalf of DWS, will expropriate the necessary land and compensate all landowners and occupiers in accordance with the Expropriation Act No. 63 of 1975. Upon completion of the construction, the permanent servitude will be incorporated into the title deed description of each property.
2. Will the activity be in line with the following? **(a) Provincial Spatial Development Framework (PSDF)**	Yes, this is a project of national importance. The objectives of this project align with the goals outlined in the Limpopo Spatial Development Framework (SDF) and are specifically referenced as an objective in the De Hoop Master Plan for the province.
(b) Urban edge / Edge of Built environment for the area	As this project is a linear activity, it bisects the urban edge and the boundary of the built environment. However, given that this is a ministerial project, and an item outlined in the IDP for the FTLM and the SDM, the positive impacts of the project outweigh the negative.
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	The FTLM IDP (2024) outlines the strategies and goals for future development within the Municipality. The IDP emphasises the urgent need for improved water treatment, particularly through the active monitoring of water sources, due to the high levels of contamination present in the water used by rural communities. The IDP is aligned with the Provincial SDF. The relevant SIP for water supply, and for this project, is the De Hoop Master Plan. The IDP highlights the need to accelerate the implementation of the De-Hoop Master Plan, supported by the ORWRDP[11], in order to address the urgent water supply demands in the area.
(d) Approved Structure Plan of the Municipality	The local municipalities include the ORWRDP in their documents as a construction objective, referring to the project as both the De Hoop

[11] Now the OMMP-BRWSP.

Need and Desirability (Timing)	
Question	**Response**
	Dam Water Scheme and the ORWRDP. As such, this constitutes an approved structure plan for the municipalities, which will support them in achieving the SIPs for the province and the region.
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	The project lies within the Olifants EMF. One of the specific objectives of the EMF is to encourage sustainable development. The EMF also highlights several key issues, including: 1. More than two million people in the area depend on groundwater resources for their basic water needs. 2. Surface water in rivers and streams is generally unusable. 3. Water resources in the EMF area are already over-allocated. 4. Inadequate services and infrastructure remain significant problems in certain areas. The EMF further recommends that "*one method of increasing the volume of available water is to import water from external source*" which is where the OMMP-BRWSP project plays a critical role. In summary, the area the pipeline will traverse is already degraded, and the OMMP-BRWSP project will help address basic human needs along this route by providing access to potable water.
(f) Any other Plans (e.g. Guide Plan)	No
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	Yes. As mentioned in 2c above, the IDP emphasises the urgent need for improved water treatment. Furthermore, the IDP is aligned with the Provincial SDF. The relevant SIP for water supply, and for this project, is the De Hoop Master Plan. The IDP highlights the need to accelerate the implementation of the De-Hoop Master Plan, supported by the ORWRDP, in order to address the urgent water supply demands in the area.
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level, e.g. development is a national priority, but within a specific local context it could be inappropriate.)	The community needs the project since it would benefit directly from the bulk water supply infrastructure. The project will provide potable water to the residents; and provide both raw and potable water to commercial users, thereby potentially enabling the provision of basic water-services and associated infrastructure. Furthermore, at least 50+ people will be employed during the construction phase of the OMMP-BRWSP project.
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	No services are needed; the project is adding additional services in the area by supplying potable water to the community and the surrounding areas.
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	Yes, it is. As discussed above regarding the IDP and Provincial SDF, the local municipalities include the ORWRDP in their documents as a construction objective, referring to the project as both the De Hoop Dam Water Scheme and the ORWRDP.

Need and Desirability (Timing)	
Question	**Response**
7. Is this project part of a national programme to address an issue of national concern or importance?	Yes, the OMMP-BRWSP is a water scheme under the authority of the DWS with the objective of meeting the water resource demand within the Olifants catchment area. As such, it is part of the national program addressing a critical issue of national concern. The need for this project stems from the commitments made by the South African Government in Chapter 2 (Bill of Rights) of the Constitution, specifically sections 24 and 27. Additionally, it aligns with the Millennium Development Goals (MDGs) set by the United Nations (UN) in 2000, where South Africa committed to achieving universal access to basic water and, in particular, to ensuring that all schools and clinics had access to water by 2008.
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	Yes, the pipeline and related infrastructure have been positioned in areas that facilitate or support the activity, such as placing the pipeline upstream and alongside existing roads, powerlines, and other infrastructure.
9. Is the development the best practicable environmental option for this land/site?	Yes, the people in this area do not have access to potable water, making this project essential for meeting their water needs. Additionally, the project alignment is located near existing roads and is primarily situated in previously disturbed areas with minimal steep slopes.
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	Yes, people in this area currently lack access to potable water. This project will provide all residents in the Olifants Catchment area of the FTLM, SDM with access to basic water, meeting a critical human need. Therefore, the negative impacts of the proposed development, after mitigation measures are implemented, are negligible when compared to the significant benefits the project will bring.
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	The SDM and FTLM will have to design and construct water treatment and reticulation infrastructure to access raw water from the OMMP-BRWSP (Phase 2D).
12. Will any person's rights be negatively affected by the proposed activity/ies?	Yes, the project will impact individuals' rights. There are parcels of land claimed by individuals within the footprint of the proposed Phase 2D infrastructure and alignment. These issues will be addressed through a formal legal process in accordance with the Expropriation Act No. 63 of 1975.
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	No, as this project will improve the resources available to people living on the urban edge.
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	Since inception, the project has acquired the status of strategic importance, and recently on 05 March 2023 the project was classified as a SIP under the SIP 19 (i.e., Water and Sanitation Infrastructure Portfolio).
15. What will the benefits be to society in general and to the local communities?	The project aims to develop much-needed bulk water infrastructure, which will then supply potable water to both residents and commercial users. The local community will gain access to potable water, addressing a fundamental human need.

Need and Desirability (Timing)	
Question	**Response**
	The expected benefits of providing a reliable potable water supply include: • A reduction in waterborne illnesses • Improved health and livelihoods for local communities • Enhanced sustainability efforts in the region On a broader scale, the project will contribute to addressing water and sanitation challenges in the area. Furthermore, the overall project holds international significance, as it supports South Africa's ability to meet its global obligations, particularly the Sustainable Development Goals (SDGs). These 17 SDGs, part of the 2030 Agenda for Sustainable Development, were adopted by the UN General Assembly on 25 September 2015. As a member of the UN, South Africa has committed to achieving these globally recognised goals. Specifically, SDG Target 6.1 calls for universal and equitable access to safe and affordable drinking water.
16. Any other need and desirability considerations related to the proposed activity?	Not applicable.
17. How does the project fit into the National Development Plan for 2030?	The NDP for 2030 aims to create jobs, develop and expand infrastructure, transition to a low carbon economy and unify South Africa. This project will fit into the NDP as follows: <u>Create jobs:</u> • The proposed project is expected to result in jobs for the construction phase and the operational phase. • Indirect opportunities for small businesses would be generated such as accommodation, food and service industries through the increased number of people travelling to the proposed area. • Many indirect jobs, such as the hospitality industry, transportation industry and manufacturing industry may also be created. <u>Infrastructure development and expansion:</u> • The OMMP-BRWSP project aims to provide potable water to communities, which will require the construction of the necessary infrastructure, including raw bulk water pipelines and associated facilities. <u>Transformation and unity:</u> • Employment equity will be met through the Operation and Maintenance Project Company and the contractors responsible for the construction of the pipeline and associated infrastructure. • Economic development is one of the most important requirements of the country. Engagement with the community, relevant Traditional Authority (Pulana Maroga Traditional Authority) and stakeholders has already commenced. The NDP outlines that, by 2030, a Public Infrastructure Investment Program will allocate 10% of GDP to water resources, energy, and transport. It further commits to creating more efficient infrastructure for water supply, improving water access for all South Africans, and ensuring access to safe drinking water (NDP, 2013).

Need and Desirability (Timing)	
Question	**Response**
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.	**Table 5-5** lists the general objectives of integrated environmental management and indicates how the project supports them

Table 5-5: Consideration of NEMA objectives

Section 23(2) of NEMA: The general objective of integrated environmental management is to:	Description as to how the proposed development has taken these general objectives into account.
(a) promote the integration of the principles of environmental management set out in section 2 of NEMA into the making of all decisions which may have a significant effect on the environment;	The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of impacts of the project by Specialists to ensure that the project will be undertaken in an environmentally responsible manner. In recognition that social responsibility is something which needs to be actively developed, a PPP will be undertaken. This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information.
(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;	This BAR includes the list of potential impacts associated with this project. Each aspect was evaluated to determine the significance of the impact and mitigation measures have been proposed to reduce negative impacts and to enhance positive impacts. The standard EMPr has been updated to include the recommendations from the respective specialists to guide the construction and operational phases in an environmentally and socially sound manner (Refer to **Annexure F**).
(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.	Specialist studies were commissioned to ensure that specific impacts are adequately assessed, and appropriate mitigation measures are proposed.
(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.	The PPP that is undertaken for the proposed project is described in detail in Section 4. The PPP will be done in accordance with Regulation 41 of the 2014 EIA Regulations (GN R982 of 2014) and the applicable best practice guidelines.
(e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment.	The final alignment and location of the proposed Mooihoek BPR was proposed once the ZNJV EAP team with the engineering team had been to the site as part of a site screening assessment. Detailed designs and layouts of infrastructure along and within the site footprint will take sensitivities and buffer zones into account, as detailed in the specialist assessments in **Section 7** and **Annexure D.**
(f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.	Recommendations and mitigation/ enhancement measures for each of the impacts identified in **Section 7** have been included in the EMPr in **Annexure F**. The purpose of these recommendations is to minimise the disturbance to the environment and enhance possible opportunities associated with locating the proposed development at this particular site. Where negative impacts are unavoidable, strict management and rehabilitation is recommended to minimise the potential negative impacts.

19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.	Section 2 of NEMA lists principles that underpin Sustainable Development and the consideration of environmental impact within the Act. These principles are critical to achieve Sustainable Development and to balance competing demands for resources from

Need and Desirability (Timing)	
Question	**Response**
	economic system, social, and ecological systems. These principles are applicable to the "actions of all organs of state that may significantly affect the environment" and it is therefore crucial to apply them to the proposed development, for decision-makers to be confident that their decision to allow a development, promotes sustainable development. The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of the impacts of the project to ensure that the project will be undertaken in an environmentally responsible manner. Recognising that social responsibility is something that needs to be actively developed, PPP will be undertaken (as detailed above in **Section 4**). This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information. Furthermore, knowledge from I&APs will be included in all forms, including traditional or ordinary knowledge. The PPP and consultation with the directly affected landowners will also aim to improve environmental awareness in the area [Section 2(4)(h) of NEMA]. Key organs of state that may have interest in the project have been proactively identified, and an effort has been made to promote intergovernmental coordination as far as possible to reduce the potential for conflicts of interest, caused by lack of information or inappropriate communication channels. Proof of this correspondence is detailed in **Section 4** and **Annexure C**. Environmental management has been considered to place people and their needs at the forefront of its concern, aiming to serve their physical, psychological, developmental, cultural, and social interests equitably [Section 2(2) of NEMA]. However, it is crucial that ecological considerations are also considered through this process and avoidance, minimising or rehabilitating measures are detailed for the disturbance of ecosystems and loss of biodiversity, pollution and degradation of the environment, disturbance of landscapes, and sites that constitute the nation's cultural heritage, waste, and the use and exploration of non-renewable natural resources [Section 2(4)(a)(i-v) of NEMA]. Where a negative impact is unavoidable, measures have been considered to remedy the disturbance and address the effects [Section 2(4)(p) of NEMA]. The nature of this BA process has been to undertake a risk-averse and cautious approach, and where relevant the worst-case scenario has been assessed. Each specialist has detailed their methodology as well as their assumptions and limitations about their assessments, and these reports have been included in full in **Annexure D**. The specialists conducted their site visits between October 2024 and January 2025. The findings of these assessments have been amalgamated into this BAR which have assessed the impact of this proposed development. Should this BAR be granted a positive environmental authorisation, stringent environmental health and safety standards will be required. It will also acknowledge the right of workers to refuse work that is

Need and Desirability (Timing)	
Question	**Response**
	harmful to human health, or the environment, and be informed of any potential dangers [Section 2(4)(e & j)]. In addition, this process has been undertaken in a manner that meets the principles and objectives of the South African legislation, and also meets global and international responsibilities relating to the environment by contributing to the renewable energy targets and reducing the reliance on carbon heavy energy sources using fossil fuels [Section 2(4)(n)].

6 CONSIDERATION OF ALTERNATIVES

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include -
(g) A motivation for the preferred site, activity and technology alternative;
(h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –

(i) details of all the alternatives considered;
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
(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;
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
(v) 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;
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and
(xi) a concluding statement indicating the preferred alternative development location within the approved site.

The NEMA requires that alternatives are considered during the BA process. The DEA&DP Guideline on Alternatives (2013)[12] states that: "*every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist*."

The 2014 EIA Regulations (GN R982 of 2014) provide the following definition: "*Alternatives*", in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to the –

a) property on which or location where the activity is proposed to be undertaken;
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
f) includes the option of not implementing the activity ("No-Go" alternative).

This EIA application involves seeking EA for Phase 2D, a component of the overall OMMP-BRWSP project, along with its associated infrastructure.

The project was first evaluated for different alternatives in the original impact assessment process and has since been authorised in the RoD under the ECA (Ref No.: **03/2/4** and **12/12/20/553**). However, due to issues with servitude encroachments, the authorised alignment has been re-evaluated using a Multi-Criteria Analysis (MCA) approach.

[12] This guideline has been used as a best practice tool since it is the most recent guideline on alternatives.

A MCA workshop was conducted by a multi-disciplinary team to determine the most feasible and reasonable pipeline alignment routes/locations for the proposed OMMP-BRWSP. The scoring criteria for the analysis were based on the following system:

- 0 – Fatal flaw;
- 1 – Not favourable (has most impacts and/or risks);
- 2 – Slightly unfavourable (average impacts and/or risks); and
- 3 – Favourable (least impacts and/or risks).

The most suitable locations were selected based on the following factors, which were scored using the above system:

Table 6-1: Weighing criteria

Factors	Description
Feasibility	• Topography and angles of the slopes to ensure a gravitational pipeline scheme could be developed; • Possible invert levels of the pipeline; • Existing infrastructure (roads, Eskom powerlines etc); • Access to land; • Location of human settlements; and • The details from the original EIA undertaken for the scheme.
Geotechnical Suitability	• The material required for construction; • The volume of the material required; and • The requirements for blasting.
Environmental and Social	• Impacts on heritage features; • Red data species (fauna and flora); • Land capability and vegetation cover; • Rivers and other water features; drainage lines; • Surrounding communities; and • Visual impacts.

The outcome of the MCA workshop concluded that the originally authorised alignment is no longer feasible. This is due to the placement of infrastructure such as houses, businesses, Eskom power lines, and municipal services along the original route. Furthermore, efforts were made to avoid protected trees, encountered along the route, and to remain within the boundaries of the Lebalelo Scheme. Constructing the pipeline along the original alignment would therefore be costly and would disrupt the livelihoods of local residents.

As a result, the ZNJV team proposed a slight adjustment to the alignment to ensure it is ranked as the most favourable option. It is important to note that certain areas could not be avoided, and the relevant specialist impact assessments (refer to the impact assessment discussion in **section 7** below) have recommended appropriate mitigation measures for these areas.

6.1 LOCATION ALTERNATIVES

6.1.1 RAW WATER PIPELINE SEGMENT FROM THE MOOIHOEK RESERVIOR TO THE PROPOSED MOOIHOEK BREAK PRESSURE RESERVIOR

This segment of the pipeline is necessary to connect the existing Mooihoek reservoir to the proposed Mooihoek BPR (refer to **Figure** 1-3). The selection of the pipeline alignment route was based on the location of the existing, already authorised pipeline alignment and the need to connect to the established Lebalelo scheme. Careful consideration was given when proposing the alignment, particularly with respect to Eskom servitudes, to ensure that the pipeline crosses the Eskom transmission lines diagonally. Additionally, efforts were made to minimise the impact on several houses. Moreover, attempts were made to avoid protected trees, such as the *Sclerocarya b*irrea subsp. *caffra* (Marula tree)

and the *Balanites maughamii* subsp. *maughamii* (Torchwood) encountered along the route, and to remain within the boundaries of the Lebalelo Scheme.

6.1.2 RAW WATER PIPELINE SEGMENT IN THE CENTRE SECTION OF THE ALIGNMENT

This approximately 1 km realignment of the central section on Portion 2 of the Farm Mooihoek 255 KT was undertaken to mitigate social impacts, including but not limited to relocation and resettlement. As a result of these considerations, certain adjustments were made to the approved pipeline alignment in 2023. These adjustments aimed to reduce the number of households affected. The deviations involve encroachment into a few residential yards or existing infrastructure.

6.1.3 PROPOSED BREAK PRESSURE RESERVIOR

The proposed Mooihoek BPR is necessary to allow water to flow under gravity from Mooihoek to Havercroft Junction, as the topography does not permit water to flow by gravity from the existing Mooihoek reservoir via the current LWUA pipeline to Havercroft Junction. This site is ideally suited for the placement of the BPR, as it is located near the highest point along the pipeline route, at the required elevation, and within a relatively large open area where a dam or tank of the required capacity could be feasibly constructed.

This is the only viable location for the BPR. The layout is not expected to have significant negative environmental impacts, provided that it complies with the criteria outlined in this report and the EMPr appended in **Annexure F**.

6.2 TECHNOLOGY ALTERNATIVES

6.2.1 RAW WATER PIPELINE SEGMENT FROM THE MOOIHOEK RESERVOIR TO THE PROPOSED MOOIHOEK BREAK PRESSURE RESERVIOR

Alternative 1 (Preferred Alternative):

Excavating a trench and installing the infrastructure is the approved method by the DWS. This approach ensures that the pipeline is buried underground, including beneath rivers, to protect it from damage caused by vandalism and environmental conditions. When crossing rivers, the pipeline will be concrete-encased and buried at a depth greater than the 100-year river scouring depth, ensuring the infrastructure is safeguarded throughout its lifetime. All infrastructure will be constructed in accordance with DWS requirements.

For the construction of the scheme, the following equipment and general construction technologies will be used:

- Excavators and TLBs for trenching.
- Front-end loaders and trucks to transport materials.
- Cranes to lay the pipes.
- Rock breakers, rock peckers, and blasting to trench through rock.
- Pumps to de-water the trench and excavations, allowing work to continue in areas where water ingress occurs.
- Concrete batching facilities and equipment to construct other structures such as scour chambers, pump stations, reservoirs, and pigging stations (which allow for cleaning of the pipeline to prevent bacterial growth).

The scheme will be operated from a control room in Groblersdal via a fibre optic cable, making the entire system automated during operation. However, the scheme has been designed to allow for manual operation if needed.

Alternative 2:

An overland pipeline is prone to vandalism and theft. Additionally, this method of installation is not approved by the DWS. Furthermore, large-diameter pipelines present additional concerns, such as acting as physical barriers and posing safety risks.

Alternative 3:

Pipe jacking or tunnelling could be considered; however, it is costly and unnecessary if excavation is a feasible option.

Note: Alternatives 2 and 3 were not subjected to specialist assessment and will therefore not be discussed further in this report. Only Alternative 1 is considered feasible and has been assessed in detail.

6.3 SIZING OPTIONS OF THE PROPOSED BREAK PRESSURE RESERVOIR

It is proposed that the BPR provide at least six hours of storage based on the design flow rate, which would require a total storage capacity of 16.5 Mℓ.

If the required storage hours are reduced, the storage capacity needed in the BPR would also decrease in direct proportion to the reduction in storage time. This would result in a reduction in both the spatial requirements and costs associated with the BPR. However, such a reduction would compromise the reliability of the system and could lead to situations where water cannot be supplied to Clapham or the Phase 2F system when the Steelpoort pumps are not operational.

Based on the required storage capacity and available space, two practical options have been considered for the construction of the BPR: an earth embankment dam or a reinforced concrete reservoir (either circular or rectangular). The feasibility study of these two options revealed that there is insufficient space on the soccer field to accommodate an earth embankment dam with the necessary dimensions to provide a storage capacity of 16.5 Mℓ.

6.3.1 EARTH EMBANKMENT DAM WITH A CAPACITY OF 3.3 ML AND WALL HEIGHT OF 5 M

If the space is fully utilised, an earth embankment dam with a storage capacity of only 3.3 Mℓ can be constructed, with wall heights of 5 m (refer to **Figure** 6-1).

Figure 6-1: Earth embankment dam with a capacity of 3.3 ML and wall height of 5 m.

6.3.2 EARTH EMBANKMENT DAM WITH A CAPACITY OF 16.5 ML AND A WALL HEIGHT OF 5 M

However, if the two properties directly to the west of the soccer field are also acquired, it would be possible to construct an earth embankment dam with a storage capacity of 16.5 Mℓ and an embankment height of 5 m (refer to **Figure** 6-2).

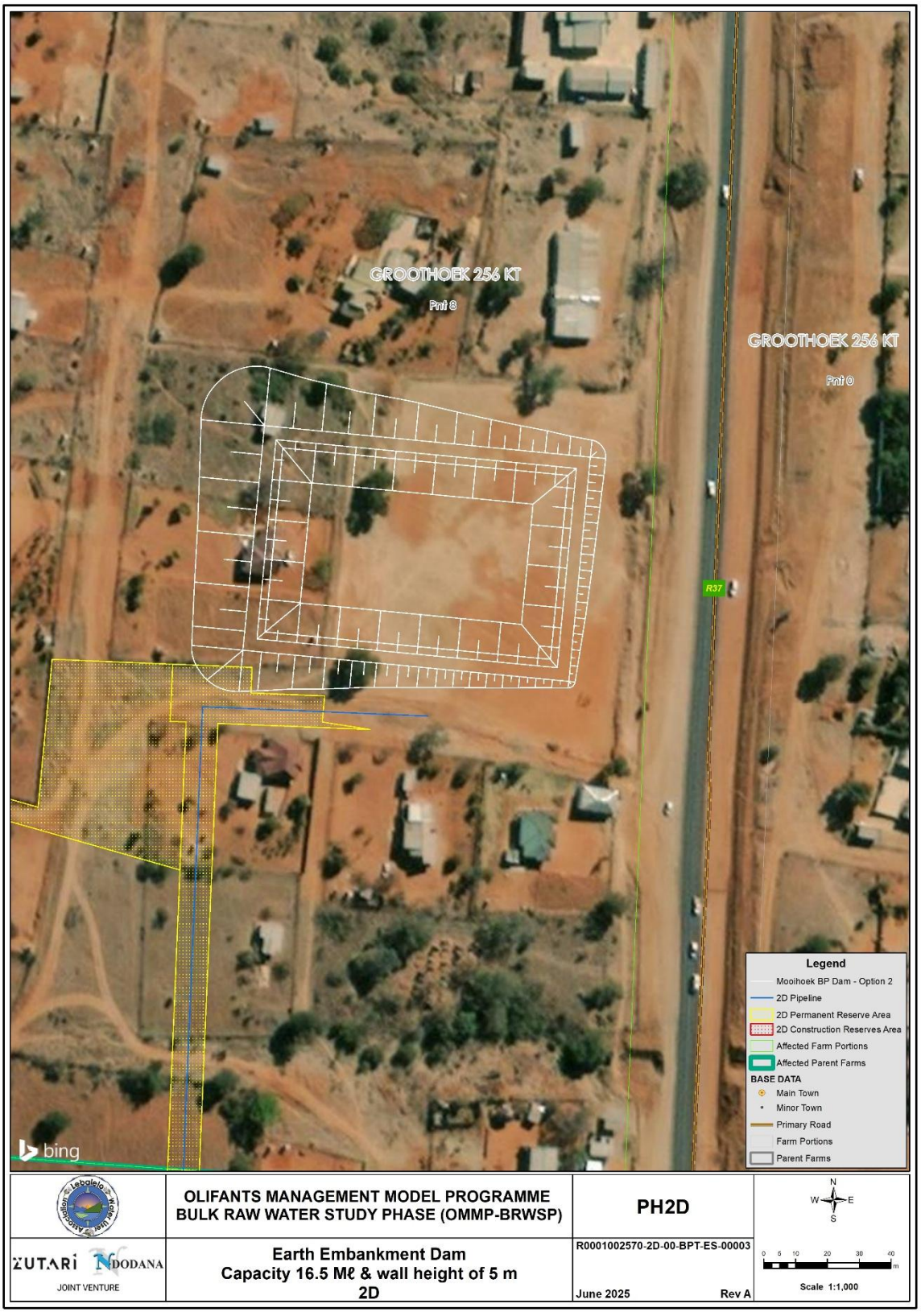


Figure 6-2: Earth embankment dam with a capacity of 16.5 ML and a wall height of 5 m.

6.3.2.1 Rectangular and Circular Reinforced Concrete Reservoir - Storage Capacity of 16.5 mℓ and Water Depth of 5.5 m

Reinforced concrete reservoirs were modelled to determine the spatial requirements. A rectangular reservoir measuring 50 m x 60 m with a water depth of 5.5 m would provide a total storage capacity of 16.5 Mℓ. Alternatively, a circular reservoir with a diameter of 62 m and the same water depth would also meet the required capacity. Both options could be further optimised by increasing the water depth. These configurations would comfortably fit on the soccer field site without the need for additional land acquisition, and removing / relocating the large Marula Trees (refer to **Figure** 6-3 and **Figure** 6-4).

Figure 6-3: Rectangular reinforced concrete reservoir - storage capacity of 16.5 Mℓ and water depth of 5.5 m.

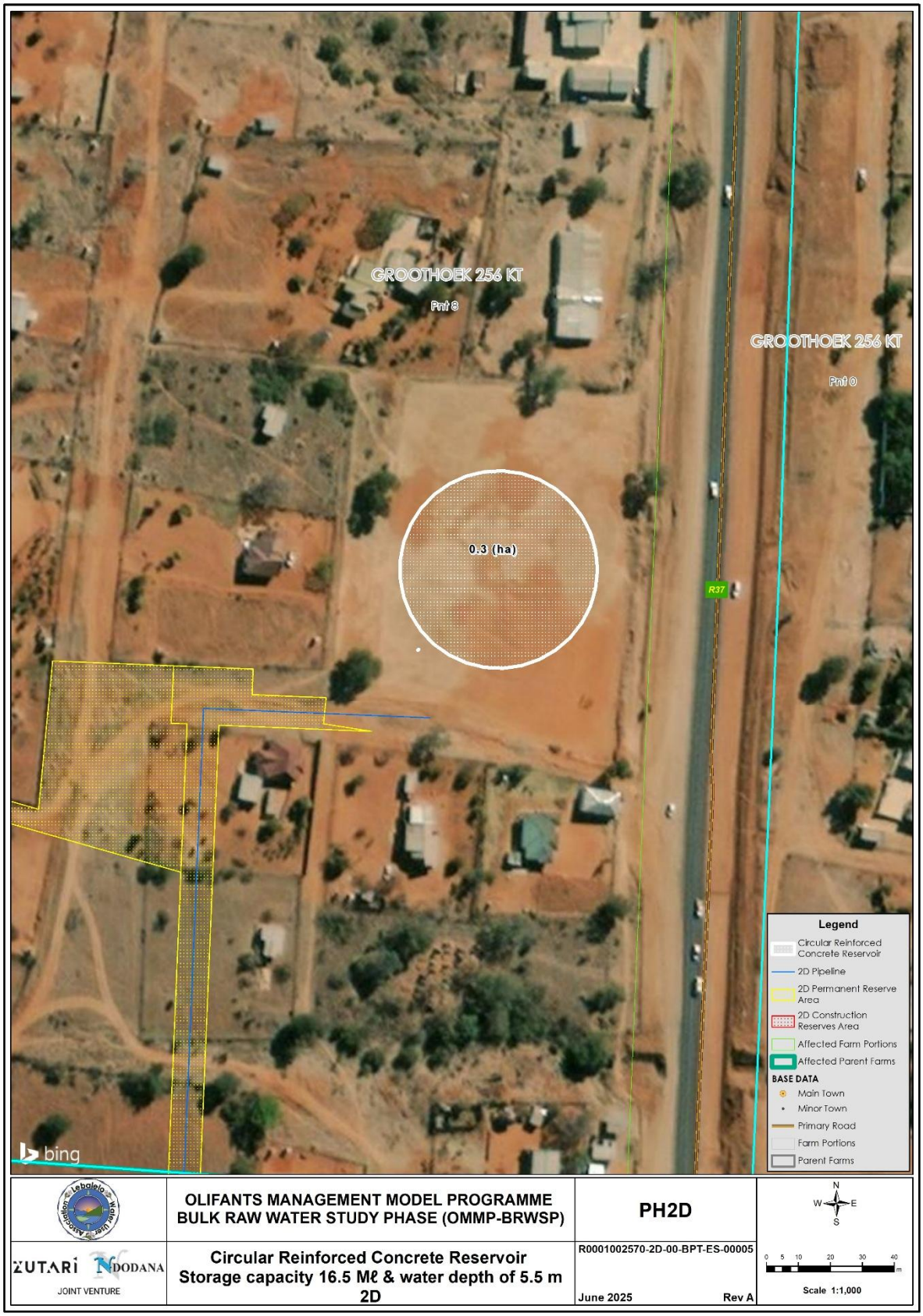


Figure 6-4: Circular reinforced concrete reservoir - storage capacity of 16.5 Mℓ and water depth of 5.5 m.

It is important to note that none of the figures presented above include the ancillary infrastructure surrounding the reservoir. Spatial allowance must be made for pipework, valve chambers, inlet and outlet structures, access gates, fencing, vehicular access, parking, security, telemetry infrastructure, and other related components.

Note: For this application, the preferred alternative for the sizing of the proposed BPR is a circular reservoir with a diameter of 62 m, a water depth of 5.5 m, and a total storage capacity of 16.5 Mℓ (see **Table** 5-1 above).

6.4 NO-GO ALTERNATIVE

The assessment of alternatives must always include the “no-go” option as a baseline against which all other alternatives must be measured. The no-go option represents the status quo which normally presents the option of not implementing the activity. The assessment of the No-Go is a requirement of NEMA but also considered a global best practice. This assessment can provide a baseline scenario against which the project (or its alternatives) can be compared. In this instance, the no-go alternative would mean that the objective to meet the water resource demand within the Olifants catchment area will not be achieved. As a result, the communities in the FTLM, through which the pipeline traverses, would not have access to clean potable water. This is not a feasible alternative. The no-go alternative would only have been seriously considered if significant environmental or social red flags, or fatal flaws, had been identified at sites considered for the pipeline development and associated infrastructure — issues which are not present in this application.

7 BASELINE ENVIRONMENT AND ENVIRONMENTAL IMPACT ASSESSMENT

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the site and surrounding area, specialist studies and discussions with various role players. The high-level identification of potential impacts which may occur as a result of the proposed activities described in **Section 5**, is broad and covers the phases of the project life cycle. Cumulative impacts have been assessed per environmental aspect in the BAR and by specialists.

The specialist assessments conducted, and compliance statement compiled as part of the BA process have been included as **Annexure D** to this report. As such, the baseline descriptions of the footprint, followed by the predicted impact assessments are detailed below, as assessed by the specialist team.

7.1 PROJECT BASELINE INFORMATION

7.1.1 CLIMATE

The climate of the study area can be described as semi-arid, lying in the rain shadow of the escarpment which has an annual rainfall of 400 mm and mean temperature of 22ºC.

7.1.2 SURFACE AND WIND FIELD

The SDM experiences an average monthly wind speed of 0.72 m/s. Wind patterns are predominantly from the south-south-west (30.6%) and south-west (20.4%).

7.1.3 TEMPERATURE AND HUMIDITY

The average monthly temperature in the SDM ranges between 4 and 32ºC. The average maximum daytime temperature of 32 ºC occurs in January with the lowest average minimum temperature of 4ºC occurring in July.

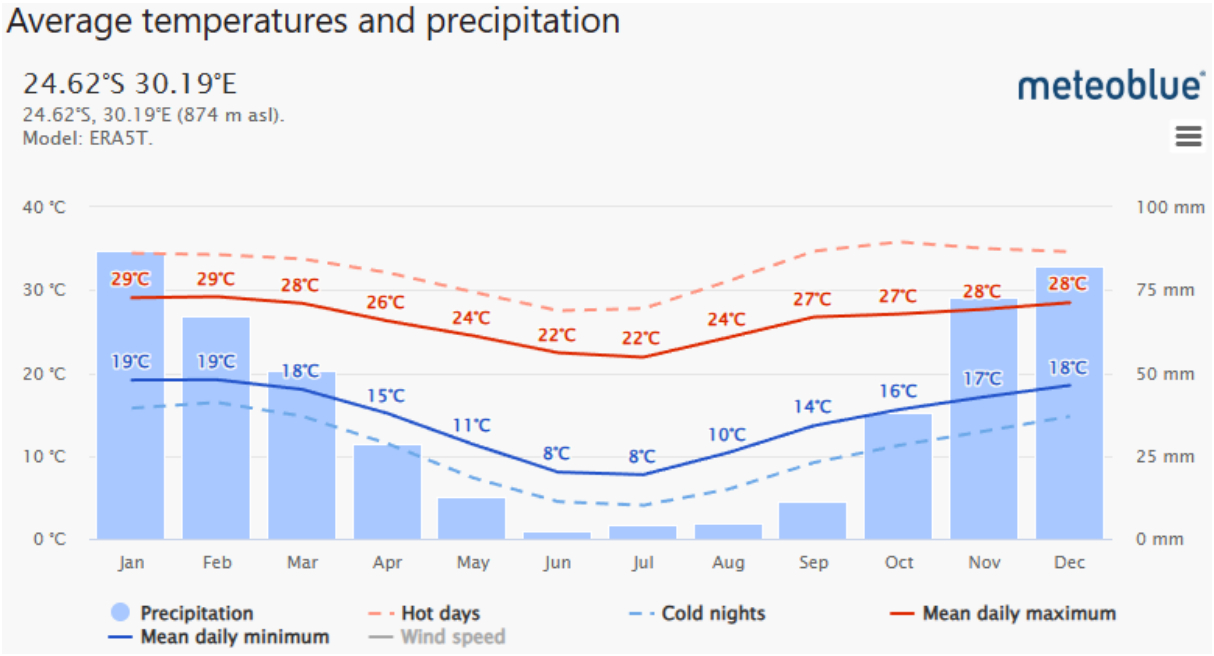


Figure 7-1: Makgemeng Average Temperature and Precipitation for the Period 1993 – 2023.

7.1.4 PRECIPITATION

The average annual rainfall is 551 mm and the average maximum monthly rainfall in the summer month of December/January/February is 267 mm. Little rainfall occurs during the winter month of July with an average monthly precipitation of 3 mm.

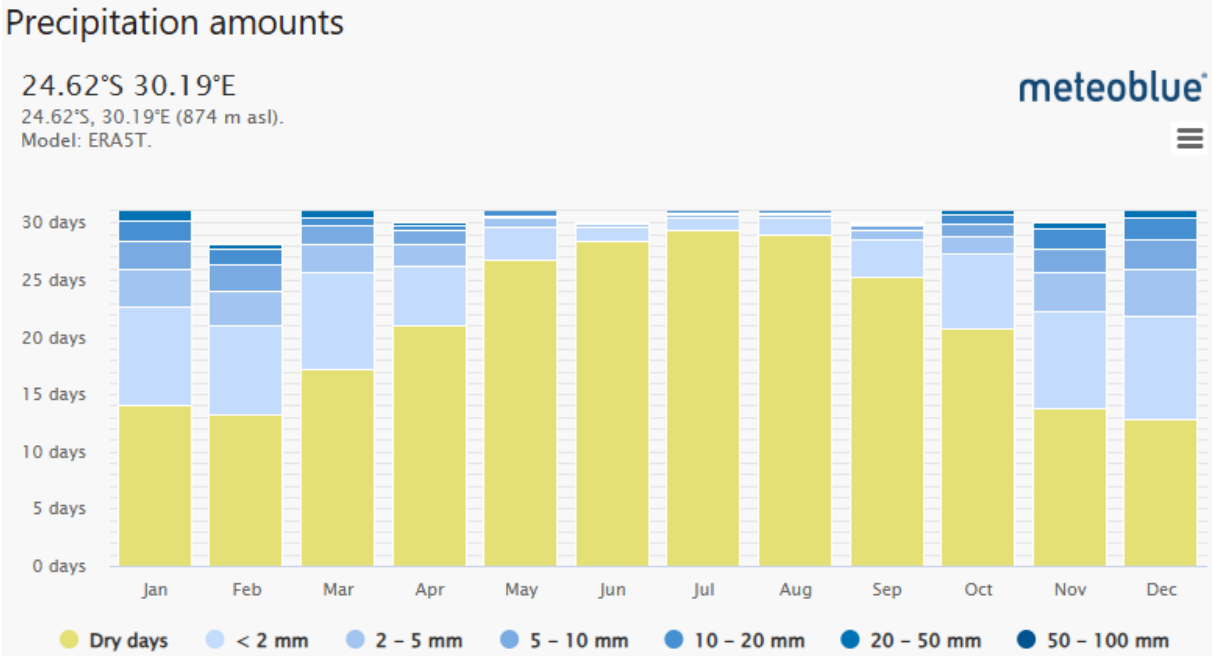


Figure 7-2: Makgemeng Average Monthly Rainfall for the Period 1993 – 2023.

7.1.5 TOPOGRAPHY AND LANDUSE

The main economic activities in Sekhukhune are mining and irrigated agriculture Platinum, Chrome, Gold, and Palladium mines are situated in the eastern part of the district, around the Leolo Mountains. The rocks and soils of the Sekhukhuneland region hold some of the highest concentrations of heavy metals in the world including chromium, platinum, titanium, and vanadium. This has led to enormous growth in the mining sector, with many more mines planned for the area.

Development of the Dilokong Corridor, an area rich in mineral deposits that stretches across the northeast of Sekhukhune through Fetakgomo and Tubatse, is expected to provide increased economic opportunity in the district. There are commercial irrigated farms near Groblersdal and Marble Hall in the south-west and Zebediela in the north, however only 30% of the land area of the district is under commercial farming.

The topography of the Phase 2D project ranges from 740 m to 1050 m Above Mean Sea Level (AMSL).

7.2 AGRICULTURAL COMPLIANCE STATEMENT (SOILZA, 2024)

The agricultural compliance statement was compiled by SoilZa. The assessment was based on an on-site investigation conducted on 10 November 2024. It was also informed by existing climate, soil, and agricultural potential data for the site. The objective of an agricultural assessment is to answer the question: will the proposed development cause a significant reduction in agricultural production potential, and most importantly, will it result in a loss of arable land?

7.2.1 SITE SENSITIVITY VERIFICATION

The agricultural sensitivity of the site, as classified by the screening tool, is shown in **Figure** 7-3. The screening tool classifies the pipeline route as ranging from low to high agricultural sensitivity. The high sensitivity classification is due to a combination of some land being classified as cropland (high sensitivity) and some being classified as high sensitivity because of its land capability rating. However, the data set used by the screening tool to classify cropping status is outdated. There is almost no cropland along the route. There is some subsistence cropping that takes place from time-to-time in certain places. This assessment therefore disputes the high sensitivity rating by the screening tool for the cropping status component of sensitivity and confirms it as less than high.

The direct relationship between land capability rating, agricultural sensitivity, and rain-fed cropping suitability is shown in **Table** 7-1, including differences between the summer and winter rainfall areas.

Table 7-1: Relationship between land capability, agricultural sensitivity, and rain-fed cropping suitability.[13]

Land capability value	Agricultural sensitivity	Rain-fed cropping suitability	
		Summer rainfall areas	Winter rainfall areas
1 - 5	Low	Unsuitable	Unsuitable
6	Medium		
7			Suitable
8	High	Suitable	
9 - 10			
11 - 15	Very High		

The classified land capability of the site ranges from 3 to 10. According to the strict definitions of agricultural sensitivity, the site must be classified as high sensitivity because its inherent land capability is likely to be above 8 in many places along the route. This assessment verifies the classified land capability, based on the assessment of the cropping potential in the agricultural report (see Section 8) and therefore verifies it as being of high agricultural sensitivity in terms of the land capability component of sensitivity.

[13] Note that a value of 8 is defined as high agricultural sensitivity in NEMA's agricultural protocol but does not show as high on the screening tool's output due to an error in the tool. In this assessment, all areas of value 8 are treated as being high sensitivity.

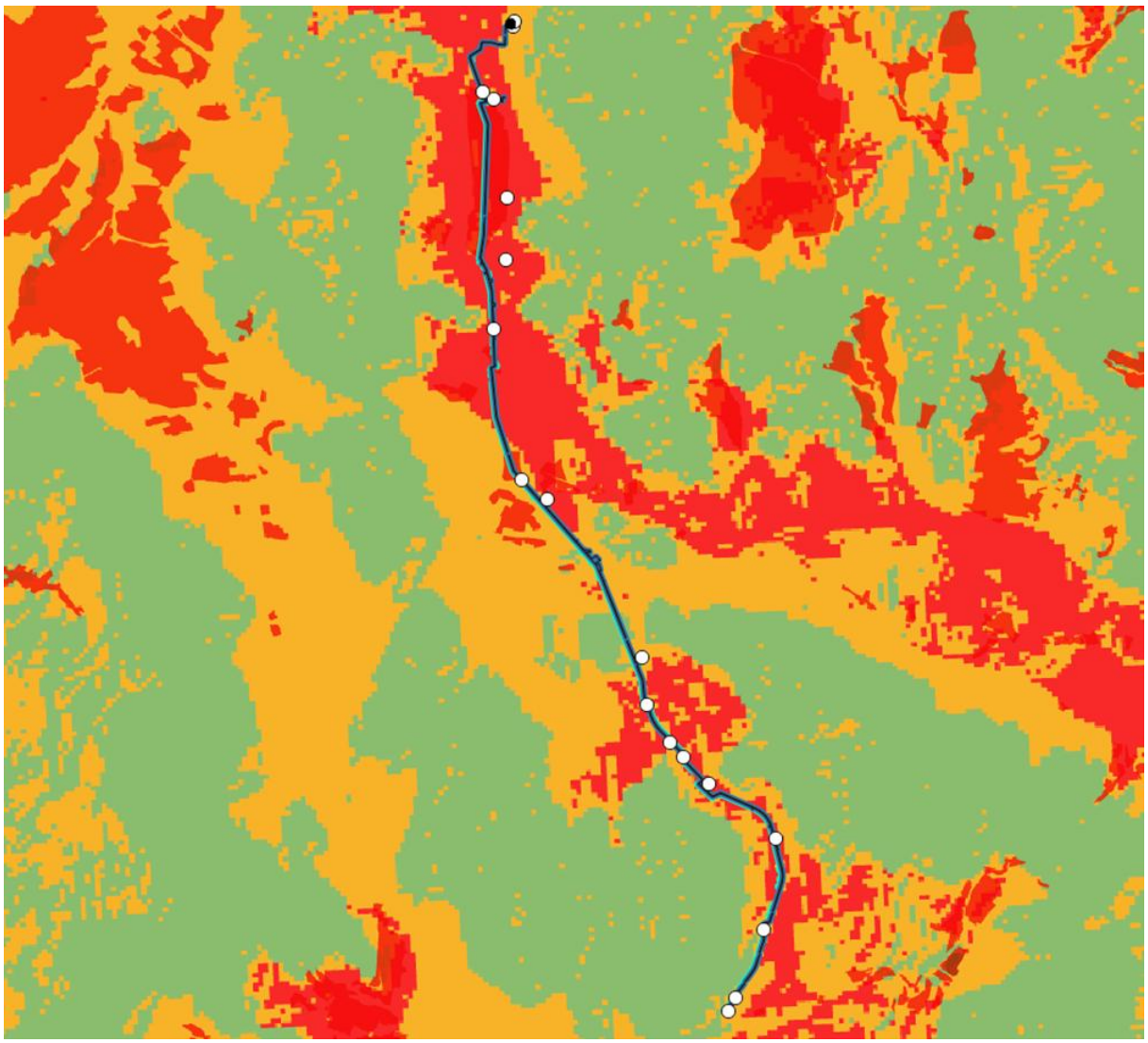


Figure 7-3: The pipeline route overlaid on agricultural sensitivity, as classified by the screening tool (green = low; yellow = medium; red = high; dark red = very high).

This assessment confirms the high sensitivity rating of the pipeline route by the screening tool because of the land's assessed agricultural production potential and current agricultural land use. However, although the sensitivity is high in places, the impact significance is low.

7.2.2 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The cropping potential of most of the site is limited by the combination of climate constraints (fairly low rainfall), terrain constraints in places, and soil constraints. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. Because of these constraints, much of the site is unsuitable for viable rainfed crop production and its viable agricultural use is limited to grazing. Almost all of the route is used only as grazing land, with patches of subsistence cropping in limited places.

Figure 7-4: Typical site conditions (SoilZa, 2024).

7.2.3 ASSESSMENT OF THE AGRICULTURAL IMPACT

7.2.3.1 Impact Identification and Assessment

There is only ever a single agricultural impact of any development, and that is a net change to the future agricultural production potential of the land. The significance of an agricultural impact is a direct function of the following three factors:

1. the size of the footprint of impacted land.
2. the baseline production potential (particularly cropping potential) of that land.
3. the length of time for which agriculture will be excluded (or for which potential will be decreased).

In the case of a buried pipeline, factor 3 and factor 1 are both so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has. The impact duration is confined to the construction period only. The pipeline is buried underground which means that agriculture can continue unaffected above it, once construction is completed. Therefore, no land, is permanently lost to agriculture. The footprint of land that will be excluded from agricultural production, even during construction, is extremely limited, with some impingement on subsistence cropland.

The potential impacts associated with soil erosion and degradation can be completely prevented with standard, generic mitigation measures that are all inherent in the project engineering and are standard, best-practice for construction sites, and are included in the EMPr. Such impacts are therefore not significant.

The main concern of agricultural impact is to protect against a threat to national food security due to the loss of agricultural production potential, mainly through loss of arable land. The proposed development will cause no long-term loss of agricultural production potential, and the agricultural impact is therefore assessed as being of very low significance. There will be some minor disturbances to agricultural activities during construction.

7.2.3.2 Cumulative Impact Assessment

The potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential.

Due to its negligible agricultural impact, the assessed development will not contribute to the cumulative impact. The cumulative agricultural impact of the proposed development is therefore assessed here as being of low significance and therefore as acceptable. The development will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the development be approved.

7.2.3.3 Assessment of Alternatives

Because of the insignificant agricultural impact of the proposed pipeline, there can be no material difference between the agricultural impacts of the non-preferred and the preferred alternatives along the proposed route.

The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative, but this is not significantly different from the very low impacts of the development and there is therefore no preferred alternative between the development and the no-go if assessed purely from an agricultural impact perspective.

7.2.4 MITIGATION MEASURES

Where construction-related disturbances have any potential to lead to channelling of runoff water with consequent erosion, the water runoff must be safely controlled by way of bunds and ditches to be safely disseminated downstream.

The following steps must be implemented for mitigation of impact on soil capability along the excavated trench for the pipeline:

1. When excavating for the pipeline, the upper 150 mm (15 cm)[14] of topsoil - as recommended in the project and contract specifications — must be excavated first and stockpiled.
2. The subsoil must then be excavated and stockpiled **separately** from the topsoil stockpile.
3. When the trench is refilled after the pipeline is installed, the subsoil must first be backfilled into the trench.
4. Thereafter, the stockpiled topsoil must be evenly spread at the surface on top of the subsoil.
5. The soil should be backfilled to be raised approximately 450 mm (30 cm) above the surface - as per contract specifications- because it will settle over time and potentially create a water flow path with consequent erosion if it settles to form a depression.

7.2.5 ADDITIONAL ASPECTS REQUIRED IN AN AGRICULTURAL ASSESSMENT

7.2.5.1 Micro-siting

The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimise fragmentation and disturbance of agricultural activities. Because of the low agricultural impact, micro-siting is not necessary and will make no material difference to agricultural impacts and disturbance.

7.2.5.2 Confirmation of Linear Activity Impact

The agricultural protocol requires confirmation, in the case of a linear activity, that the land can be returned to the current state within two years of completion of the construction phase. It is hereby confirmed that the land along the buried pipeline can be returned to the current state of agricultural production potential within two years of construction.

[14] Recommended by the specialist.

7.2.6 SPECIALIST CONCLUSION

The overall conclusion of this assessment is that the proposed development is acceptable because it leads to no loss of future agricultural production potential.

The screening tool classifies the pipeline route as ranging from low to high agricultural sensitivity. This assessment confirms the high sensitivity rating of the pipeline route by the screening tool because of the land's assessed agricultural production potential and current agricultural land use. However, although the sensitivity is high in places, the impact significance is low.

The cropping potential of most of the site is limited by the combination of climate constraints (low moisture availability), terrain constraints in places, and soil constraints. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. Because of these constraints, much of the site is unsuitable for viable rainfed crop production and its viable agricultural use is limited to grazing. Almost all of the route is used only as grazing land, with patches of subsistence cropping in limited places.

An agricultural impact is a change to the future agricultural production potential of land. In this case, the impact duration is confined to the construction period only. The pipeline is buried underground which means that agriculture can continue unaffected above it, once construction is completed. Therefore, no land, is permanently lost to agriculture and almost no cropland is impacted.

The proposed development will cause negligible loss of agricultural production potential, and the agricultural impact is therefore assessed as being of very low significance. From an agricultural impact point of view, it is recommended that the proposed development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions other than that the recommended mitigation is implemented.

7.3 AIR QUALITY IMPACT ASSESSMENT (EHRCON, 2024)

EHRCON (Pty) Ltd (EHRCON) was commissioned to assess the air quality impacts associated with the proposed scope changes for Phase 2D. The objectives of this study were to characterise and describe ambient emissions from the construction, operation, and rehabilitation phases of the Phase 2D Project, and to assess their potential impact on the health of the receiving community.

7.3.1 POLLUTION SOURCES AND RECEPTORS

7.3.1.1 Pollution Sources

Four "hot-spot" areas were selected for dispersion modelling based on the current understanding of the air quality within the province, the location of significant sources as well as available emissions data.

These are:

- **Polokwane region**: a region with a high number of sources and no up-to-date ambient air quality data to determine the current state of the air.
- **Lephalale region**: the only region within the province with power stations and large-scale coal mining activities.
- **Phalaborwa region**: the only area with fertiliser manufacturing, a copper smelter and large opencast mining operations.
- **Steelpoort Valley**: an area with a significant number of mining activities.

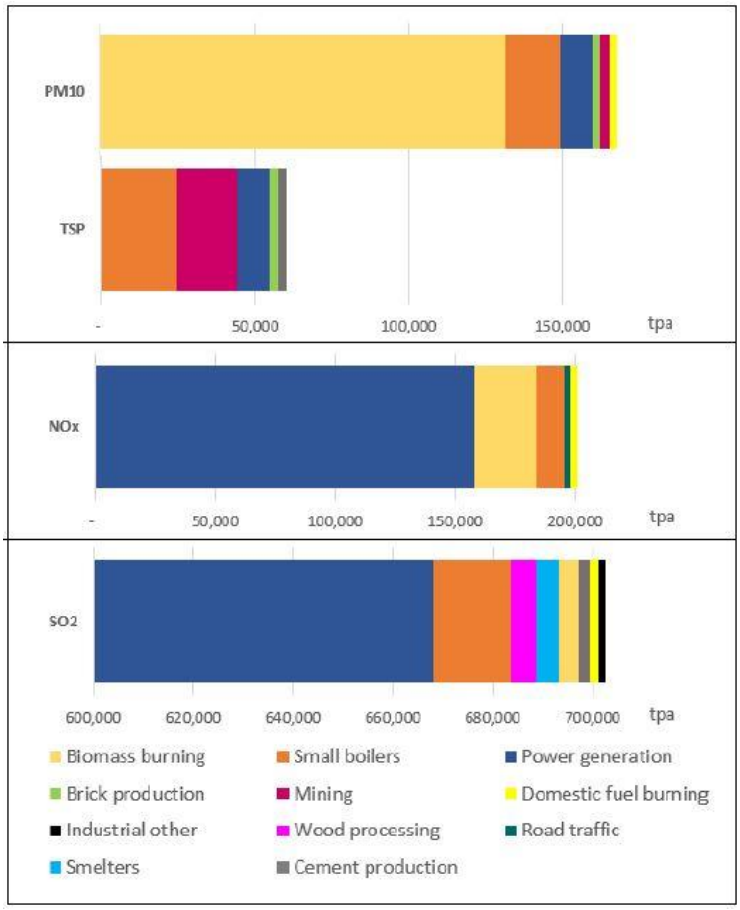


Figure 7-5: Limpopo Province Emission Per Source Group.

Some of the concerns identified were:

- The predicted impacts within the Polokwane area are mainly localised.
- The area around Lephalale is of concern, due to the planned development rather than the current situation. Current Ground Level Concentrations (GLCs) PM_{10} are however a concern around the opencast mines in the area where it is predicted to exceed standards at nearby settlements.
- The main area of concern is around Phalaborwa due to very high SO_2 concentrations impacting the town.
- The Steelpoort area due to the numerous mining operations within proximity to villages and homesteads resulting in high PM_{10} GLCs.

Dispersion modelling carried out as part of the baseline assessment indicated that ambient air quality standards of PM_{10} and SO_2 may be exceeded from time-to-time near Lephalale, Phalaborwa and in the Steelpoort Valley. This implies a potential of Zones 3[15] or 4[16] being approached, requiring action by Air Quality Officers. However, as no substantive air quality measurements have been conducted in these areas, other than SO_2 by Phalabora Copper, it is suggested that insufficient information exists to indicate which of the two air quality control zones is applicable. It was recommended, therefore, that current monitoring requirements are aimed at a Zone 3 (purple zone) level in those regions. Until better information becomes available, it was recommended that a Zone 2[17] classification be given to the other areas in the province.

[15] **Purple Zone:** Class 3 Air Quality Area: The areas where ambient air quality remains within the standards, but sustained air quality management interventions are required to, at least, maintain or improve this situation.

[16] **Orange Zone:** Class 4 Air Quality Area: The areas where ambient air quality represents a possible threat to health and well-being and requires immediate and sustained air quality management interventions to, at least, bring the area into compliance with the standards within agreed time frames.

[17] **Blue Zone:** Class 2 Air Quality Area: The areas where ambient air quality remains within Alert Levels, but "pre-emptive" air quality management interventions are required other than basic good air quality governance.

7.3.1.2 Air Quality Monitoring

7.3.1.2.1 Ambient Particulate Matter Monitoring

Ambient PM_{10} and $PM_{2.5}$ concentrations (and meteorological parameters) were monitored at Dilokong Hospital, Driekop and the Samancor Chrome Winterton Recreational Club from October 2015 until March 2016.

Figure 7-24 and **Figure** 7-29 include the Particulate Matter (PM) monitoring locations.

During 2015, eleven exceedances of the 24-hour PM_{10} standard were recorded at Dilokong Hospital, indicating non-compliance with the PM_{10} standard as only four exceedances of the standard are permitted per calendar year. $PM_{2.5}$ concentrations were low, with no exceedances recorded, indicating compliance with the standard. One exceedance of the PM_{10} standard was recorded on in February 2016, with no exceedances of $PM_{2.5}$ being recorded.

Figure 7-6 and **Figure** 7-7 present the daily average PM_{10} and $PM_{2.5}$ concentrations recorded over the period 7 October 2015 to 5 February 2016 at Dilokong Hospital. For 2015, the PM_{10} annual average was 52.20 µg/m^3, exceeding the annual standard (40 µg/m3), while the $PM_{2.5}$ annual average was 8.25 µg/m^3, remaining well below the annual standard of 25 µg/m^3.

For 2016, the PM_{10} running annual average was 34.03 µg/m^3, falling below the annual standard, while the $PM_{2.5}$ running annual average was 5.50 µg/m^3, remaining well below the new more stringent annual standard of 20 µg/m^3.

No exceedances of PM_{10} or $PM_{2.5}$ were recorded at Samancor Chrome Winterton Recreational Club.

Figure 7-8 and **Figure** 7-9 present the daily average PM_{10} and $PM_{2.5}$ concentrations recorded over the monitoring period of 6 February to 2 March 2016 at Samancor Chrome Winterton Recreational Club.

The PM_{10} running annual average was 36.14 µg/m^3, falling below the annual standard while the $PM_{2.5}$ running annual average was 6.39 µg/m^3, falling well below the new more stringent annual standard of 20 µg/m^3.

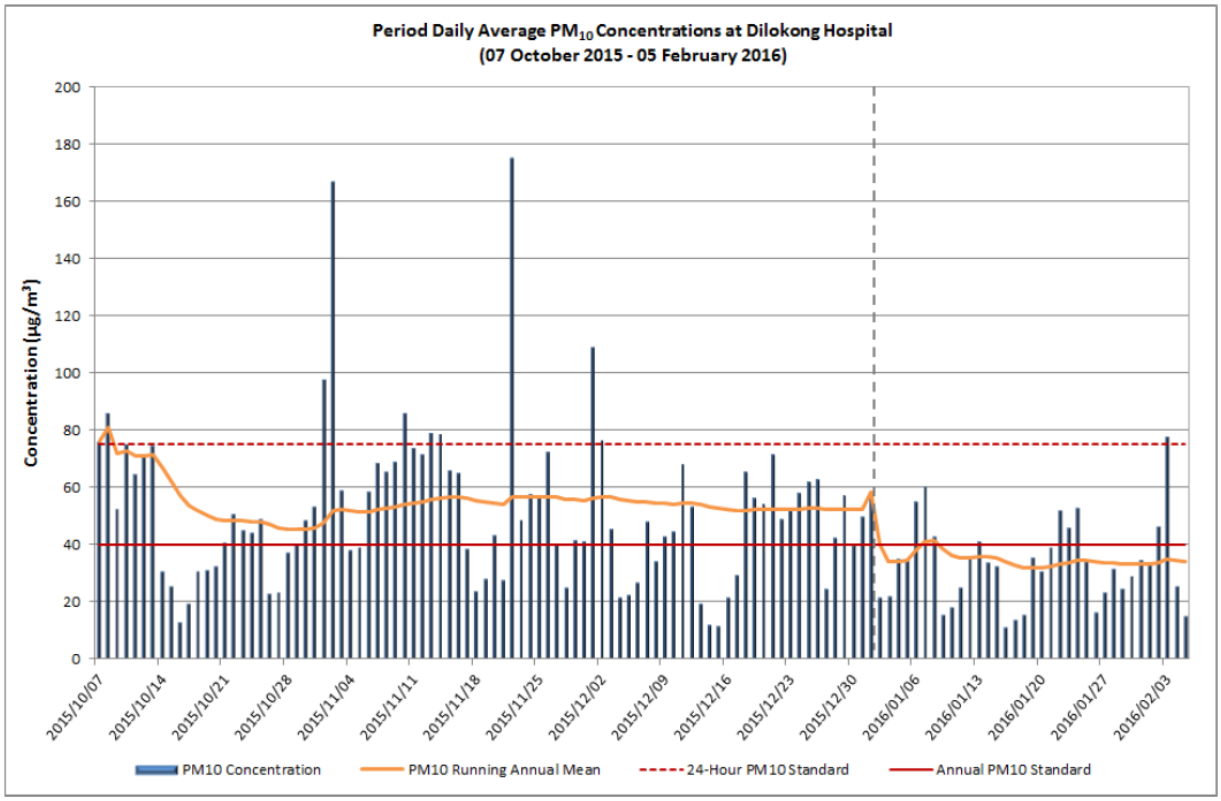


Figure 7-6: Daily Average PM_{10} Concentrations at Dilokong Hospital.

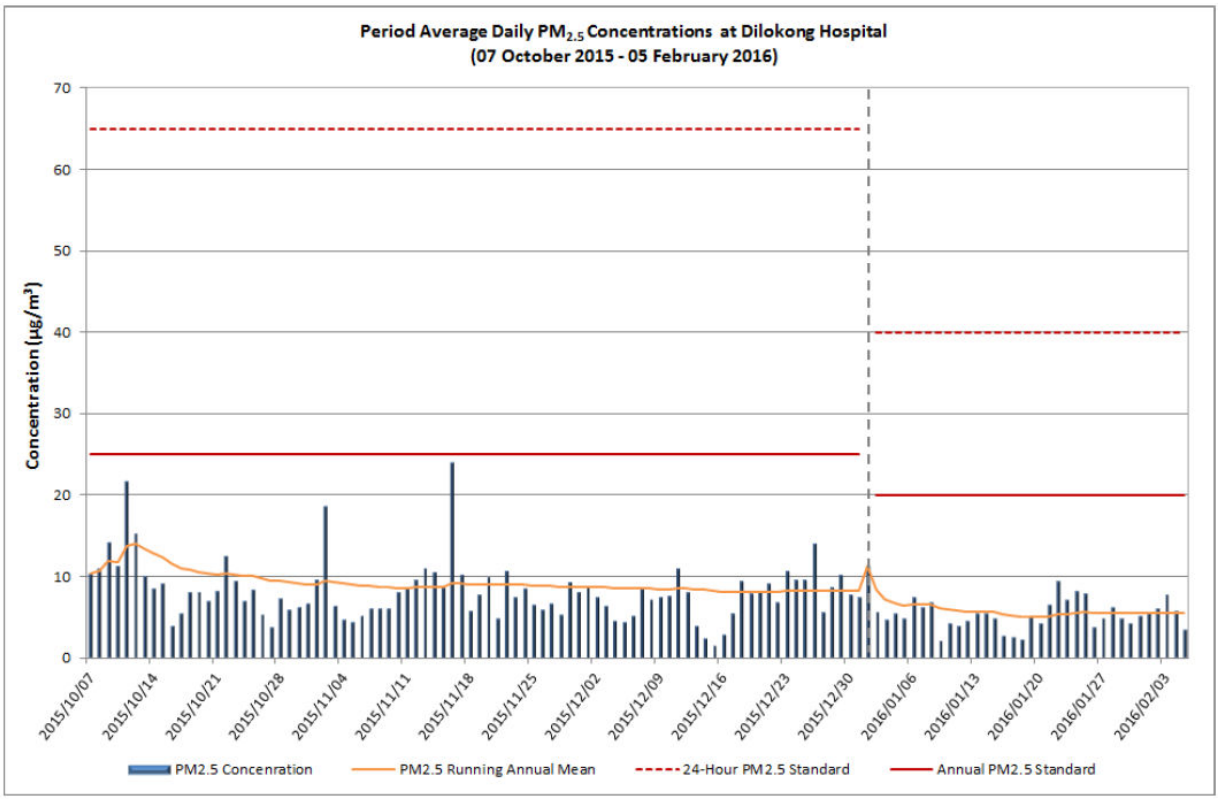


Figure 7-7: Daily Average $PM_{2.5}$ Concentrations at Dilokong Hospital.

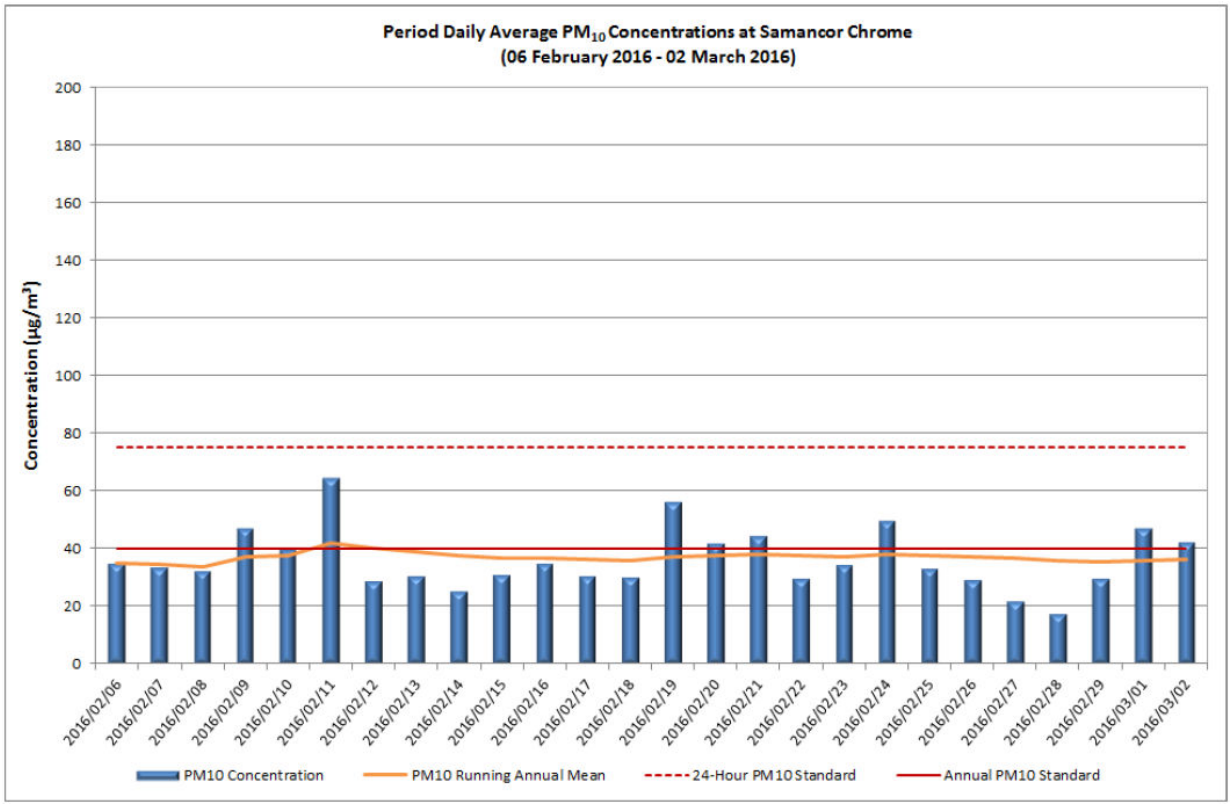


Figure 7-8: Daily Average PM_{10} Concentrations at Samancor Crome Winterton Recreational Club.

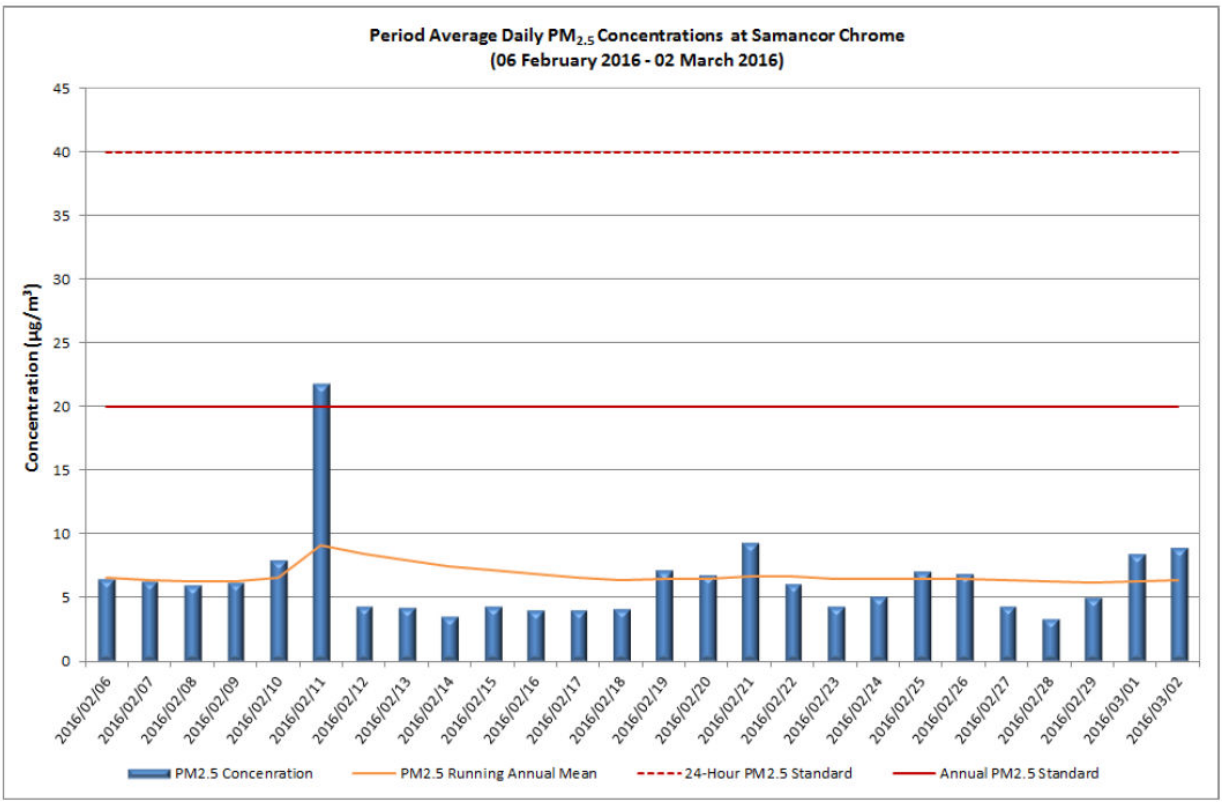


Figure 7-9: Daily Average $PM_{2.5}$ Concentrations at Samancor Crome Winterton Recreational Club.

7.3.1.2.2 Ambient Dust Deposition

7.3.1.2.3 Ambient Dust Deposition

Ambient dust deposition monitoring was conducted from October 2015 to March 2016. Ten dust deposition monitoring stations were deployed along Phase 2D. The monitoring stations are indicated in **Figure** 7-10 and **Figure** 7-11.

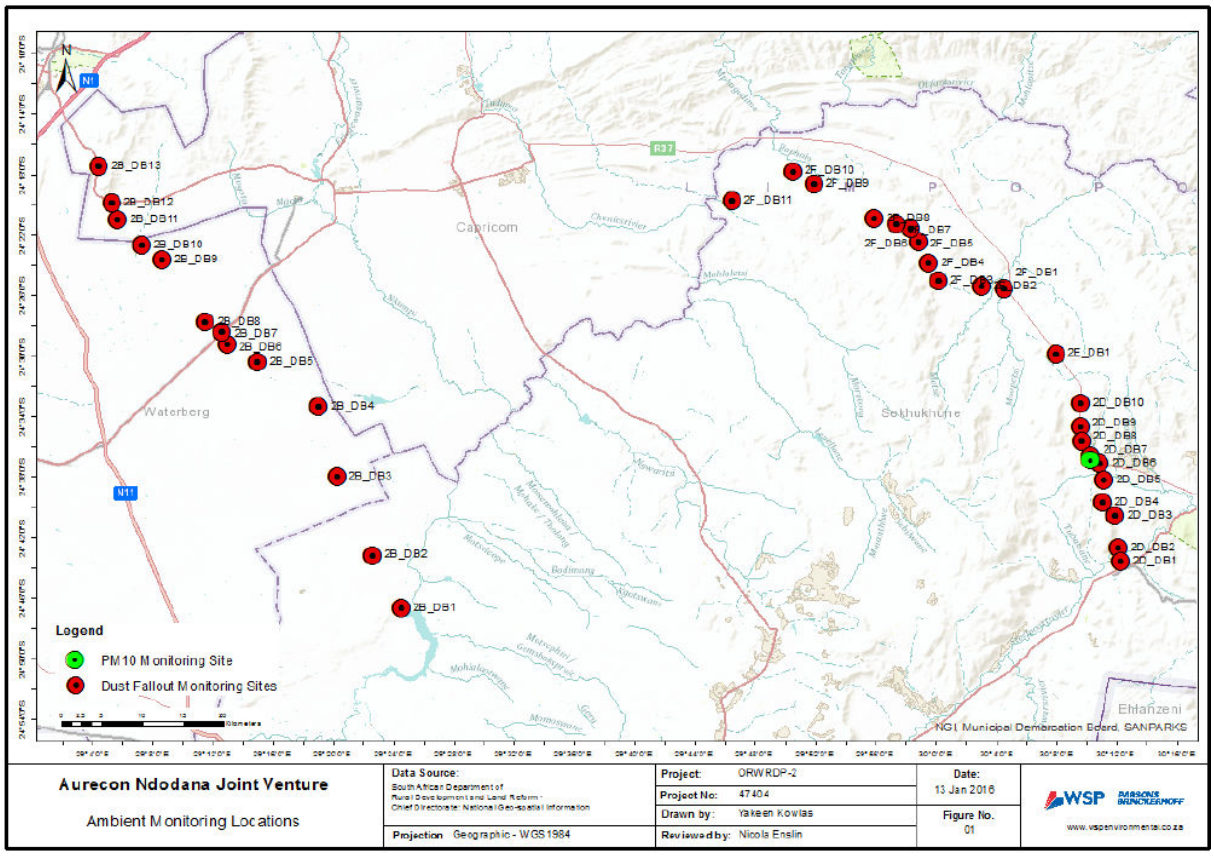


Figure 7-10: Dust Fallout and Particulate Monitoring (Dilokong Hospital) Locations for OMMP-BRWSP.

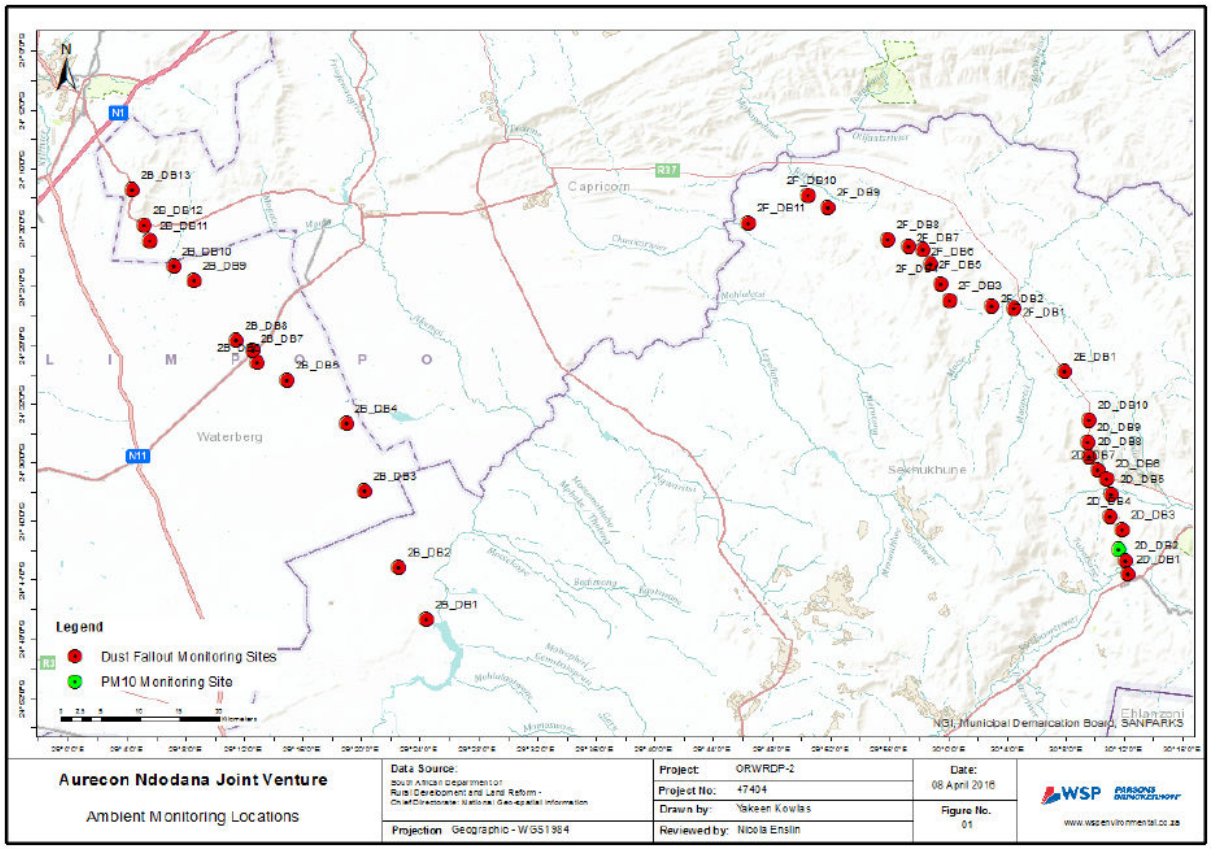


Figure 7-11: Dust Fallout and Particulate Monitoring (Samancor Chrome) Locations for OMMP-BRWSP.

Table 7-2 presents the site descriptions, site classifications as well as the coordinates for each monitoring station. **Figure 7-12** provides an overview of the dust fallout levels measured at Phase 2D.

In 2015, dust fallout recorded at sites 2D-DB5 (November and December 2015) and 2D-DB8 (October and November 2015) was non-compliant with the National Dust Control Regulations as two sequential exceedances of the residential standard were recorded. The Regulations stipulate that only two non-sequential exceedances are permitted per calendar year, per monitoring location. Dust fallout recorded in 2016 was non-compliant with the Regulations at the 2D-DB1 monitoring location, as two sequential exceedances were recorded at this monitoring location (January and February 2016). All remaining sites indicate compliance with the standard.

Table 7-2: Phase 2F Dust Fallout Monitoring Stations Descriptions, Classifications and Coordinates.

Description	Classification	Latitude (S)	Longitude (E)
2D-DB1	Residential	24°43'35.44"	30°12'18.00"
2D-DB2	Residential	24°42'40.10"	30°12'8.17"
2D-DB3	Residential	24°40'34.86"	30°11'56.08"
2D-DB4	Residential	24°39'41.83"	30°11'4.20"
2D-DB5	Residential	24°38'13.09"	30°11'10.00"
2D-DB6	Residential	24°37'5.77"	30°10'53.58"
2D-DB7	Residential	24°35'40.63"	30° 9'39.60"
2D-DB8	Residential	24°35'40.63"	30° 9'42.77"
2D-DB9	Residential	24°34'39.00"	30° 9'35.28"
2D-DB10	Residential	24°33'8.93"	30° 9'38.41"

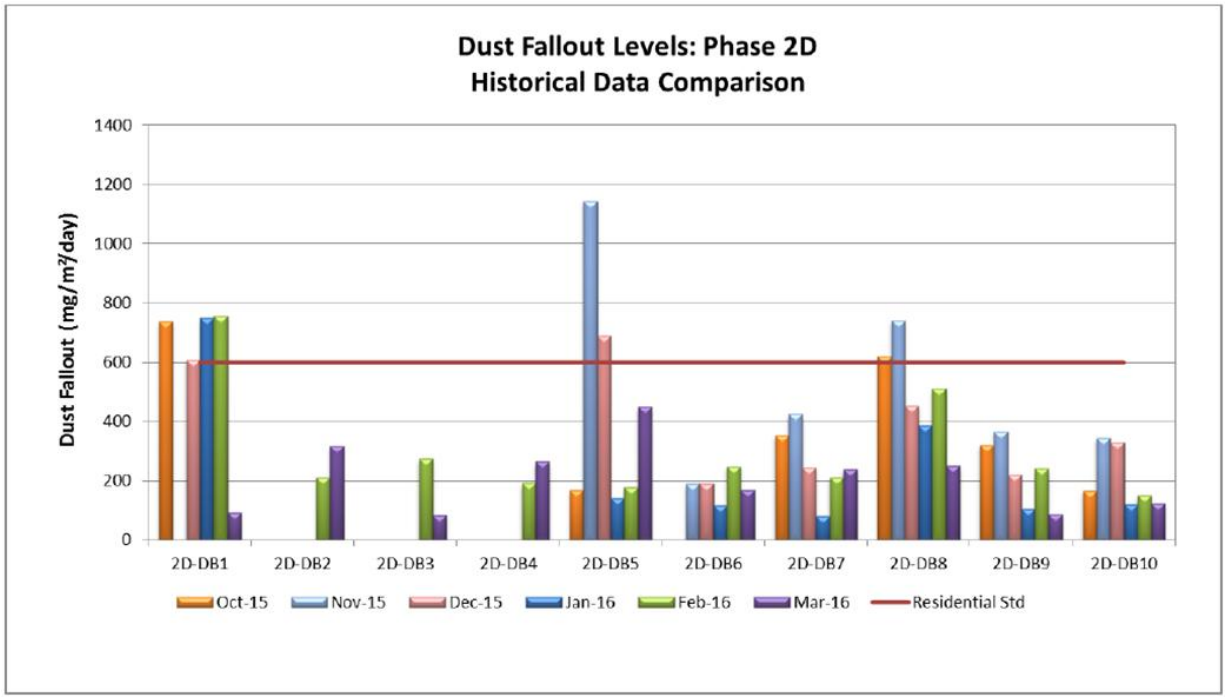


Figure 7-12: Dust Fallout Levels Measured at Phase 2D.

7.3.1.3 Pollution Receptors

The impact will possibly include an area up to 150 m and can extend to 1 km in worst-case scenarios. Sensitive receptors include community areas, educational institutions, medical facilities, recreational facilities, places of worship and villages. Other receptors located within the vicinity of the project include mines and associated infrastructure (i.e. Steelpoort Chrome Mine, Samancor Chrome Winterveld, African Rainbow Minerals Modikwa Platinum Mine and Samancor Tubatse Alloy).

7.3.2 SEKHUKHUNE DISTRICT MUNICIPALITY

There are several key sources of pollutants in the SDM, which include industrial processes, household emissions, agriculture, transportation, fire, waste disposal and wastewater treatment.

There are two monitoring stations situated within the SDM, Steelpoort and Dilokong. Monitoring data for the Dilokong monitoring station was included in this study, as the monitoring station is situated within the vicinity of the study area.

7.3.2.1 Particulate Matter

Figure 7-13 shows the 24-hour average PM_{10} concentrations (blue line) for the Dilokong monitoring station.

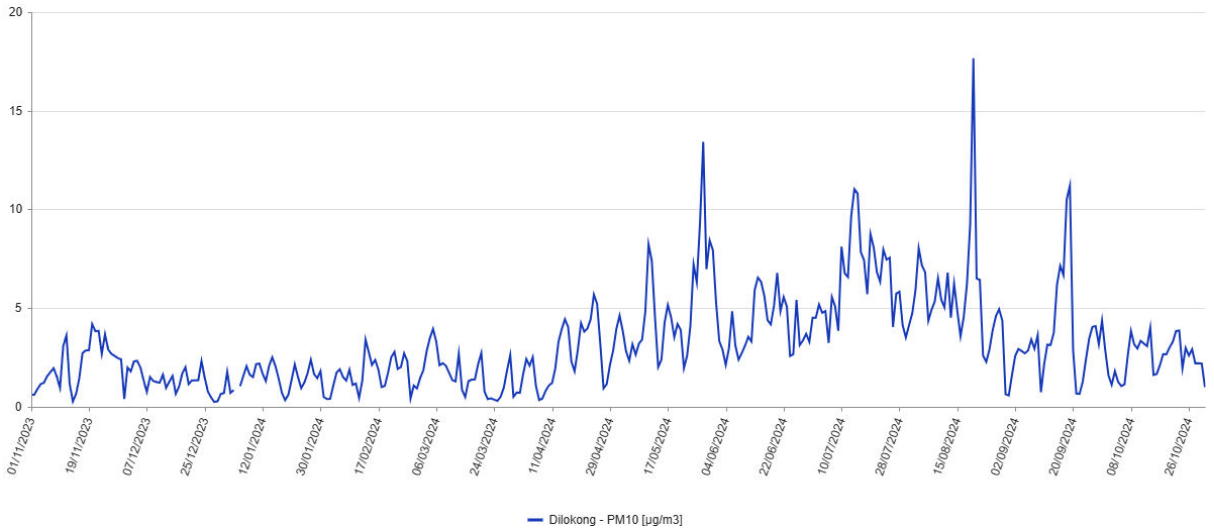


Figure 7-13: Dilokong Daily Average PM_{10} Concentration [South African Air Quality Information System (SAAQIS), 2024].

Figure 7-14 shows the 24-hour average $PM_{2.5}$ concentrations (blue line) for the Dilokong monitoring station.

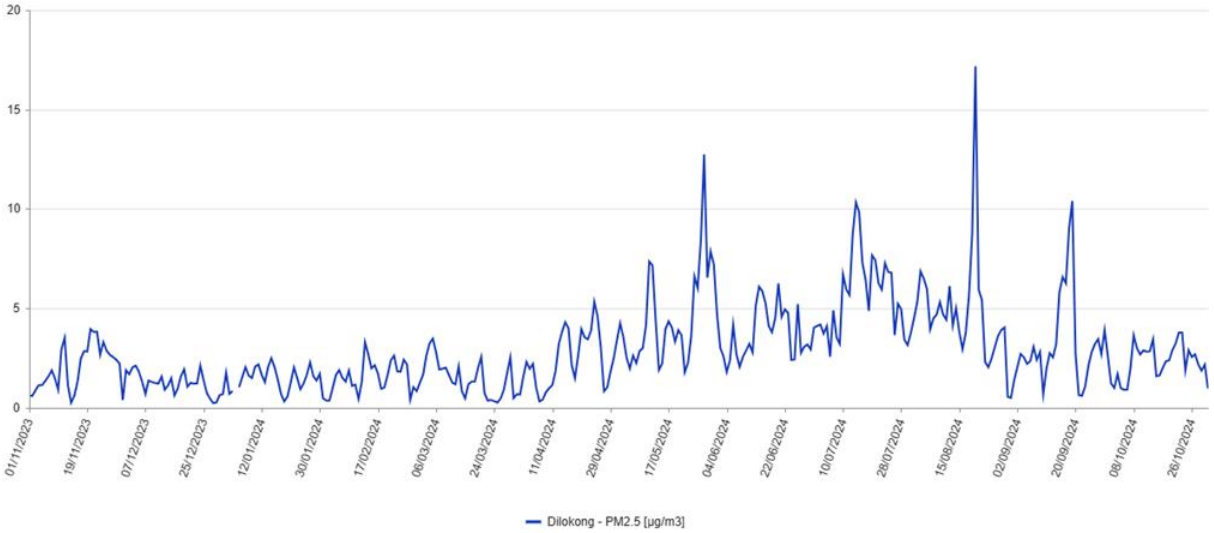


Figure 7-14: Dilokong Daily Average $PM_{2.5}$ Concentration (SAAQIS 2024).

7.3.2.2 Sulphur Dioxide

Figure 7-15 shows the 24-hour average SO_2 concentrations (blue line) for the Dilokong monitoring station.

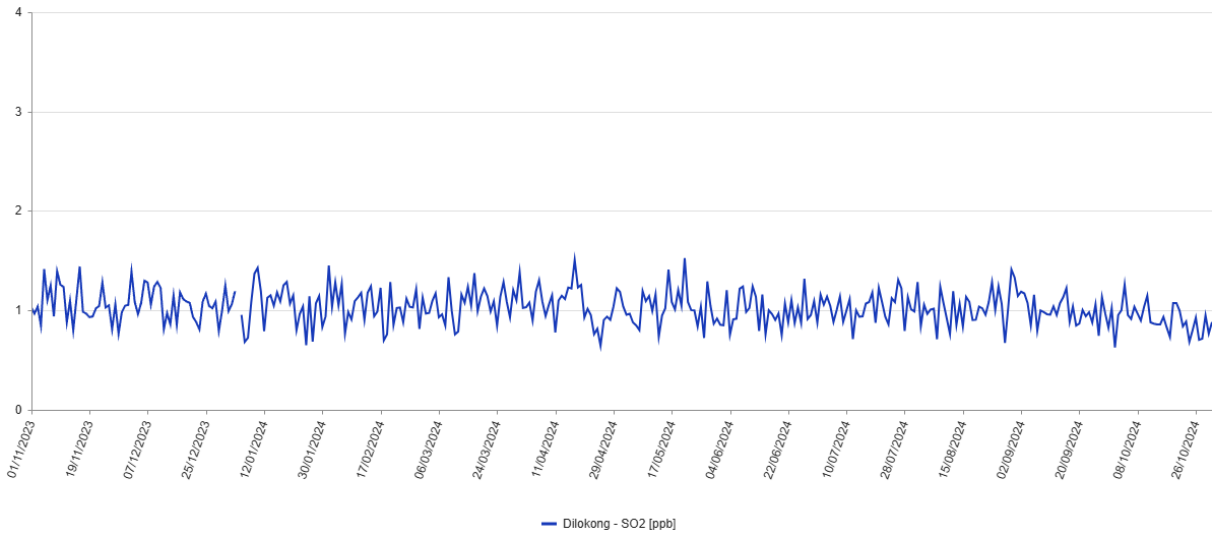


Figure 7-15: Dilokong Daily Average SO_2 Concentration (SAAQIS, 2024).

7.3.2.3 Nitrogen Oxides

Figure 7-16 shows the 24-hour average NO_x concentrations (blue line) for the Dilokong monitoring station.

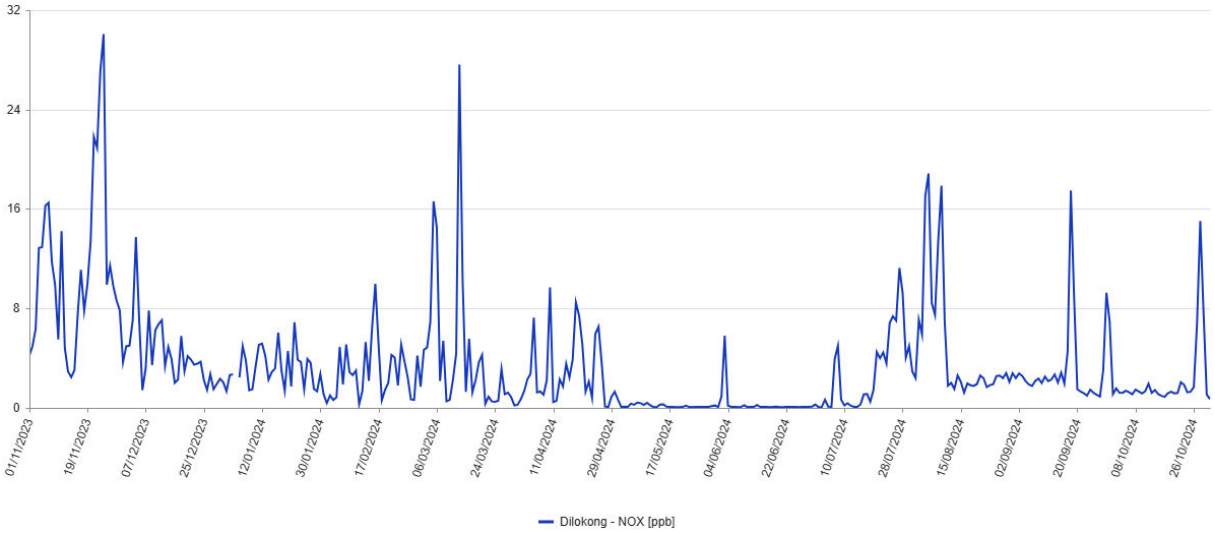


Figure 7-16: Dilokong Daily Average NO_x Concentrations (SAAQIS, 2024).

7.3.3 IMPACT ASSESSMENT

7.3.3.1 Model Results and Discussion

Dispersion results for the Phase 2D project are presented for the following scenarios:

- Dust deposition rates during Construction Operations
- PM_{10} concentrations during Construction and Rehabilitation Operations

NO_2, SO_2, CO and $PM_{2.5}$ emissions were quantified, but not modelled due to the relatively low expected risk.

7.3.3.1.1 Dust Deposition during Construction

Dispersion model output plots for dust deposition during construction are reflected in **Figure** 7-17.

Maximum deposition rates around the Mooihoek BPR are expected to exceed the residential standard of 600 mg/m^2/day up to a maximum distance of 250 m from the centre of construction operations.

It is unlikely that deposition rates will exceed current background levels beyond 150 m from the construction alignment.

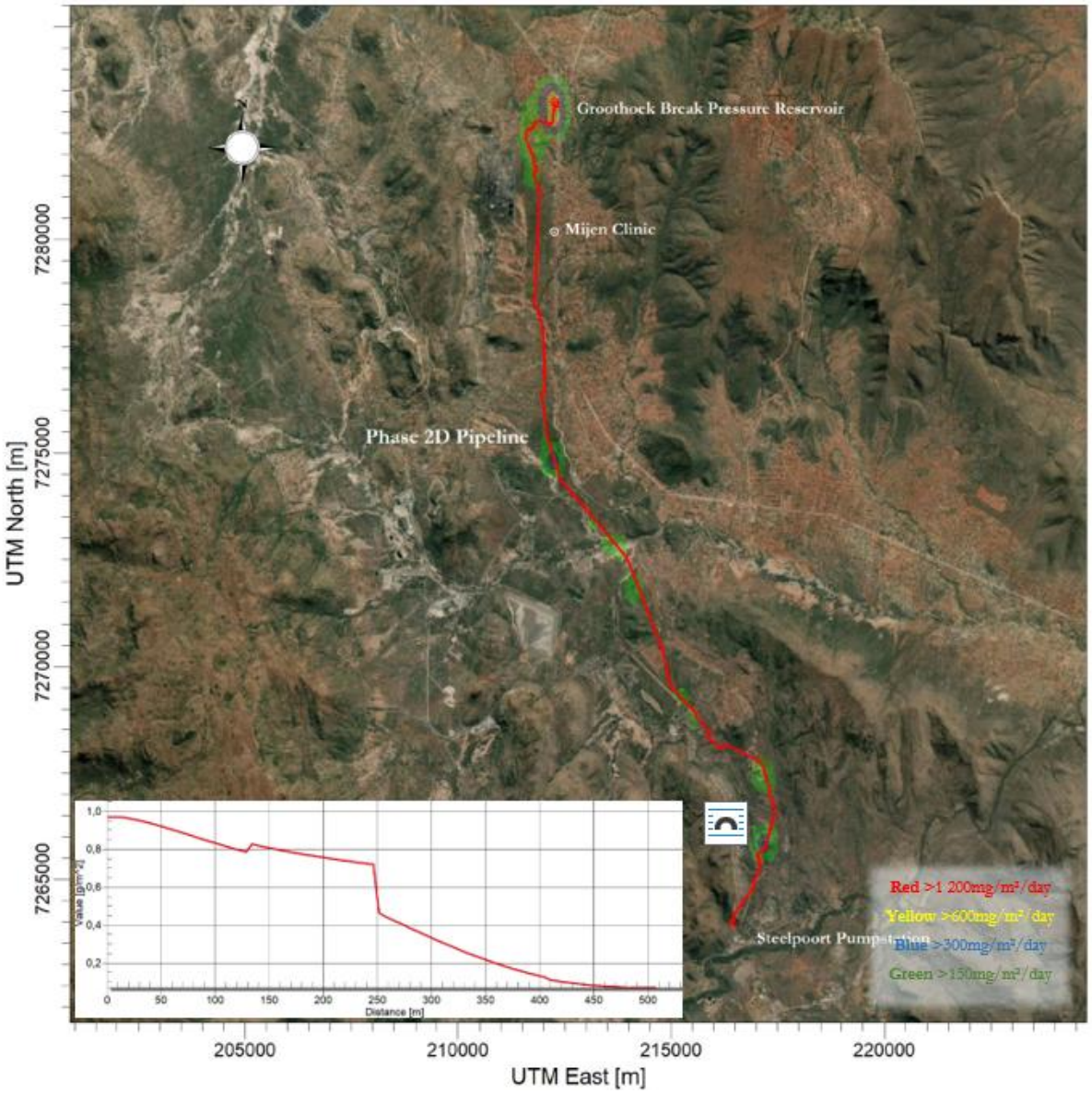


Figure 7-17: Daily Average Dust Deposition Rate – Construction (Non-residential Standard – 1,200 mg/m^2/day, Residential Standard – 600 mg/m^2/day).

7.3.3.1.2 PM_{10} during Construction and Rehabilitation

Contravention of the daily average PM_{10} standard may exceed the allowable number of four per annum around the Mooihoek BPR, up to a distance of 500 m during construction and up to distance of 250 m during rehabilitation (**Figure** 7-18). Further contraventions of the daily standard will most likely occur infrequently along the alignment.

Annual average PM_{10} concentrations are expected to be insignificant (i.e. <50% of the standard) throughout the life of the project, as seen in **Figure** 7-19.

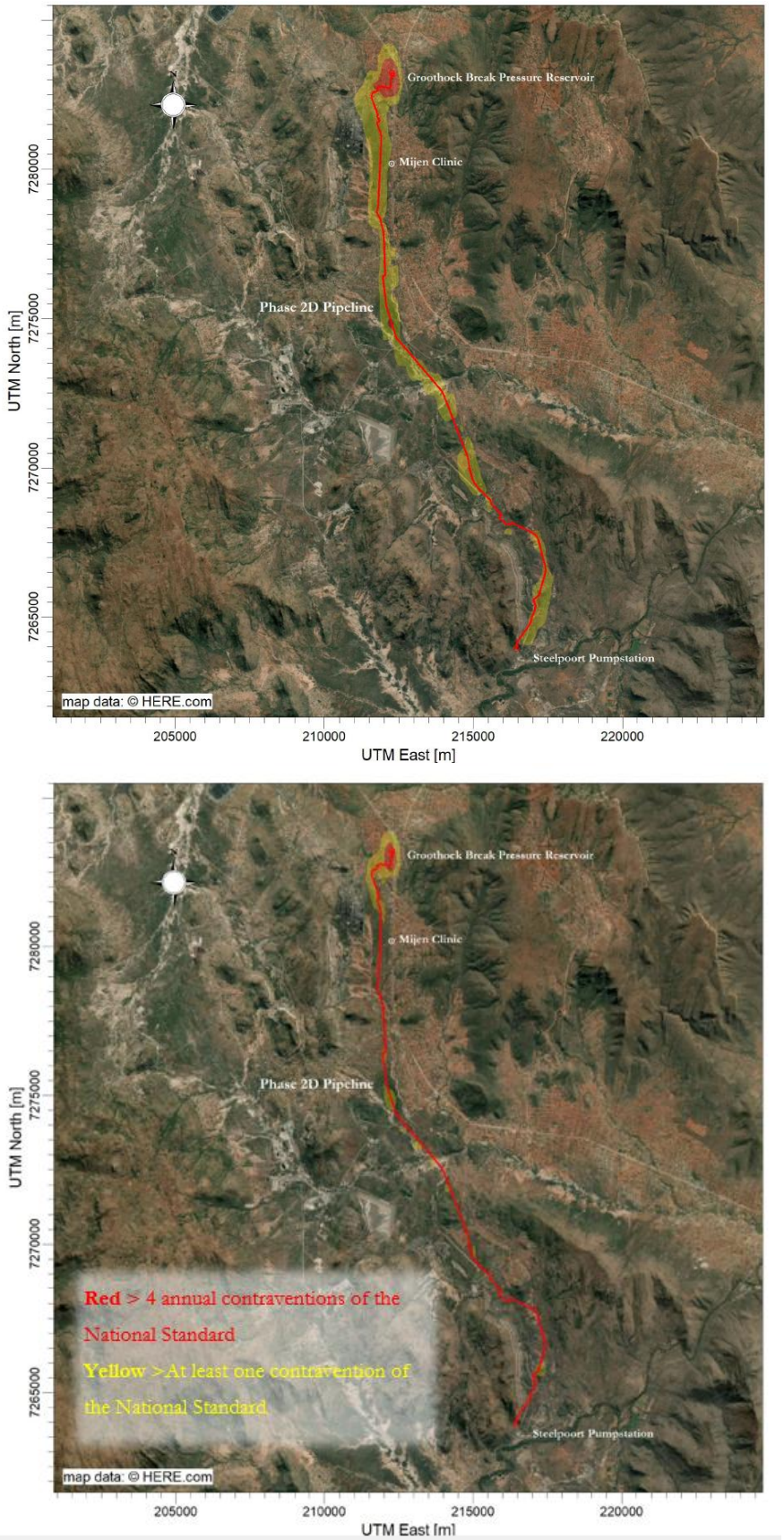


Figure 7-18: Daily Average PM_{10} Concentration – Construction (top) / Rehabilitation (Bottom) (South African National Standard - 75µg/m^3).

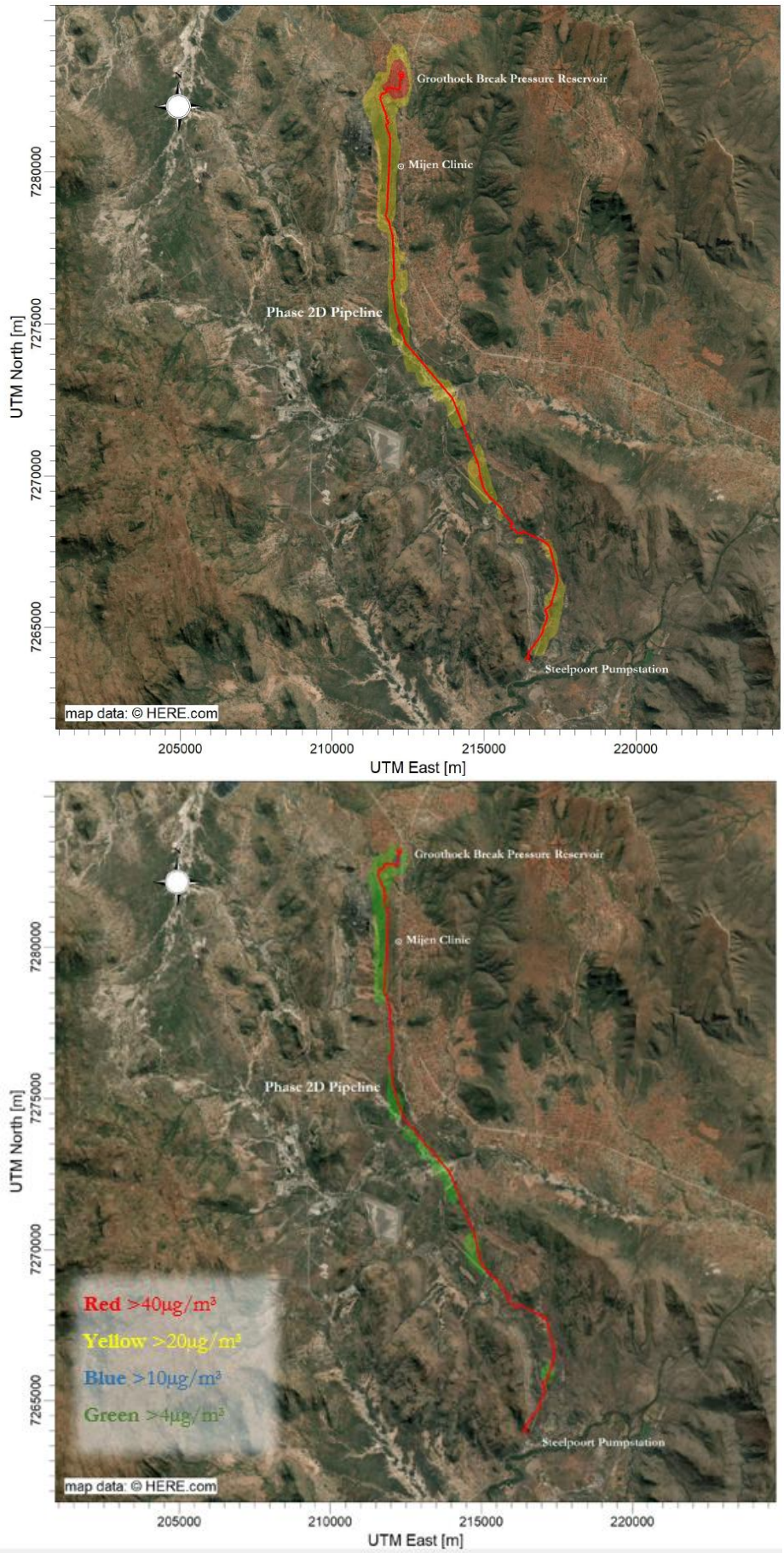


Figure 7-19: Annual Average PM_{10} Concentration – Construction (top) / Rehabilitation (Bottom) (South African National Standard - 75µg/m^3).

7.3.3.2 Significance Analysis Assessment

The table below summarises the results of the Particulate Emissions Significance Analysis.

Table 7-3: Phase 2D Particulate Emissions Significance Analysis.

Item/Receptor	Impact of particulate emissions	Consequence Intensity + Duration + Extent				Significance Consequence x Probability			Motivation
		Intensity	Duration	Extent	Rating	Consequence	Probability	Rating	
CONSTRUCTION									Negligible to moderate damage to natural or social systems or resources. The impact could continue for less than 2 years. The impact could extend across the site and to nearby properties Mitigation through administrative control and best industry practice (see Section 5.2 of the Air Quality Impact Assessment report). Residual impact at background levels. High assessment confidence.
1.	<250m	3	2	3	Slight	8	4	Negligible	
2.	250 to 500m	3	2	3	Slight	8	4	Negligible	
3.	>500m	1	2	3	Slight	6	4	Negligible	
REHABILITATION									
4.	<250m	2	2	3	Slight	7	4	Negligible	
5.	250 to 500m	2	2	3	Slight	7	4	Negligible	
6.	>500m	1	2	3	Negligible	5	4	Negligible	
OPERATION									
7.	<250m	1	2	2	Negligible	5	4	Negligible	

The table below summarises the results of the Gaseous Emissions Significance Analysis.

Table 7-4: Phase 2D Gaseous Emissions Significance Analysis.

Item/Receptor	Impact of gaseous emissions	Consequence Intensity + Duration + Extent				Significance Consequence x Probability			Motivation
		Intensity	Duration	Extent	Rating	Consequence	Probability	Rating	
CONSTRUCTION, REHABILITATION & OPERATION									
1.	<250m	1	2	2	Negligible	5	4	Negligible	Negligible damage to natural or social systems or resources. Impact could continue for less than 2 years. The impact could extend across the site and to nearby properties Mitigation through administrative control and best industry practice (see Section 5.2 of the Air Quality Impact Assessment report). Residual impact at background levels. High assessment confidence.

In support of an emission reduction strategy, the OMMP-BRWSP must confirm or, where necessary, revise the current understanding of the significance of specific pollutants and sources. To fulfil this objective, emissions were ranked based on the emissions inventory and the impact significance analysis.

From the emissions inventory, the following observations can be made:

- A total emission rate of 174.53 g/s was calculated for Phase 2D.
- Construction emissions will most possibly be the largest source of ambient pollution (86.9%), followed by rehabilitation (12.9%) and operations (0.2%).
- PM comprises approximately 98.7 % of the pollution load. PM_{10} is the criteria pollutant of concern and contributes about 25.7% of the pollution load. Total suspended particulates and $PM_{2.5}$ contribute 69.7% and 2.5%, respectively.

From the impact significance analysis, the following observations can be made:

- The incremental impact of all pollutants during construction, rehabilitation and operations are expected to be negligible. Current industry standard techniques should be maintained and supplemented with administrative control measures to maintain the residual impact at the nearest sensitive receivers at current background levels.

7.3.4 SPECIALIST RECOMMENDATIONS

7.3.4.1 Administrative Measures

In view of the predicted ambient pollutant concentrations resulting from emissions from the Phase 2D project, the following is recommended:

- Ambient monitoring in combination with modelling and emission inventory to assess the effectiveness of control measures at source and receivers, on an annual basis.

The recommended performance assessment and reporting programme for continued dustfall monitoring during the Phase 2D project are provided in
Table 7-5.

Table 7-5: Dustfall Monitoring Reporting Programme**.**

Criteria	Dustfall Monitoring
Monitoring objectives	Assessment of compliance with dustfall limits within the main impact zone of the project. Facilitate the measurement of progress against environmental targets within the main impact zone of the operation. Temporal trend analysis to determine the potential for nuisance impacts within the main impact zone of the operation. Tracking of progress due to pollution control measure implementation within the main impact zone of the project. Informing the public of the extent of localised dust nuisance impacts occurring in the vicinity of the operation.

Criteria	Dustfall Monitoring
Monitoring location(s)	Four (4) single buckets should be installed around the Mooihoek BPR site and at least one (1) single bucket should be installed per kilometre of the alignment. The following factors can severely affect the validity of data from a monitoring site: • Sites with restricted air flows in the vicinity of the monitor: Sites should not be adjacent to walls, buildings or trees that impede or distort the air flow. In general, the site should be in an open area, free of structures higher than 1 m within a 20 m radius of the gauge. • Obstacles between source to be monitored and the gauge. • Local sources of pollution and extraneous contamination that can affect the gauge. • Accessibility and security from vandalism are major considerations in the selection of a site.
Sampling techniques	Single bucket dust gauges measure the fallout of windblown settleable dust. Instruments to be deployed in accordance with ASTM D1739.
Accuracy of sampling technique	Margin of accuracy given as ±200 mg/m^2/day.
Sampling frequency and duration	On-going, continuous monitoring to be implemented facilitating data collection over 30-day averaging period. Monitoring may be suspended after the first six months of operation.
Commitment to QA/QC protocol	Comprehensive QA/QC protocol implemented.
Interim environmental targets (i.e. receptor-based performance indicator)	Relevant dust deposition standards not to be exceeded more than twice per annum and not in consecutive months.
Frequency of reviewing environmental targets	Annually (or may be triggered by changes in air quality regulations).
Action to be taken if targets are not met	Source apportionment and review of standard control measures and implementation of contingency measures where applicable.
Procedure to be followed in reviewing environmental targets and other elements of the monitoring strategy (e.g. sampling technique, duration, procedure)	Procedure to be drafted in liaison with interested parties considering: (i) trends in local and international ambient particulate guidelines and standards and/or compliance monitoring requirements, (ii) best practice regarding monitoring methods, (iii) current trends in local air quality, i.e. is there an improvement or deterioration, (iv) future development plans within the air shed (etc.)
Progress reporting	At least annually to the necessary authorities.

7.3.4.2 Best Available Industry Techniques

7.3.4.2.1 Fugitive Emissions from Unpaved Surfaces

Unpaved roads will most possibly be significant sources of dust emissions. Three types of measures may be taken to reduce emissions from unpaved roads:

- Measured aimed at reducing the extend of unpaved roads such as paving. Permanent improvements in road surfaces results in continuous control efficiencies
- Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds.
- Measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilisation. The control efficiencies obtained by wet suppression and chemical stabilisation are cyclic. As efficiency decays over time, periodic re-application is required.

7.3.4.2.2 Fugitive Emissions from Paved Surfaces

The following measures are aimed at reducing fugitive dust emissions from paved surfaces:

- Construction integrity of all paved areas should be regularly inspected and frequently repaired if required.

- Set an acceptable speed limit for all onsite vehicles (30 kilometers per hour for construction vehicles and 40 kilometers per hour for light and passenger vehicles).
- Minimise travelling distance and unnecessary traffic.
- Measures which entail periodic removal of deposited material, i.e. broom and vacuum sweeping, may also be adopted to reduce dust generation.

7.3.5 KEY FINDINGS

The air quality impact study concludes the following:

- Ambient monitoring data from the SDM Dilokong Hospital station were included in the study.
- A total emission rate of 174.53 g/s was calculated for Phase 2D.
- Construction emissions will most possibly be the largest source of ambient pollution (86.9%), followed by rehabilitation (12.9%) and operations (0.2%).
- PM comprises approximately 98.7 % of the pollution load. PM_{10} is the criteria pollutant of concern and contributes about 25.7% of the pollution load. Total suspended particulates and $PM_{2.5}$ contribute 69.7% and 2.5% respectively.
- Dispersion of emissions from the process was modelled using the ISC-AERMOD View model based on the standard Gaussian solution.
- The results present the spectrum from maximum ground level concentration to maximum impact area, and account for annual averages.
- GLCs were predicted for atmospheric conditions based on local meteorological data for the period 1 July 2023 to 30 June 2024.
- Winds are mostly from the north-easterly sector 45.1%. Calm periods are the exception (2.8%), and wind speeds are mostly light, between 0.5 and 2.1 m/s (45.6%). Moderate winds between 2.1 and 3.6 m/s occur 27.3%, and brisk winds above 3.6 m/s, 17%. Strong winds above 5.7 m/s occur 7.3%.
- Maximum deposition rates around the Mooihoek BPR are expected to exceed the residential standard of 600 mg/m2/day up to maximum distance of 250 m from the centre of construction operations. It is unlikely that deposition rates will exceed current background levels beyond 150 m from the construction alignment. The impact of dust deposition during rehabilitation and operation is not significant.
- Contravention of the daily average PM_{10} standard may exceed the allowable number of four per annum around the Mooihoek BPR, up to a distance of 500 m during construction and up to a distance of 250 m during rehabilitation. Further contraventions of the daily standard will most likely occur infrequently along the alignment.
- Annual average PM_{10} concentrations are expected to be insignificant (i.e. <50% of the standard) throughout the life of the project.
- The incremental impact of all pollutants during construction, rehabilitation and operations is expected to be negligible. Current industry standard techniques should be maintained and supplemented with administrative control measures to maintain the residual impact at the nearest sensitive receivers at current background levels.
- Ambient monitoring should be used in combination with modelling and emission inventory to assess the effectiveness of control measures at source and receivers, on an annual basis.
- Monitoring of ambient air quality will assist effective air quality management and open communication to all stakeholders.

7.4 CIVIL AVIATION COMPLIANCE STATEMENT (PARIVISION, 2024)

The Civil Aviation Compliance Statement was compiled by Hein Reid of Parivision.

An impact analysis, applying intensity, duration, and extent criteria, shows negligible risk, with no significant impacts on airstrips or restricted airspace. In accordance with GN No. 320 (20 March 2020) a Compliance Statement was compiled.

7.4.1 ANALYSIS OF SENSITIVITY FEATURES

Figure 7-20 below illustrates the high sensitivity for Civil Aviation within the proposed development footprint.

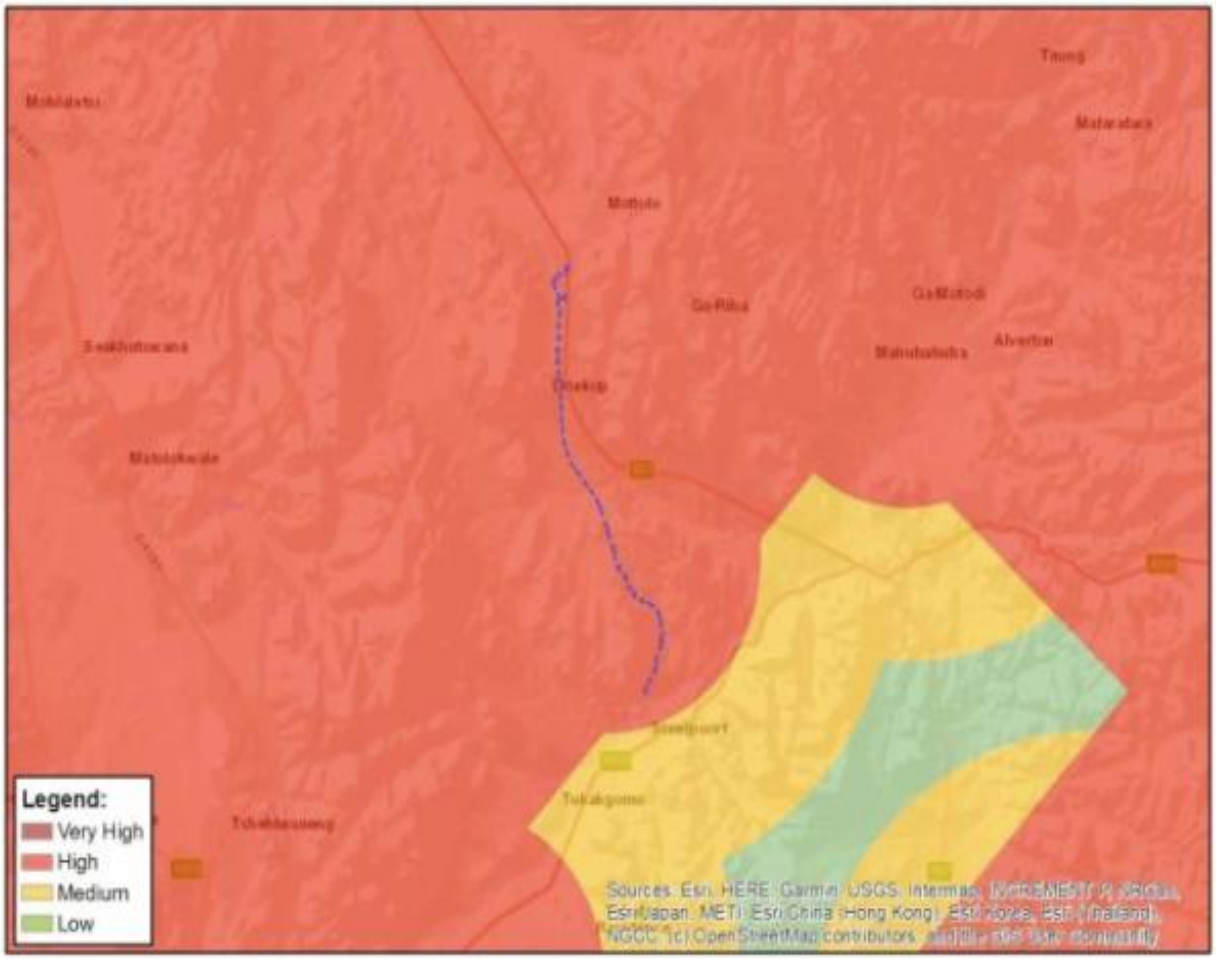


Figure 7-20: High Civil Aviation Theme Sensitivity

The DFFE Screening Tool Report for EA shows three sensitivity features:

a. **Winterveldt Airstrip**: The proposed site has a high sensitivity due to its proximity to Civil Aviation infrastructure, as it lies within 8 km of the Winterveldt Airstrip. This high sensitivity classification is primarily attributed to its proximity to the Winterveldt Mine Airport (ICAO: FAWT), a registered airfield located within 8 km of the site. **Figure** 7-21 below shows the position of FAWT in relation to the proposed development.

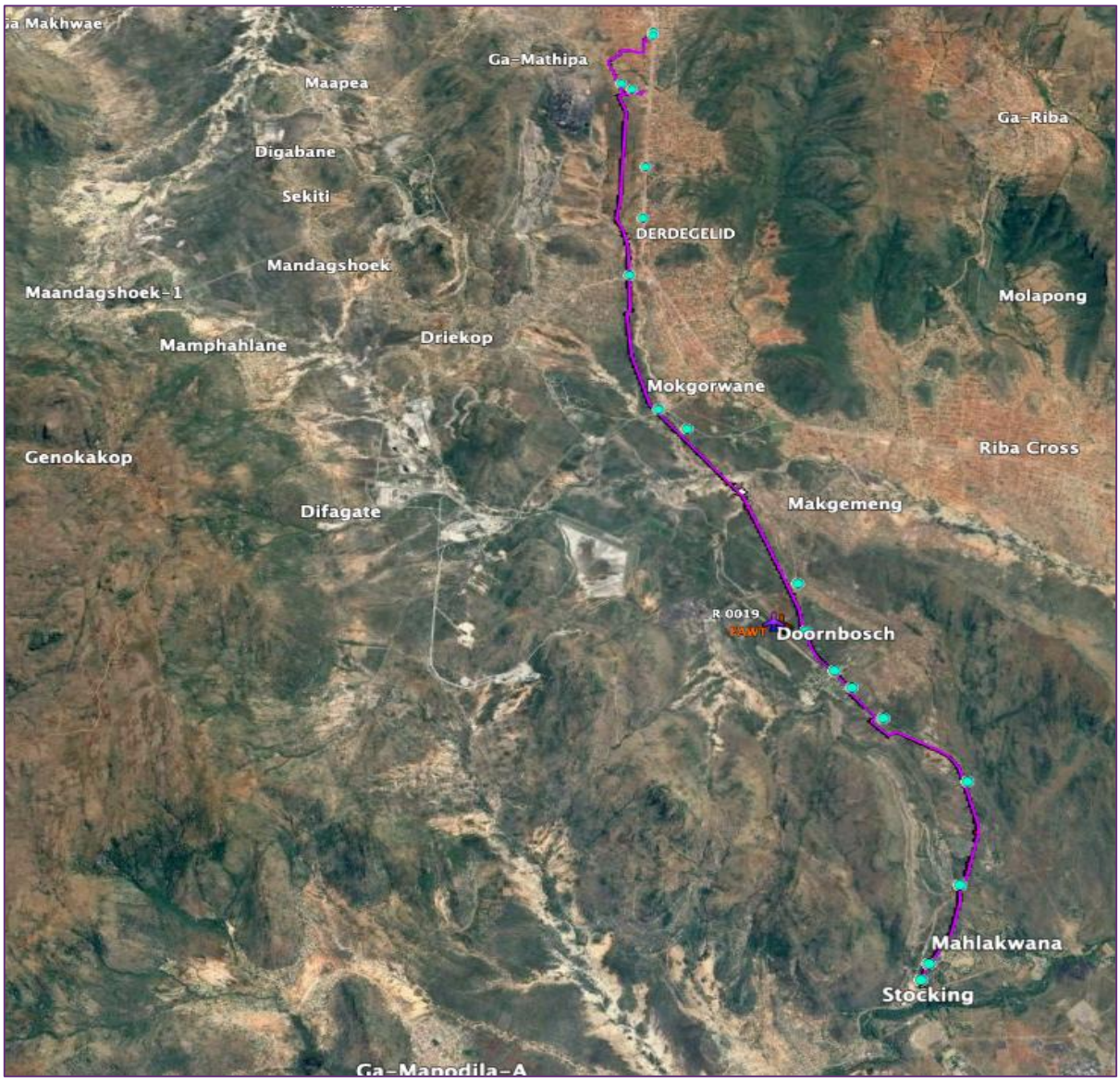


Figure 7-21: Position of Winterveldt Airstrip.

FAWT is designated for daytime operations only and primarily serves the logistical and transport needs of a nearby mine, handling approximately 12 flights per month[18]. The flight activity contributes to the high sensitivity rating in the DFFE Screening Tool Report, as the site's activities could potentially interact with established aviation routes and safety protocols associated with FAWT.

b. **Airspace**: The proposed development is near restricted airspace.
   (i) **FAR 71:** Restricted Flying Area (FAR) 71: Transvaal Military Middle Flying Area (Upper) Flight Level (FL) 105 - FL195[19]. FAR 71 is situated above the proposed development area. It extends upwards from around 10,500 feet (~3,200 m).
   (ii) **G465:** The G465 Airway is an established aviation route in South Africa, mainly used for air traffic operating across the southern part of the country. It extends over the proposed development area from an altitude of 10,500 feet (~3,200 m) and above. It is a designated Air Traffic Service (ATS) route, which provides a pre-defined controlled route for aircraft to follow, enhancing the efficiency and safety of enroute flights. Normal International Rules of The Air apply to traffic operating along the G465 Airway.

[18] Source: Airport Managing Authority
[19] SA AIP, ENR, DD 15 October 2024

(iii) **UG 465:** UG465 is an upper-level ATS route in South Africa, like the G465 airway but specifically designated for air traffic at higher altitudes. UG 465 is positioned immediately above G465. The "U" prefix in UG465 denotes that it is an "upper" (higher) airway, which typically starts at FL245 (24,500 feet / ~ 7,500 m) or higher. This upper airway is used by aircraft flying at cruising altitudes. Normal International Rules of The Air apply to traffic operating along the G465 Airway.

Figure 7-22 below shows the position of FAR71, G465 and UG465.

Figure 7-22: Position of FAR71, G465 and UG465 relative to proposed development.

c. **Steelpoort Airstrip:** The proposed site is also situated between 8 and 15 km from the Steelpoort Airstrip (medium sensitivity). The Steelpoort Airstrip, located in the Limpopo province of South Africa, primarily serves the mining industry in the area. It is not a registered airstrip; it is used for occasional charter flights. **Figure** 7-23 below shows the position of Steelpoort Airstrip 18.5 km to the southwest.

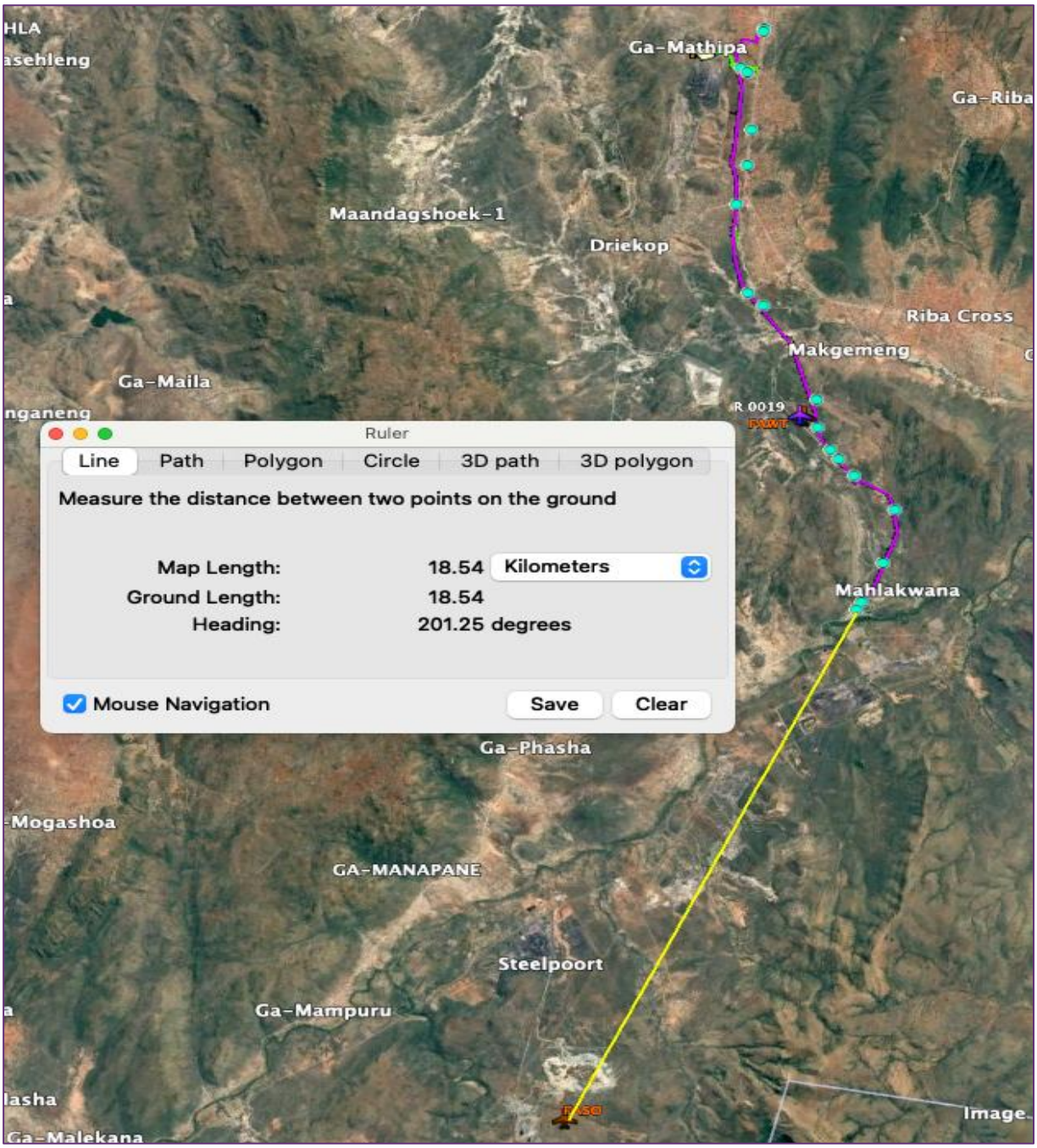


Figure 7-23: Steelpoort Airstrip.

7.4.2 IMPACT ASSESSMENT SUMMARY

Based on the findings, the proposed developments have minimal to no impact on nearby airstrip or airspace operations:

a. Winterveldt Airstrip (FAWT): No operational changes are anticipated at FAWT due to the development, which involves a pipeline infrastructure capped at a height of 10 m. This low height minimises risk to airfield operations and visibility and does not meet the criteria for a formal OLS assessment.
b. Restricted Airspace: No impact.
c. Steelpoort Airstrip (FASO): No impact on operations at FASO.

Overall, the developments do not affect airstrip operations and do not require any changes to airspace.

7.5 DEFENCE COMPLIANCE STATEMENT (PARIVISION, 2024)

The Defence Compliance Report was compiled by Hein Reid of Parivision. Due to the very low significance of pre-mitigation impacts, a full assessment of Defence Impact Assessment was deemed unnecessary. However, to meet regulatory and oversight requirements, a Compliance Statement was prepared for each category of defence.

7.5.1 IMPACT IDENTIFICATION

7.5.1.1 DFFE Screening Tool Report

The DFFE screening tool report shows a medium sensitivity due to a Military and Defence Site. **Figure** 7-24 below shows the medium defence sensitivity area for the proposed development footprint, with a large portion of the proposed development falling in a low sensitivity area.

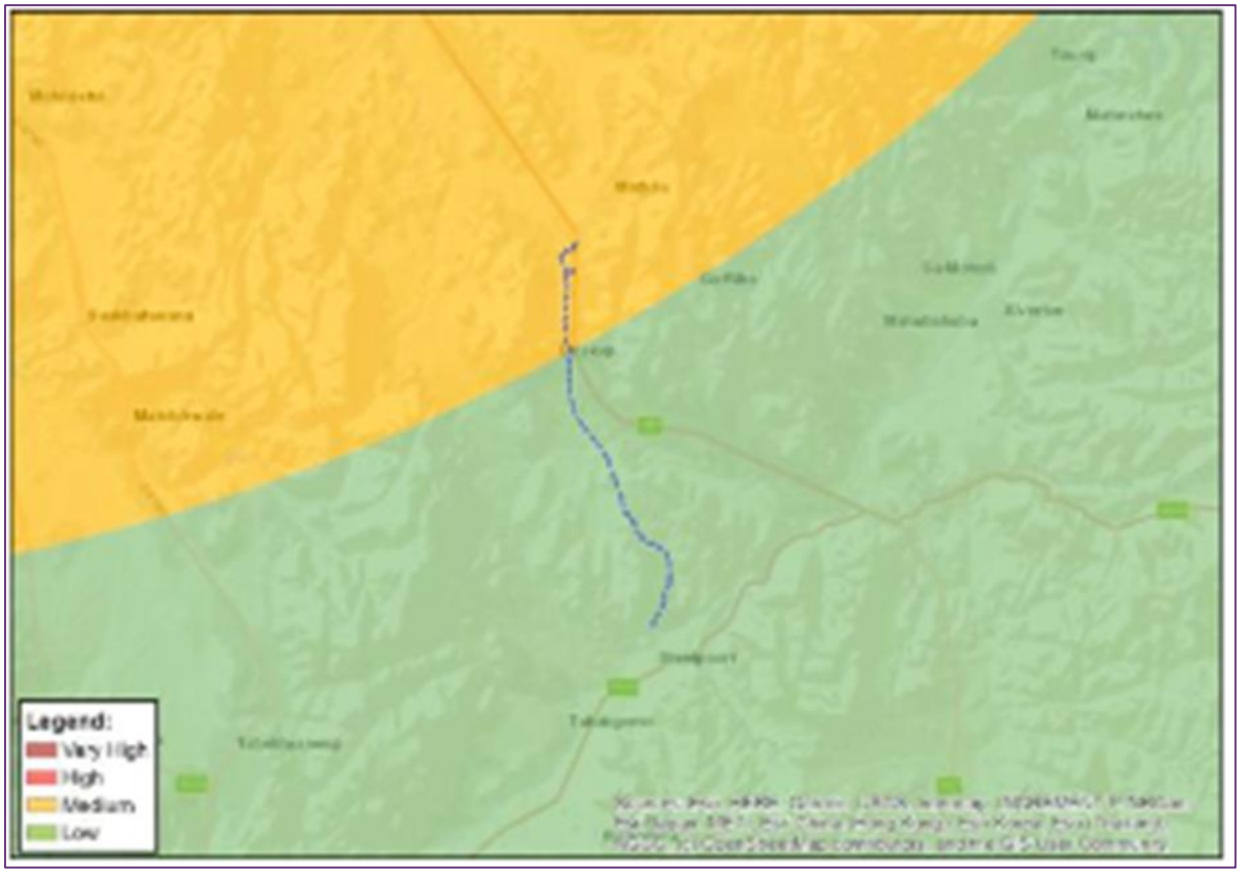


Figure 7-24: Defence Theme Sensitivity.

7.5.1.2 Findings

a. Specialist Study Impact Assessment

The vertical component of the spatial dimensions for the proposed infrastructure will not exceed 10 m above ground level, and the proposed development will therefore have no adverse effect on defence activities within the vicinity.

Based on the findings, the proposed developments have minimal to no impact on nearby defence installations or activities.

7.6 HERITAGE IMPACT ASSESSMENT (PSG HERITAGE, 2024)

The HIA report was compiled by PGS Heritage. PGS conducted a survey of the proposed development footprints through three site visits: one in November 2024 and two in January 2025.

7.6.1 OVERVIEW OF THE STUDY AREA AND SURROUNDING LANDSCAPE

7.6.1.1 Heritage Screening

Figure 7-25 presents the results of the environmental screening assessment for the archaeological and cultural heritage theme. According to the screening tool report, in this case, the proposed development occurs within an area of low archaeological and cultural heritage sensitivity, although areas of high and very high sensitivity occur in proximity to the proposed footprints. The development is located within an already-disturbed landscape, combined with the presence of sensitive heritage resources (such as burial grounds and graves). PGS agrees with the overall rating of low sensitivity, with areas of high sensitivity in between.

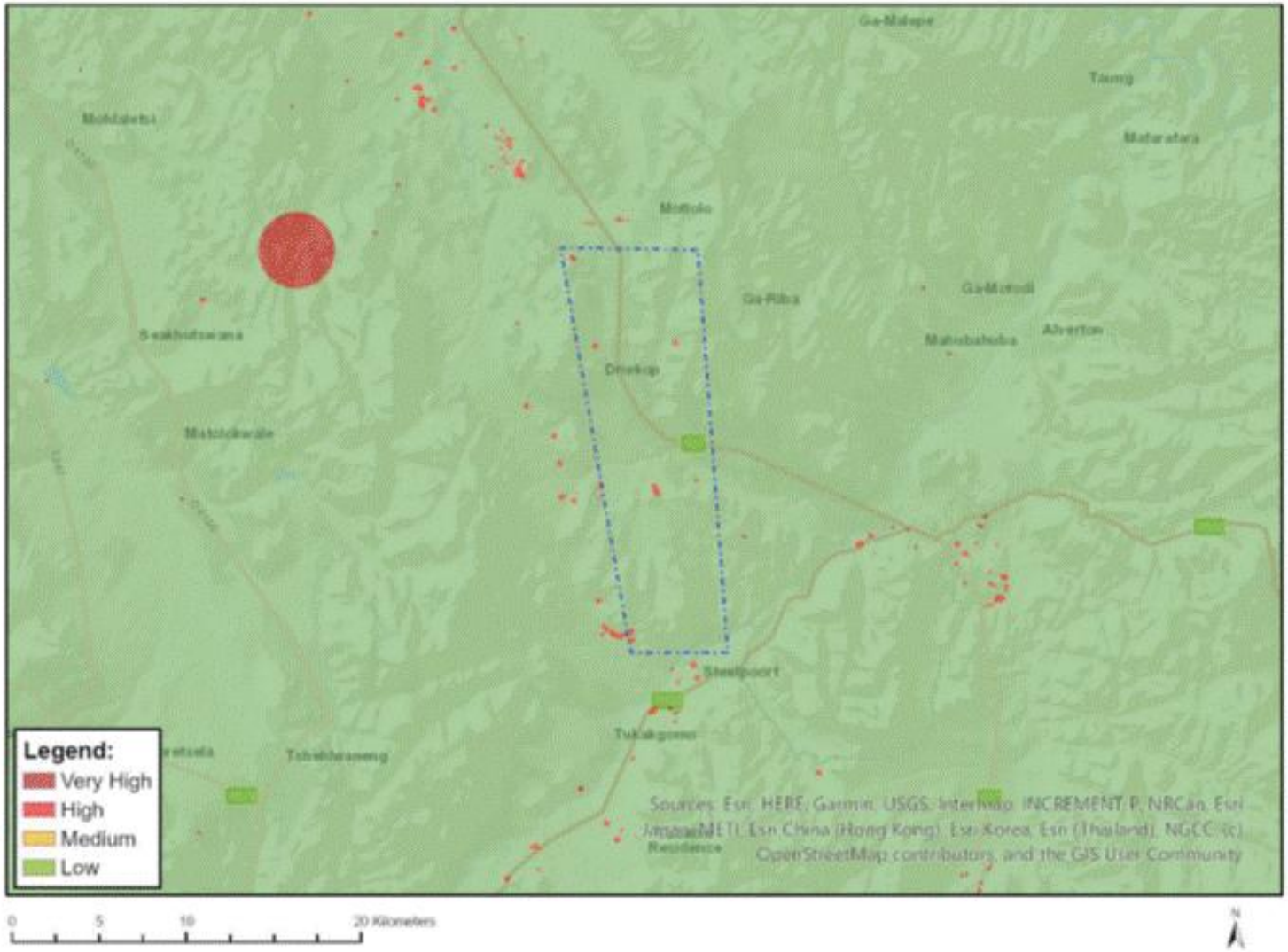


Figure 7-25: Screening Tool Map indicating a Low Sensitivity Rating for Archaeology and Cultural Heritage for the Project Area with areas of High Sensitivity in between (broad outline of the study area in blue).

7.6.1.2 Heritage Sensitivity

Table 7-6 lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

Table 7-6: Tangible Heritage Site in the Study Area.

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA Sections 3 and 35
Structures	Possibly older than 60 years	NHRA Sections 3 and 34
Burial grounds	Graves	NHRA Sections 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (**Table 7-7**).

Table 7-7: Landform Type to Heritage Find Matrix.

Landform Type	Heritage Type
Permissions to Occupy (PTO) Stands and residential areas	Burial grounds and graves
Farmsteads	Historical and/or archaeological material

7.6.1.3 Fieldwork Findings[20]

Figure 7-26 and **Table 7-8** below presents the heritage resources identified during this survey. Photographs, and more detailed descriptions of the identified heritage resources are included in Appendix B of the HIA. PGS identified 3 heritage resources during the site survey in the Phase 2D project area, including:

- Archaeological artefacts, comprising a low-density scatter of undecorated pottery sherds and a scatter of stone tools; and
- One burial ground (cemetery).

[20] Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under Section 27 of the NHRA.

Figure 7-26: Heritage Resources identified within the Phase 2D Project Study Area (PGS Heritage, 2025)

Table 7-8: Heritage Resources Identified during the Field Survey of the Phase 2D Project Area.

Site No	Site Co-ordinates X	Y	Time Period	Brief Site Description	Grading	Heritage Significance
Oli14	-24.65239	30.18289	Stone Age	A low-density cluster of small stone tools, which may include some possible scrapers. The artefacts were identified in a sand road and are likely to be *ex situ*.	Negligible	Not Conservation Worthy (NCW[21])
Oli15	-24.65239	30.18289	Iron Age	A cluster of undecorated ceramic sherds in an area of approximately 3 m by 3 m. The artefacts were mostly observed in a sand road. They are likely to be *ex situ*.	Negligible	NCW
Oli16	-24.5815	30.15772	Historical / Modern	A cemetery of at least 250 graves, but which may include 400 graves. The most recent headstone dates to 2024 and the earliest grave dates to 1904. Many graves are demarcated with formal dressing, some are demarcated stone packing and some are fenced off. The Local Guide confirmed that the graveyard is still in use. The fence line surrounding this cemetery was difficult to establish, given its size and the overgrown vegetation obscuring the fence. A large area has been fenced off, and it seems that this considers the future use of the cemetery. Visible graves appear to be grouped in two clusters, one of which closely follows the fence closest to the proposed pipeline. A sign on the outside of the fence includes contact details for the people responsible for allowing access to the site.	High	Grade 3 - A (IIIA[22])

[21] No research potential or other cultural significance: A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.

[22] High significance: Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.

7.6.1.4 Archaeological Artefacts and Sites

Some general background scatters of Stone Age lithics and Iron Age potsherds were observed on several properties within the project area. Given the erosion prevalent on site, it is likely that these artefacts have been washed out of their original context and are *ex situ*. They therefore present minimal information potential. Given this, and their presence across much of the study area, individual scatters were not recorded. Their presence is, however, noted as it represents the possibility of an *in situ* site being encountered during project-related activities. **Figure 7-27** and **Figure 7-28** below present some photographs of these resources.

Figure 7-27: Background Scatter of Stone Tools (PGS Heritage, 2025).

Figure 7-28: Background Scatter of Ceramic Potsherds (PGS Heritage, 2025).

Oli14 and **Oli15** also comprise scatters of stone tools and ceramics, respectively. These are more concentrated than the background scatters described above and were recorded as such. No other indicators of a Stone Age or Iron Age sites were observed. These artefacts were identified on and near a sand road. This suggests that the artefacts may be out of their depositional context and are of limited information potential. As such, PGS considers them to be of negligible heritage value and are thus deemed NCW.

7.6.1.5 Burial Grounds and Graves

Oli16 is a cemetery of at least 250 graves. Most of these graves present formal grave dressings with legible headstones. The cemetery appears to have been in use since 1904 and, according to the Local Guide, is still in use currently.

The high heritage significance of graves is globally accepted. Graves are intrinsically unique and irreplaceable and carry high social importance. For this reason, they are afforded a **high significance** value in this assessment and have been assigned a Grade 3 A (Grade III A) rating.

7.6.2 IMPACT ASSESSMENT

Both **Oli14** and **Oli15** are located within the footprints of a proposed access route (Access 01) and are at risk of direct impact (destruction of these sites). Both of these sites are considered NCW. No additional actions are required in terms of the NHRA for a heritage resource that is NCW or which has negligible heritage value. The recording of such sites and including these records in an HIA report are considered appropriate mitigation to conserve data through these records. As such, this report does not consider the potential impacts to heritage resources **Oli14** and **Oli15.**

Table 7-9: Summary of the Impact Assessment on Heritage Resources of High Significance.

IMPACT DESCRIPTION: Direct Impact on Heritage Resources Oli16				
Predicted for project phase:	Pre-construction	Construction	~~Operation~~	~~Decommissioning~~
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	A direct or indirect impact on these heritage sites would be permanent.	Consequence: Extremely detrimental	Significance: Very high - negative
Extent	Regional	The effects of a direct impact on the burial grounds or individual graves may attract negative attention from a wider region, including (at a minimum) Next-of-Kin living outside the study area.		
Intensity	Very high - negative	Given the significance of these sites, any impact to these features will be of very high intensity.		
Probability	Certain	Given the location of the identified heritage sites in relation to the proposed footprint, the Project will directly impact these resources.		
MITIGATION:				
PGS recommends OMMP-BRWSP implement a 30 m[23] no-go buffer zone around all three sites to avoid the potential direct impact to these heritage resources. This may require changes to the proposed infrastructure footprints. These sites must be conserved in situ through the development and implementation of a Heritage Management Plan (HMP). Where the in-situ conservation and implementation of the 30 m buffer zone is not feasible for either or both sites, OMMP-BRWSP must undertake a stakeholder engagement process to determine the feasibility of undertaking a Grave Relocation Process to relocate the graves included in **Oli16** to avoid impacting them. Such a process must be completed following the requirements of Section 36 of the NHRA, as well as other applicable laws and by-laws. PGS considers the in situ preservation of these resources as the preferable option in the post-mitigation scenario below.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Medium-term	*In situ* conservation and management of these sites would produce benefits that will extend to the medium term, at a minimum.	Consequence: Slightly beneficial	Significance: Low - positive
Extent	Site-specific	The *in situ* conservation and management of the sites will affect only the affected sites.		
Intensity	Low - positive	The *in situ* conservation of these sites will constitute a small, but positive, change to these sites.		
Probability	Fairly likely	Should the abovementioned mitigations be put into place, it is likely that the benefits to the heritage sites will occur.		

7.6.3 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

[23] Please refer to **Section 8.1.1** for information regarding the appropriate buffer for the project. The EAP has recommended that a **5 m buffer** be maintained around areas of heritage significance, as identified by the specialist.

The following section must be read in conjunction with **Table 7-11** of this report.

7.6.3.1 Construction and Operational Phases

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camp areas, and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind that delays can be costly during construction, and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance; however, foundation holes do offer a window into the past, and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognise any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following Chance Find Procedure must be implemented.

7.6.3.2 Chance Find Procedure

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the Environmental Control Officer (ECO) as well as team leaders in the identification of heritage resources and artefacts **during the implementation of the EMPr**. The Environmental Monitor (EM) and Environmental Officer (EO) must be trained as well.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

7.6.3.3 Possible Finds During Construction

The study area occurs within a generally disturbed and developed area, which includes burial grounds and graves as identified during the desktop and fieldwork phase. Soil or vegetation clearance for infrastructure as well as the proposed construction activities, could uncover the following:

- Unmarked burial grounds and graves; and
- Archaeological resources with information potential.

7.6.3.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead

times must be worked into the construction time frames. **Table 7-10** gives guidelines for lead times on permitting.

Table 7-10: Lead times for permitting and mobilisation.

Action	Responsibility	Timeframe
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do the necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial grounds or graves affected by the development	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

7.6.3.5 Heritage Management Plan for EMPr Implementation

Table 7-11: HMP for EMPr implementation.

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement the Chance Find Procedure in cases where possible heritage finds are uncovered.	Construction	During construction	• Applicant • ECO • Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Sections 34-36 and 38 of NHRA.	ECO Monthly Checklist/Report
Burial grounds and graves	All burial grounds and graves must be retained and avoided with a **buffer zone of 30 m** as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of Section 36 of the NHRA and its regulations as well as the National Health Act and its regulations and any provincial legislation.	Pre-construction Construction	During Construction	• Applicant • ECO • Heritage specialist	ECO (monthly)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA.	ECO Monthly Checklist/Report

7.6.4 SPECIALIST CONCLUSIONS AND RECOMMENDATIONS

Three heritage resources were identified within the Phase 2D footprint:

- Archaeological resources, comprising a scatter of Stone Age lithics (**Oli14**) and Iron Age undecorated ceramics (**Oli15**); and
- One burial ground (**Oli16**).

PGS recommends that OMMP-BRWSP establish and implement a 30 m no-go buffer zone between the proposed infrastructure and the identified burial ground **Oli16**. Where such a no-go buffer zone cannot be implemented, PGS recommends that OMMP-BRWSP appoint a suitably qualified professional to determine whether a Grave Relocation Process (GRP) is feasible for the affected **Oli16**. If such a process is considered feasible, OMMP-BRWSP must undertake this process, including obtaining all required permits, as required in terms of Section 36 of the NHRA and the applicable national legislation and local by-laws.

Oli14 and **Oli15** are considered NCW and no further mitigation actions are required.

To avoid or minimise impacts to heritage resources that may be present in the project area but which are not yet identified, PGS recommends that the OMMP-BRWSP develops and implements a Chance Find Procedure. This Chance Find Procedure must be implemented by LWUA as the implementation agent for this development. The Chance Find Procedure must further be implemented by all contractors and subcontractors brought in as part of the construction and operation of this project.

It is the combined considered opinion of the heritage specialists that the proposed project will have a direct impact on several identified heritage resources rated as being of high heritage significance. With the implementation of the recommended mitigation measures, the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

7.7 PALAEONTOLOGY IMPACT ASSESSMENT (BANZAI ENVIRONMENTAL, 2024)

The Palaeontological Desktop Assessment (PDA) was conducted by Banzai Environmental. This assessment is required to determine whether fossil material may be present in the planned development area and to assess the potential impact of the proposed development on the local palaeontological heritage, in compliance with the NHRA (section 38).

7.7.1 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Project is depicted on the 1:250 000 Pilgrim's Rest 2430 (1986) Geological Map (Council of Geoscience, Pretoria) (**Figure** 7-29**; Table** 7-12). This map indicates that the proposed Project is underlain by Quaternary superficial deposit that includes alluvium and scree (Q, yellow), as well as the Dwars River Subsuite (Vdr, green) and Croydon Subsuite (Vcr, blue-green) of the Rustenburg Layered Suite of the Bushveld Complex. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) **(Figure** 7-30**, Table** 7-13) indicates that the Palaeontological Sensitivity of the Quaternary deposit is Low (blue) while that of the Bushveld Complex is Zero (grey) as it is igneous in origin and thus unfossiliferous (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). The DFFE Web based Screening tool indicates that the Palaeontological Sensitivity of the study area is Medium (orange) (**Figure** 7-31). Updated geology (Council for Geoscience, Pretoria) supports the 1986 Geological Map (**Figure** 7-32).

The Quaternary superficial deposits primarily consist of unconsolidated sediments, such as clay, gravel, sand, and silt, which form relatively thin, discontinuous sediment patches or larger spreads onshore. These sediments include beach sands, channel deposits, floodplain and stream sediments, talus

gravels, and glacial drift. Quaternary deposits are significant because they reflect palaeoclimatic changes through the various geological formations (Hunter et al., 2006).

Quaternary fossil assemblages are generally rare and low in diversity, though they span a broad geographical area. In some instances, these fossil assemblages may be found in extensive alluvial and colluvial deposits, often cut by dongas. Microfossils, such as non-marine mollusc shells, are also found in Quaternary deposits. Plant materials, including foliage, wood, pollen, and peat, as well as trace fossils like vertebrate tracks, burrows, termite mounds (termitaria), and rhizoliths (root casts), are also recovered.

The Bushveld Complex comprise of the largest mafic intrusion in the world and underlie an area of almost 65 000 km^2. The maximum thickness of these rocks is almost 8 km while individual layers can be followed for about 150 km. This intrusion is world renowned for the ore reserves of platinum-group elements namely chromium and vanadium. The Bushveld Complex is divided in 4 groups namely the Lebowa Granite Suite, Rashoop Granophyre Suite, Rustenburg Layered Suite and Rooiberg Group (**Table** 7-14). The Rustenburg Layered Suite is present in the development footprint. The Rustenburg Layered Suite reveals a complete differentiation sequence of magma and is made up of various rock layers ranging from dunite, gabbro, norite, and pyroxenite, and anorthosite to magnetite and apatite-rich diorite.

The Bushveld Complex is igneous in origin and thus unfossiliferous.

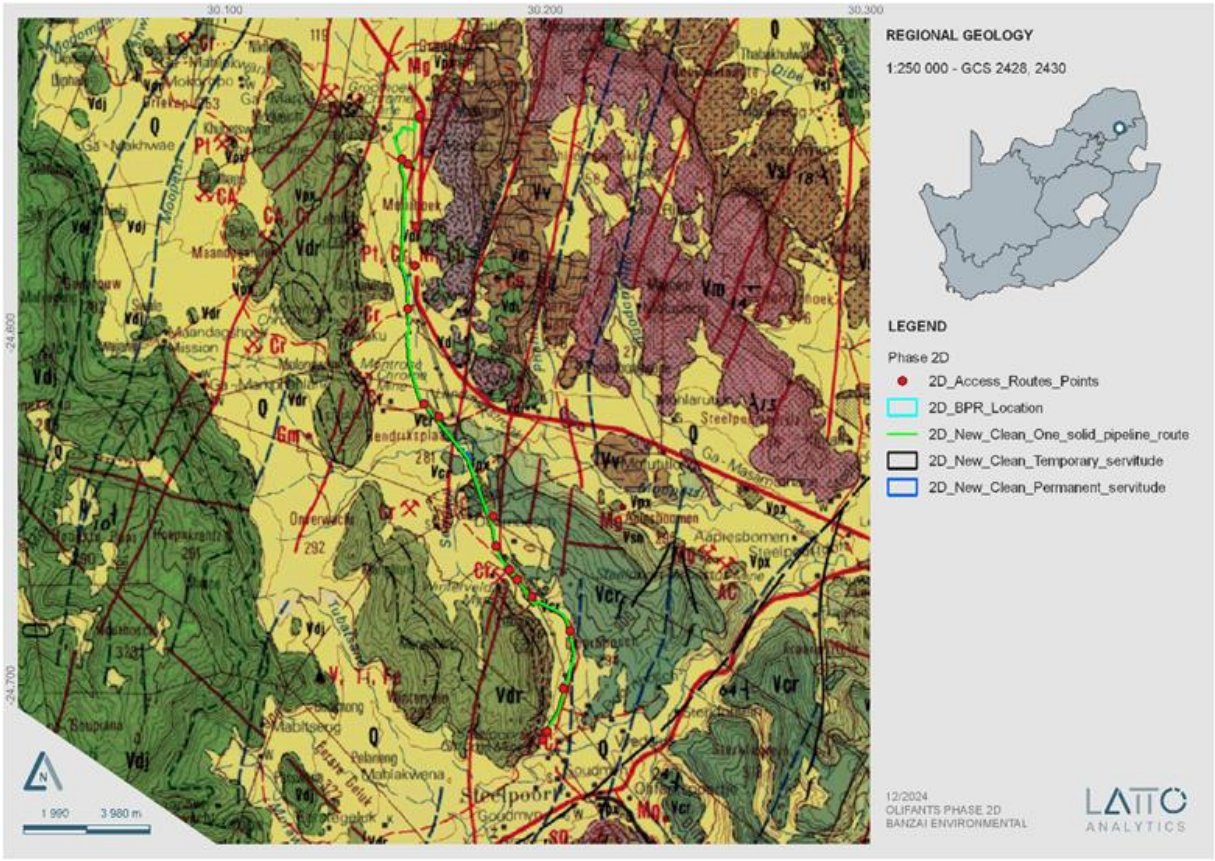
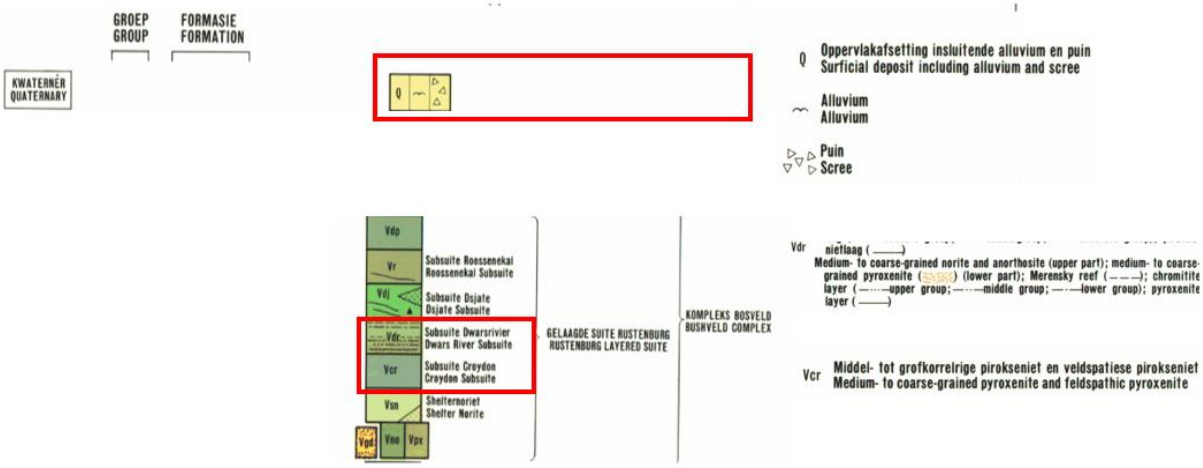


Figure 7-29: Extract of the 1:250 000 Pilgrim's Rest 2430 (1986) Geological map (Council of Geoscience, Pretoria) indicates that the Project is underlain by Quaternary superficial deposit that includes alluvium and scree (Q, yellow), as well as Dwars River Subsuite (Vdr, green) and Croydon Subsuite (Vcr, blue-gree) of the Rustenburg Layered Suite of the Bushveld Complex.

Table 7-12: Legend to the 1:250 000 Pilgrim's Rest 2430 (1986) Geological map (Council of Geoscience, Pretoria). Relevant sediments are indicated in red polygons.



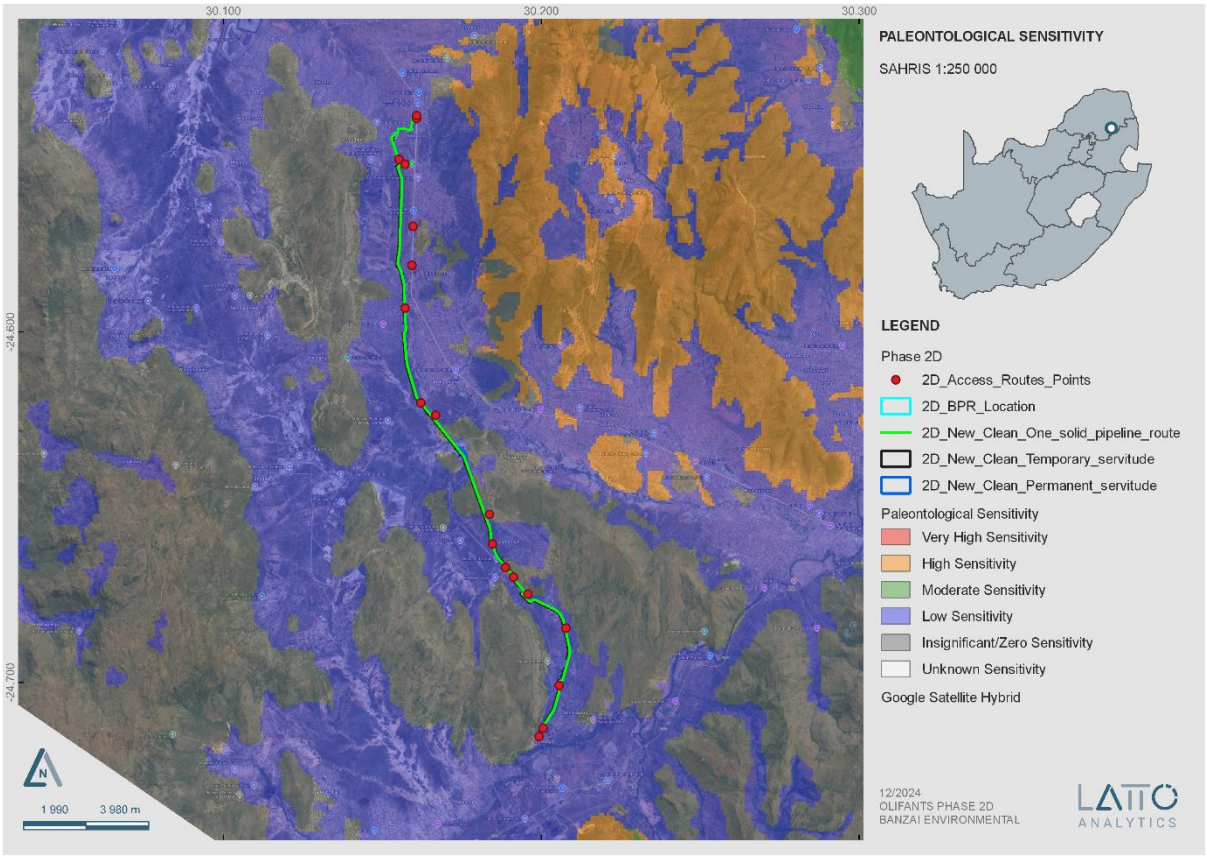


Figure 7-30: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicates that the Project is underlain by sediments with a Low (blue) and Zero (grey) Palaeontological Sensitivity.

Table 7-13: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website.

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 protocolfor 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.

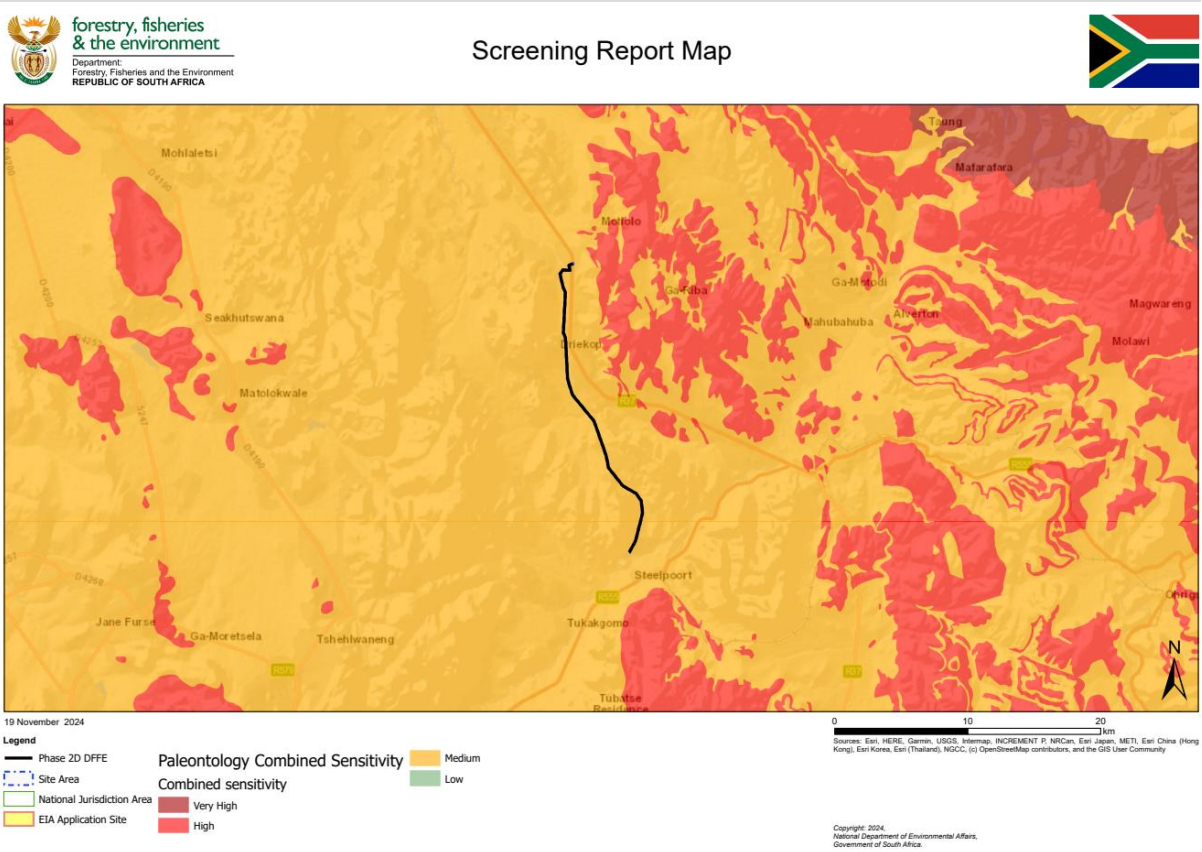


Figure 7-31: The DFFE National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the study area has a Medium (orange) Sensitivity.

The Palaeontological Sensitivity of the Project area is Low (see SAHRIS PalaeoMap, **Figure** 7-30), while the National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Medium (yellow) (**Figure** 7-31). Due to these Sensitivities, no site investigation was conducted for the Project. However, desktop research has confirmed that the Palaeontological Sensitivity of the area is Low.

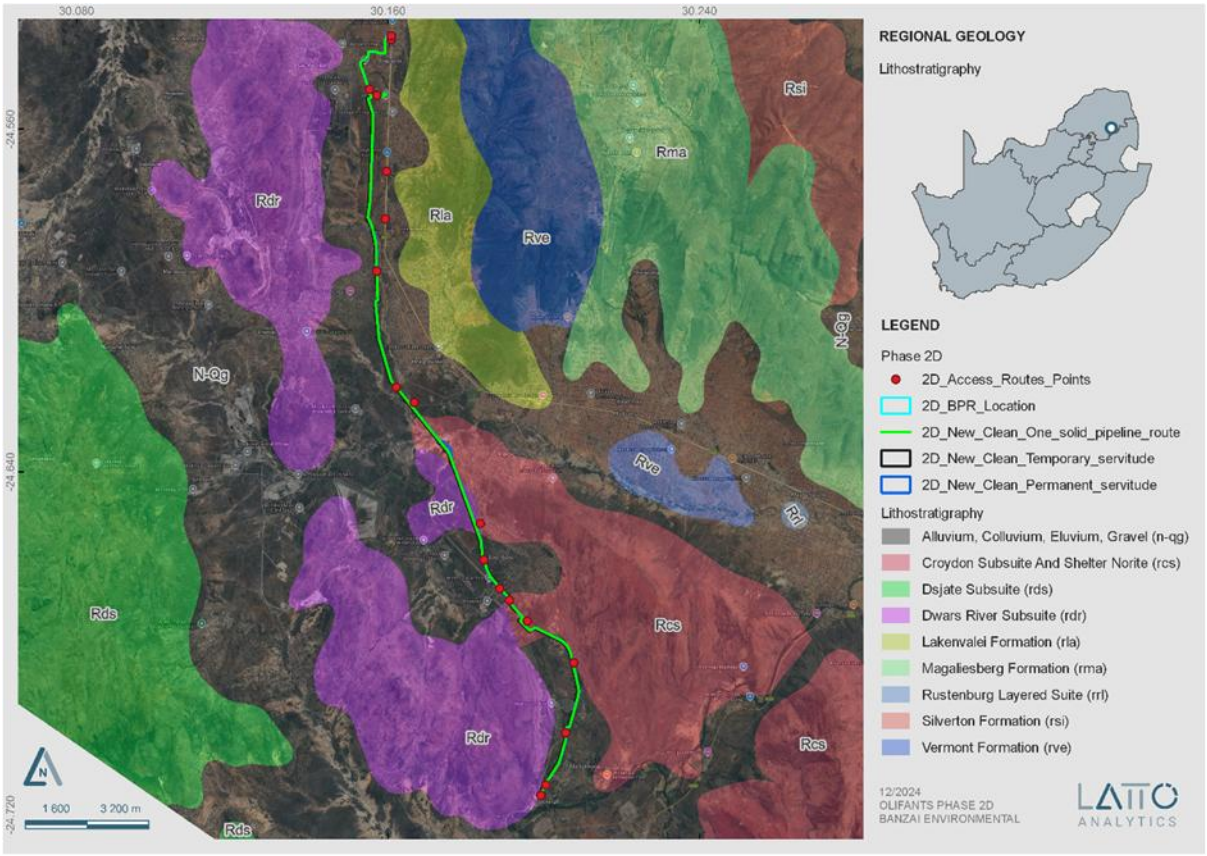


Figure 7-32: Updated geology (2014, Council for Geosciences, Pretoria) indicates that the study area is underlain by the Alluvium, colluvium, eluvium and gravel (n-qg) as well as the Croydon Subsuite and Shelter Norite (rcs), and the Dwars River Subsuite of the Rustenburg Layered Suite of the Bushveld Complex.

Table 7-14: Currently accepted nomenclature and subdivisions of the Bushveld Complex (Cawthorn et al, 2006).

Lebowa Granite Suite	Nebo, Makhutso, Klipkloof, Bobbejaanskop and Verena Granites	
Rashoop Granophyre Suite	Stavoren and Diepkloof Granophyres, Rooikop Porphyritic Granite, Zwartbank Pseudogranophyre	
Rustenburg Layered Suite	Upper Zone	Subzone C (Ol-Ap diotite Subzone B (Ol-Mt gabbronorite) Subzone A (Mt gabbronorite)
	Main Zone Upper	Upper Subzone (gabbronorite) Lower Subzone (gabbronorite, norite)
	Critical Zone	Upper Subzone (norite, anothosite, pyroxenite Lower Subzone (pyroxenite) Lower Subzone (pyroxenite)
	Marginal Zone (norite)	
Rooiberg Group	Schrikkloof Formation (flow-banded rhyolite) Kwaggasnek Formation (dacite, rhyolite) Dullstroom Formation (basaltic andesite)	

7.7.2 PALAEONTOLOGICAL IMPACT ASSESSMENT

The table below provides a summary of the impact assessment regarding the loss of fossil heritage.

Table 7-15: Loss of fossil heritage.

IMPACT DESCRIPTION: Loss of Fossil Heritage				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	Fossils are irreplaceable		

Extent	Site-specific	Only the site will be affected	Consequence: Slightly detrimental	Significance: Low - negative
Intensity	Low - negative	Palaeontological Sensitivity is Low to Zero		
Probability	Fairly likely	Palaeontological Sensitivity is Low to Zero		

MITIGATION:

Chance Find Procedure

If a chance find is made, the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.

- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO or site manager must report the find to the relevant Heritage Agency (SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ECO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilised the fossil may be collected with extreme care by the ECO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorisation, the developer may continue with the development on the affected area.

POST-MITIGATION

Dimension	Rating	Motivation		
Duration	Long-term		Consequence: Negligible	Significance: Very low
Extent	Site-specific			
Intensity	Negligible			
Probability	Very likely			

7.8 FRESHWATER AQUATIC IMPACT ASSESSMENT (SAS, 2024)

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed to conduct a freshwater ecological assessment to support this EIA process. The proposed access points, the newly proposed infrastructure of Phase 2D (including the pipeline deviations), along with a 300 m radius around these elements, are collectively referred to as the "focus area" (see **Figure** 7-33 and **Figure** 7-34 below). The field assessment was conducted from the 30th to the 31st of October, and again on the 19th of November 2024. During this period, various non-perennial drainage lines within the potential impact area of the proposed infrastructure were assessed in detail, using the information gathered during the field assessment.

7.8.1 FRESHWATER ECOSYSTEM FIELD VERIFICATION

A field assessment was undertaken from the 30th to the 31st of October and then on the 19th of November 2024, during which the presence of any riparian or wetland characteristics as defined by the Department of Water Affairs and Forestry (DWAF) (2008) and by the NWA were noted (please refer to Section 4 of the freshwater ecological report).

7.8.2 RESULTS OF THE DESKTOP ANALYSIS

7.8.2.1 Analyses of Relevant Databases

This section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (**Table** 7-16).

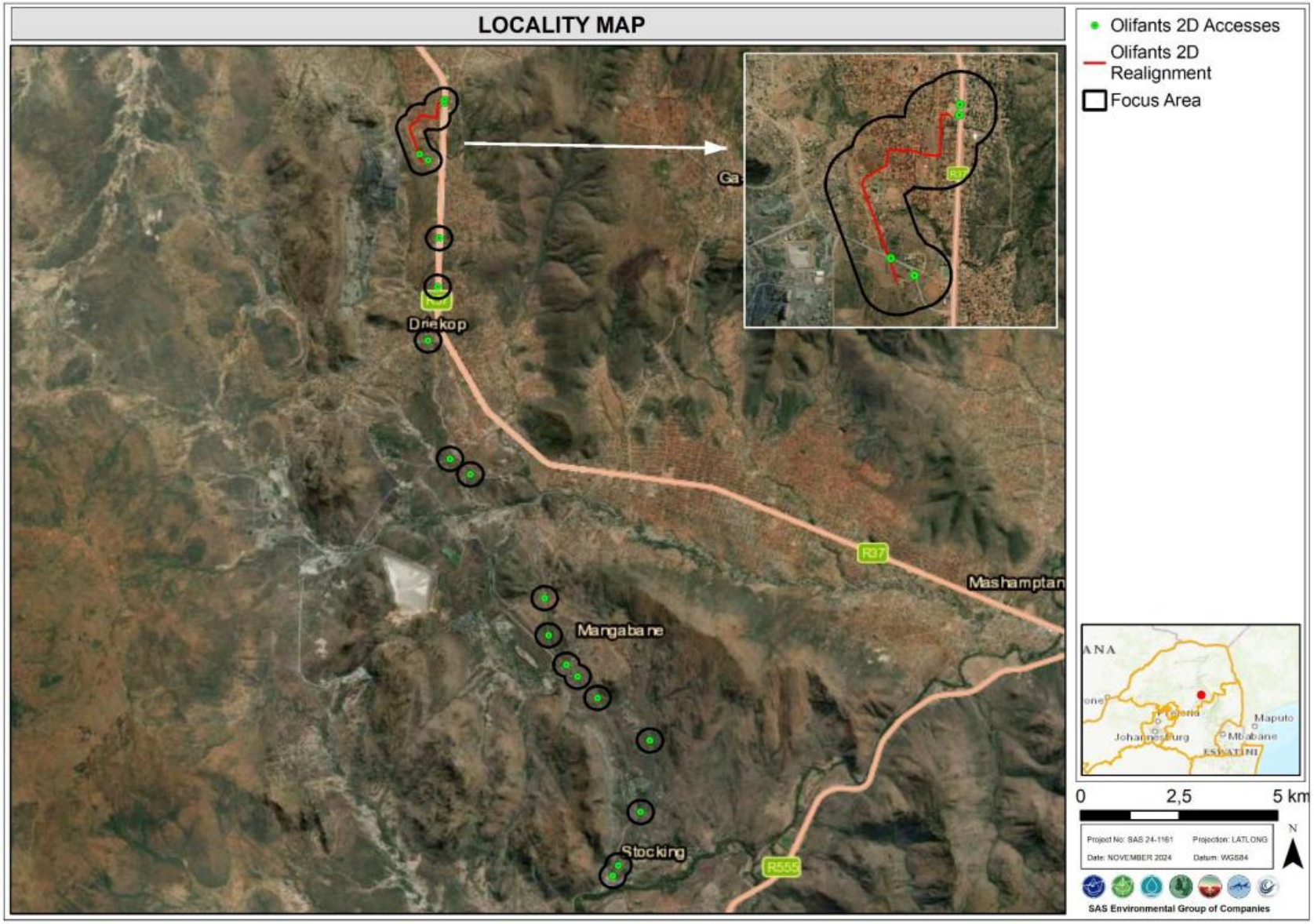


Figure 7-33: Digital satellite image depicting the proposed infrastructure and focus area in relation to surrounding areas.

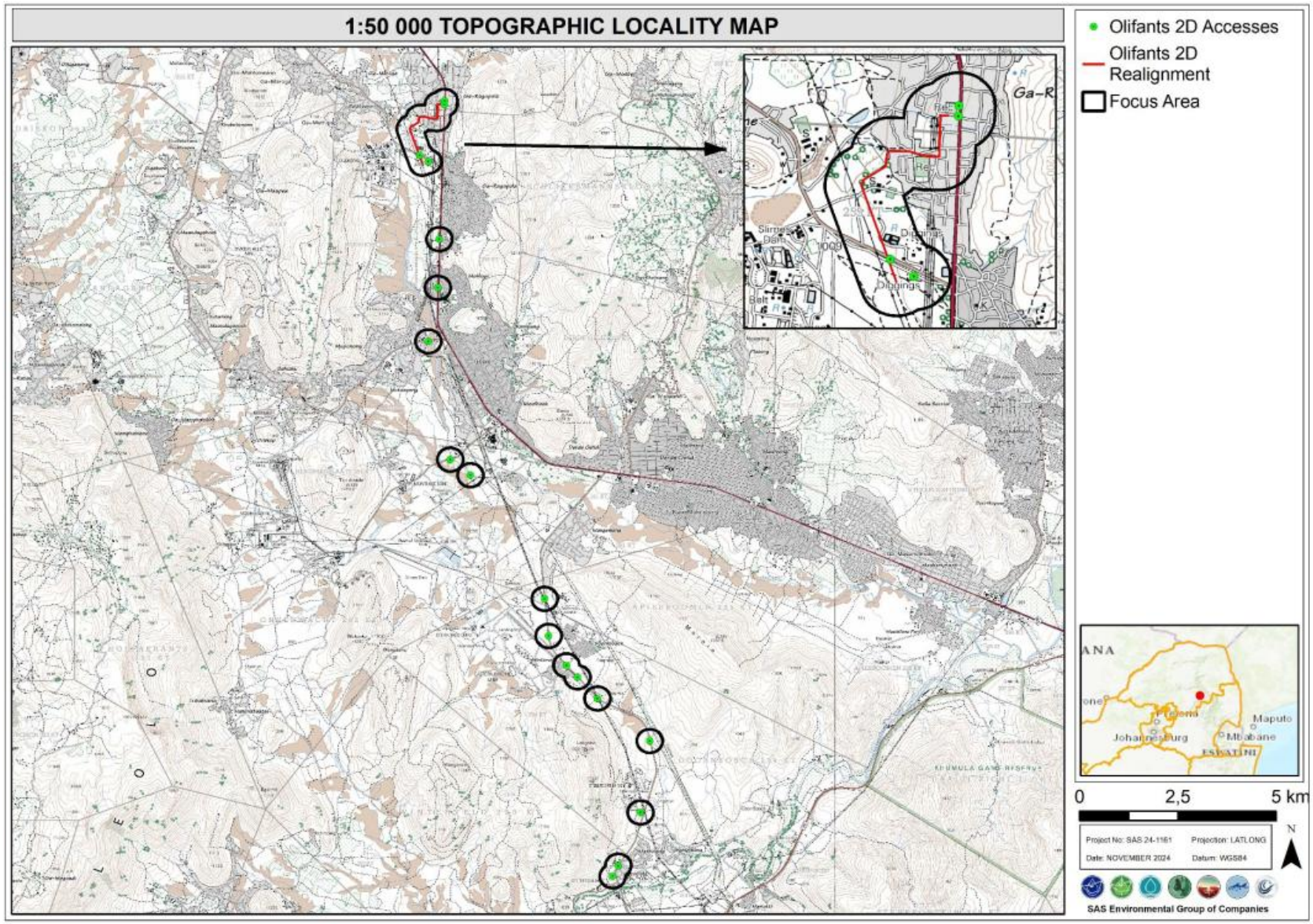


Figure 7-34: Location of the proposed infrastructure and focus area depicted on a topographical map in relation to the surrounding area.

Table 7-16: Desktop data relating to the characteristics of the freshwater ecosystems associated with the focus area and wider 2D alignment [Quarter Degree Square (QDS) 2430CA].

Aquatic ecoregion and sub-regions in which the focus area is located	
Ecoregion	Eastern Bankenveld
Catchment	Olifants North
Quaternary Catchment	B71E & B41J
WMA	Olifants
SubWMA	Middle Olifants & Steelpoort
Dominant characteristics of the Eastern Bankenveld (Kleynhans *et al*., 2007a)	
Ecoregion Level II	9.03
Dominant primary terrain morphology	Closed hills, Mountains; Moderate and high relief, low mountains
Dominant primary vegetation types	Mixed Bushveld
Altitude (m a.m.s.l)	500 to 2300
MAP (mm)	400 to 700
Coefficient of Variation (% of MAP)	20 to 34
Rainfall concentration index	55 to 64
Rainfall seasonality	Early summer
Mean annual temp. (°C)	14 to 22
Winter temperature (July) °C	2 to 20 °C
Summer temperature (Feb) °C	12 – 30 °C
Median annual simulated runoff (mm)	20 to 150
Strategic Water Source Areas for Surface Water (2021)	
Surface water Strategic Water Source Areas (SWSAs) are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. The SWSA for groundwater reflect areas that have high groundwater recharge and where the groundwater forms a nationally important resource. The 2021 Mpumalanga Tourism and Parks Agency (MTPA) database (Lötter, M.C. and Le Maitre, D) was used for surface water, while the Water Resources Commission (WRC) 2017 database (Le Maitre, D.C. *et al*.) was used for the groundwater SWSAs.	
The 2D realignment, the accesses, or associated focus area is not indicated to be within a surface water or groundwater SWSA.	

Detail of the focus area in terms of the NFEPA (2011) database	
FEPA CODE	Portions of the focus area are located within areas defined as an **Upstream Management (Code 4)** and within a **Fish Support Area (Code 2)** catchments. **Upstream Management Areas** are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. Upstream Management Areas do not include management areas for wetland FEPAs, which need to be determined at a finer scale**. Fish Support Areas** are fish sanctuaries in a lower than an A or B ecological condition and include sub-quaternary catchments that are important for the migration of threatened fish species.
Wetland vegetation (WetVeg) Type	The focus area is indicated to be within the Central Bushveld Group 1 and Central Bushveld Group 7 WetVeg types. Group 1 considered critically endangered (CR) while Group 7 is considered to be Least Threatened (LT) according to Mbona *et al*, (2015).
NFEPA Rivers	According to the NFEPA Rivers Database, there are no rivers traversing the 2D realignment, the Accesses, or associated focus areas.
NFEPA Wetlands	The database indicates two artificial wetland features; one classified as unchanneled valley bottom wetland adjacent to the 2D alignment to the east and the other being a seep wetland adjacent Access point 01. Both artificial wetland features are in a Heavily to Critically Modified (Class Z) ecological condition.
Detail of the focus area in terms of the National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) [National Wetland Map 5 is included in the National Biodiversity Assessment (NBA)]	
According to the NBA National Wetland Map 5 Database, no natural wetlands are indicated to traverse the 2D realignment, the accesses, or associated focus area. The Artificial Wetlands Database indicates four (4) open reservoirs and two (2) dams; three (3) open reservoirs and one (1) dam east of the 2D alignment within the focus area, 1 dam south of Access 01, and another open reservoir west of Access point 01b. According to the NBA Rivers Database, there are no rivers traversing the 2D realignment, the Accesses, or the associated focus area.	
National Web-based Screening Tool (2020; Accessed 2024)	
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. this assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed focus area to avoid sensitive areas.	
The 2D realignment is indicated to be of low sensitivity for the aquatic biodiversity theme.	
Detail of the focus area in terms of the Land Type Data (Job et al., 2019)	

The 2D realignment, the accesses, and associated focus area are indicated to be within Ae117, Ae112, Ae27, Ea88 and Ib192 land type groupings. **Ae land types** are red and yellow, freely drained apedal soils of the Hutton, Griffin and Clovelly soils occupying more than 40% of the landscape. Deeper (> 300 mm, but generally 500 to 1 000 mm) red soils of the Hutton form are dominant. Mishap and Glenrosa soils usually occupy significant proportions of the landscape. Soils with neocutanic, plinthic, duplex horizons and shallow black clay soils may occupy small proportions of the landscape. Katspruit, duplex soils and black clay soils usually occupy bottomland terrain positions with streambeds and erosion. **EA land types** accommodate high base status, dark coloured and/or red structured soils, usually of clay texture, associated with basis igneous rocks. More than half of the land surface is covered by vertic, melanic or red structured diagnostic horizons. Duplex soils or exposed rock may cover significant portions of the land surface, but vertic, melanic or red structured horizons are dominant. **Ib land type** groupings are areas where 60-80% of the surface is occupied by exposed rock and stones/boulders and the slopes are usually steep. The rest of the area comprises mostly shallow soils, directly underlain by hard or weathered rock.	
Detail of the proposed focus area in terms of the Limpopo Conservation Plan Version 3 (2018)	
Critical Biodiversity Area (CBA)	The southern section of the realigned pipeline, access points 04, 06 and 07, 10, and 11 are indicated as CBA 1 and 2 areas. CBA areas are irreplaceable site areas required to meet biodiversity patterns and/or ecological process targets. No alternative sites are available to meet targets. The goal is to maintain the CBA in a natural state with limited or no biodiversity loss.
Ecological Support Area (ESA)	The access point 03 is indicated to be located within ESA 1 areas. ESAs are areas with natural habitats that are important for supporting ecological processes. The goal is to avoid additional/new impacts on ecological processes.
Other Natural Areas (ONA)	A portion east of access point 08 and access point 04 are classified as ONA. ONAs are natural and intact areas but are not required to meet targets or identified as ESAs or CBAs.
No Natural Remaining (NNR)	Patches associated with Access point 05, 13, 08, 20, 21, 05, 13, and a portion of 08 are indicated as NNR. NNR are areas with no significant direct biodiversity value. These are either not natural areas, or they are degraded natural areas that are not required as ESA. These areas include mining, intensive agriculture, urban, industry, and human infrastructure.

CBA = Critical Biodiversity Area; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; EPL = Ecosystem Protection Level; ESA = Ecological Support Area; ETS = Ecosystem Threat Status; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; PES = Present Ecological State; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area.

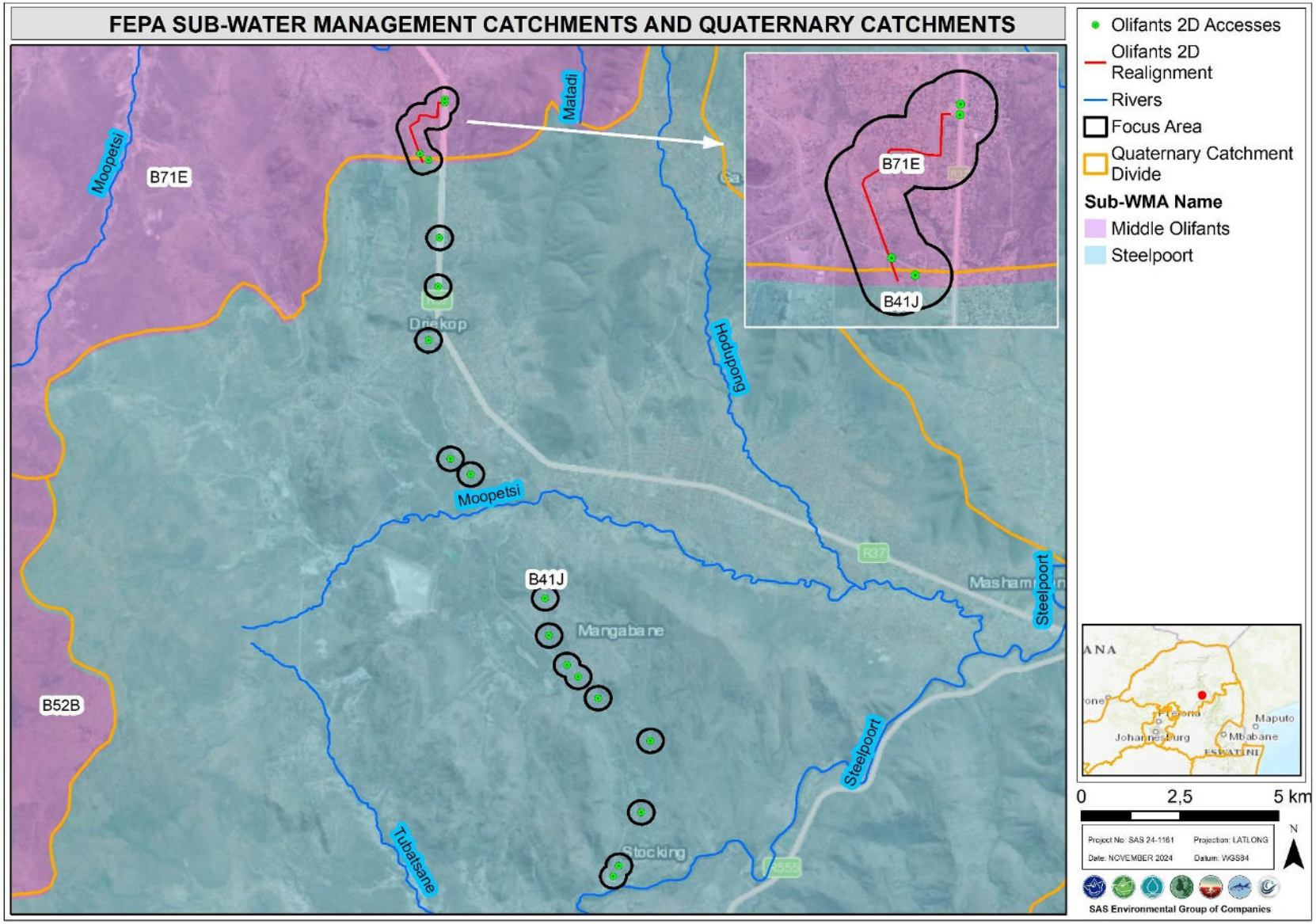


Figure 7-35: Sub-WMAs and quaternary catchments associated with the focus area.

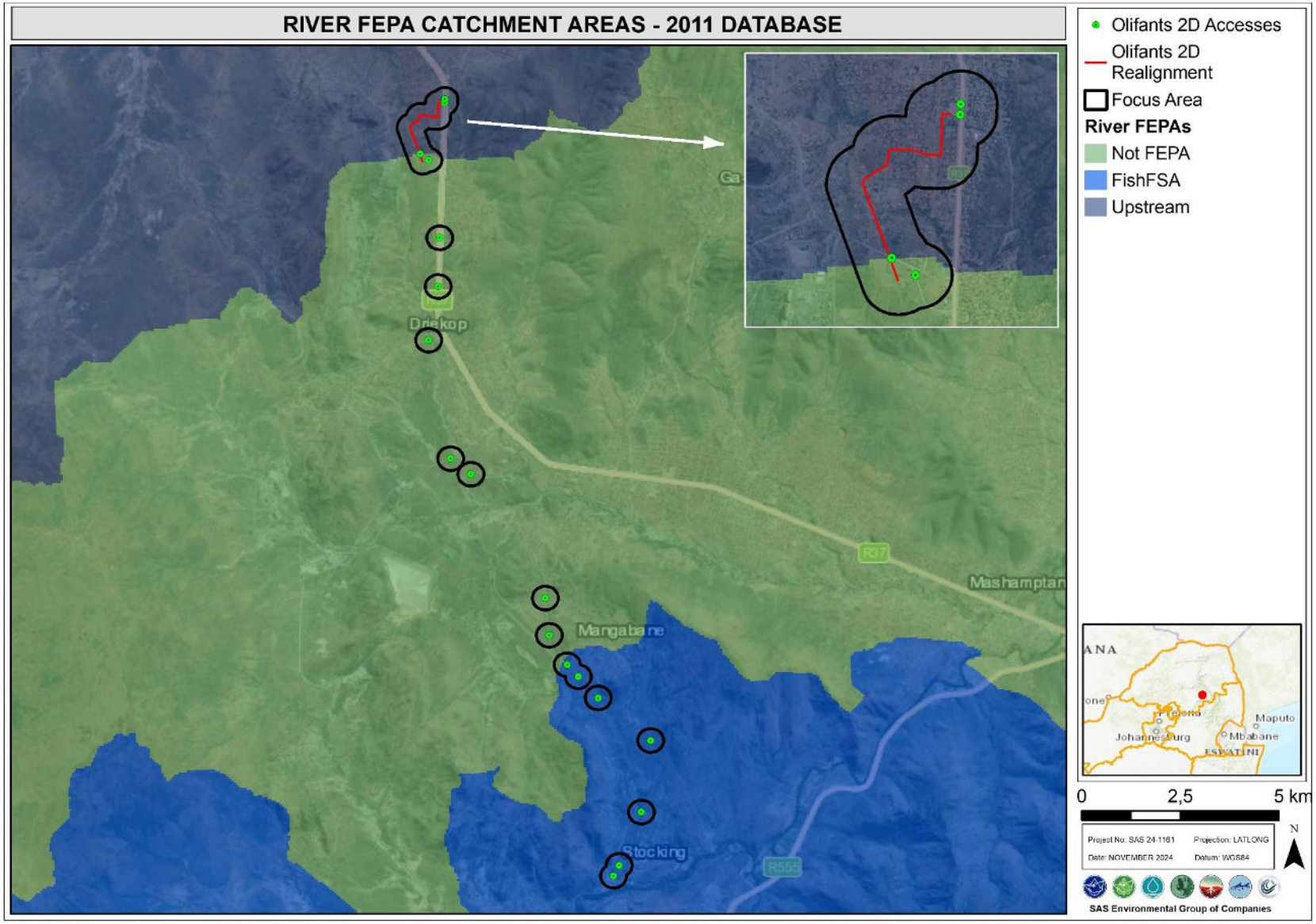


Figure 7-36: FEPA catchment designations associated with the focus area.

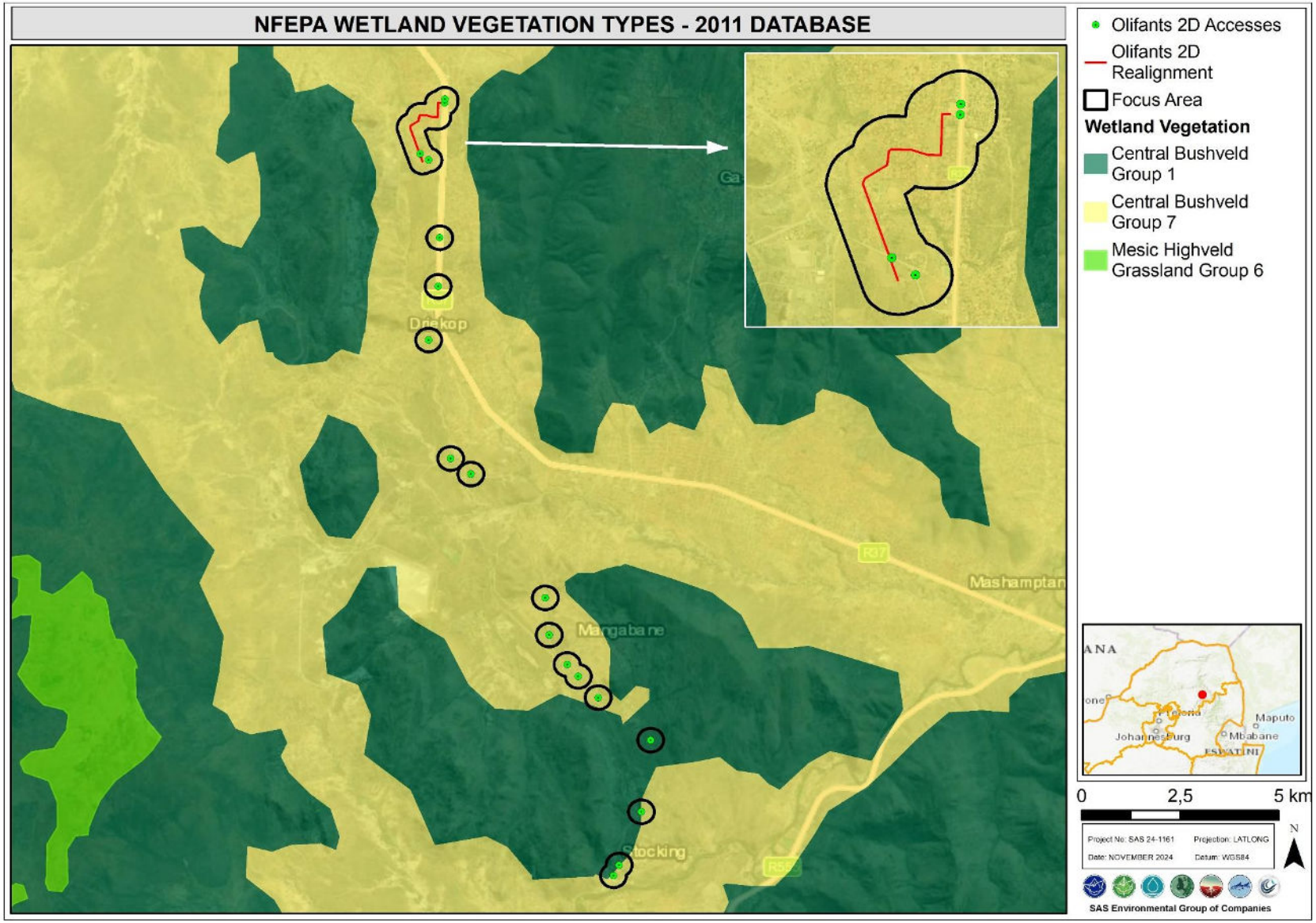


Figure 7-37: Freshwater Ecosystems (NFEPA, 2011) associated with the focus area.

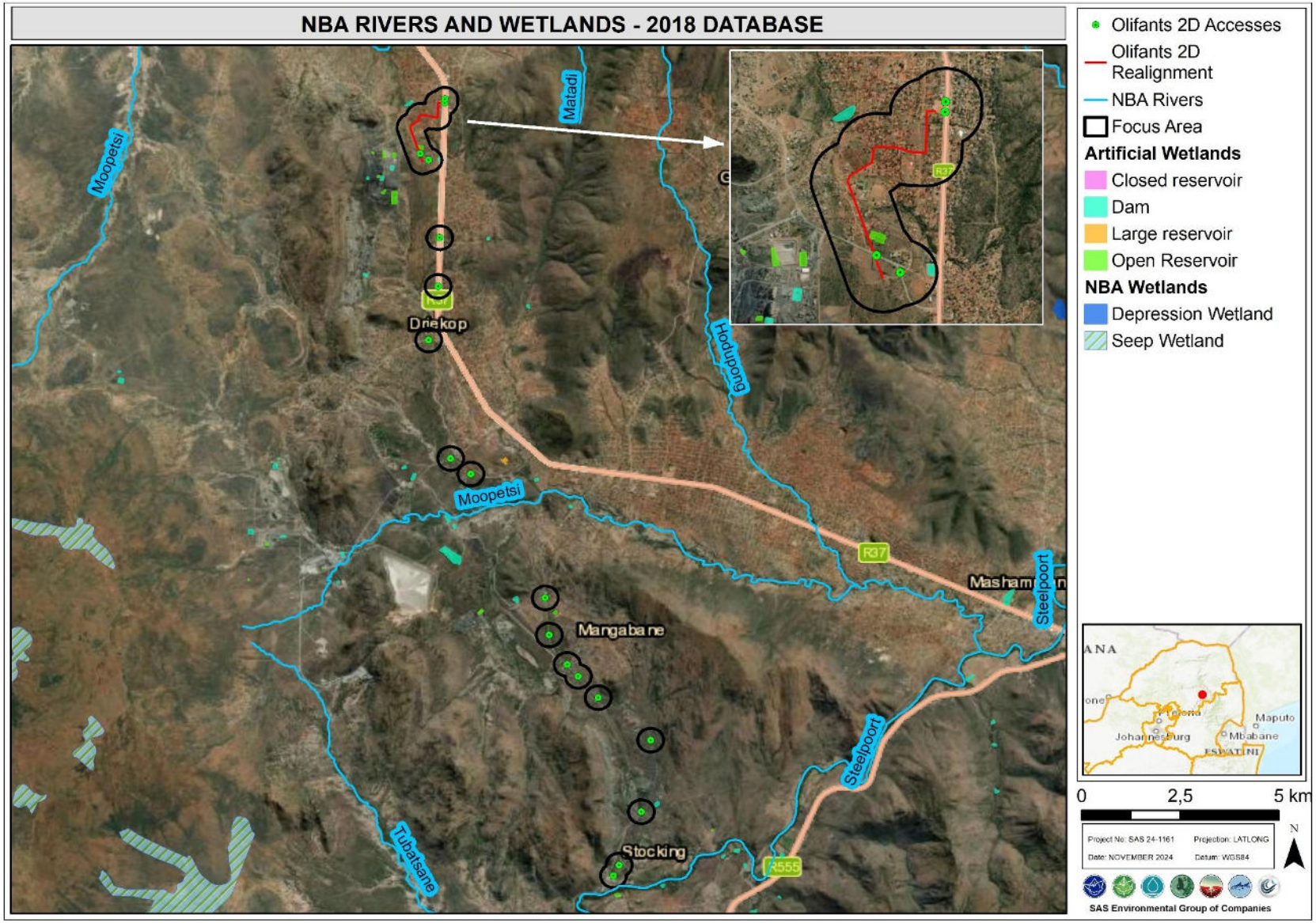


Figure 7-38: Freshwater Ecosystems associated with the focus area according to the NBA (2018) Freshwater Database.

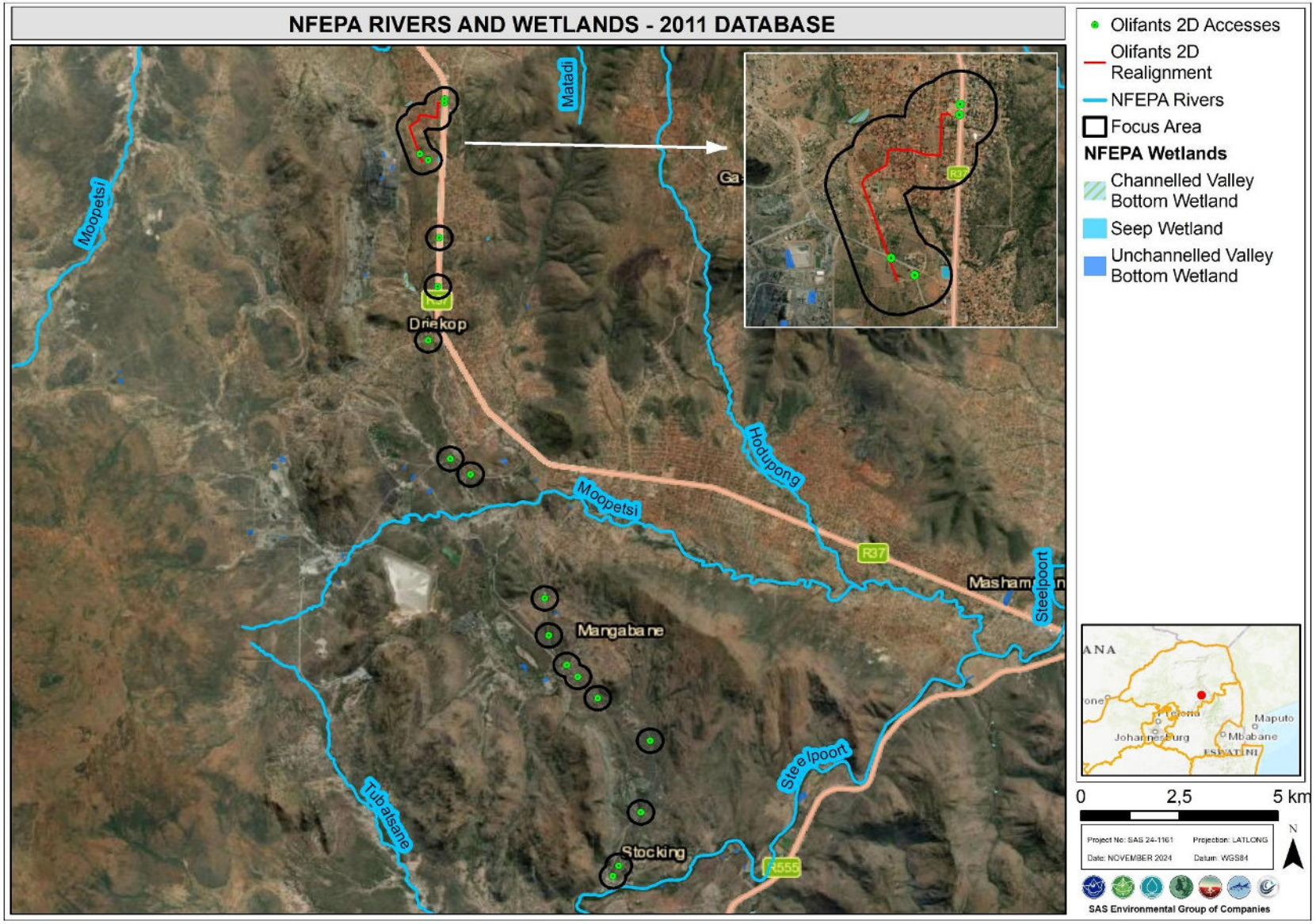


Figure 7-39: Freshwater Ecosystems associated with the focus area according to the NFEPA (2011) Database.

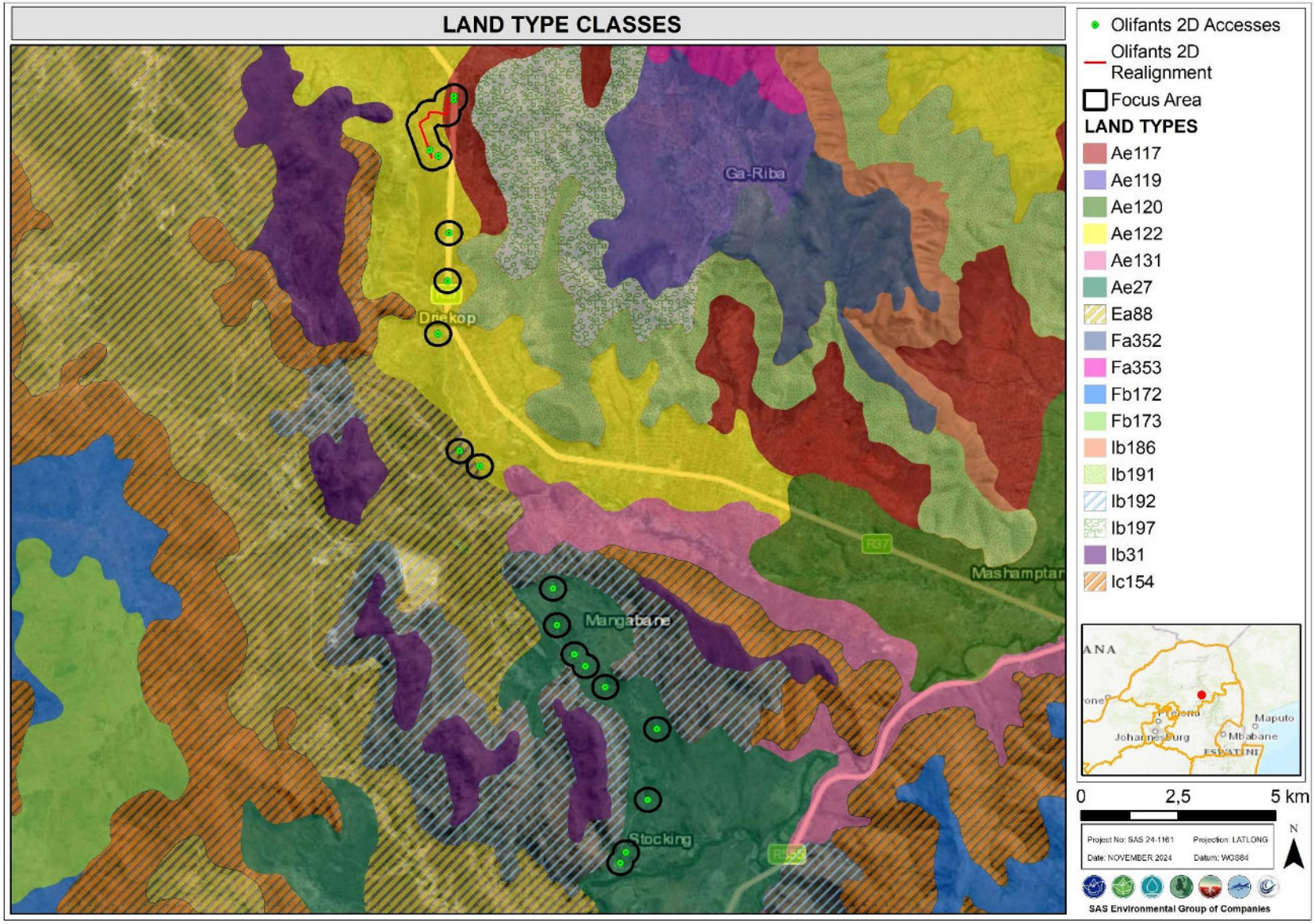


Figure 7-40: Land Types associated with the focus area (Job et al., 2019).

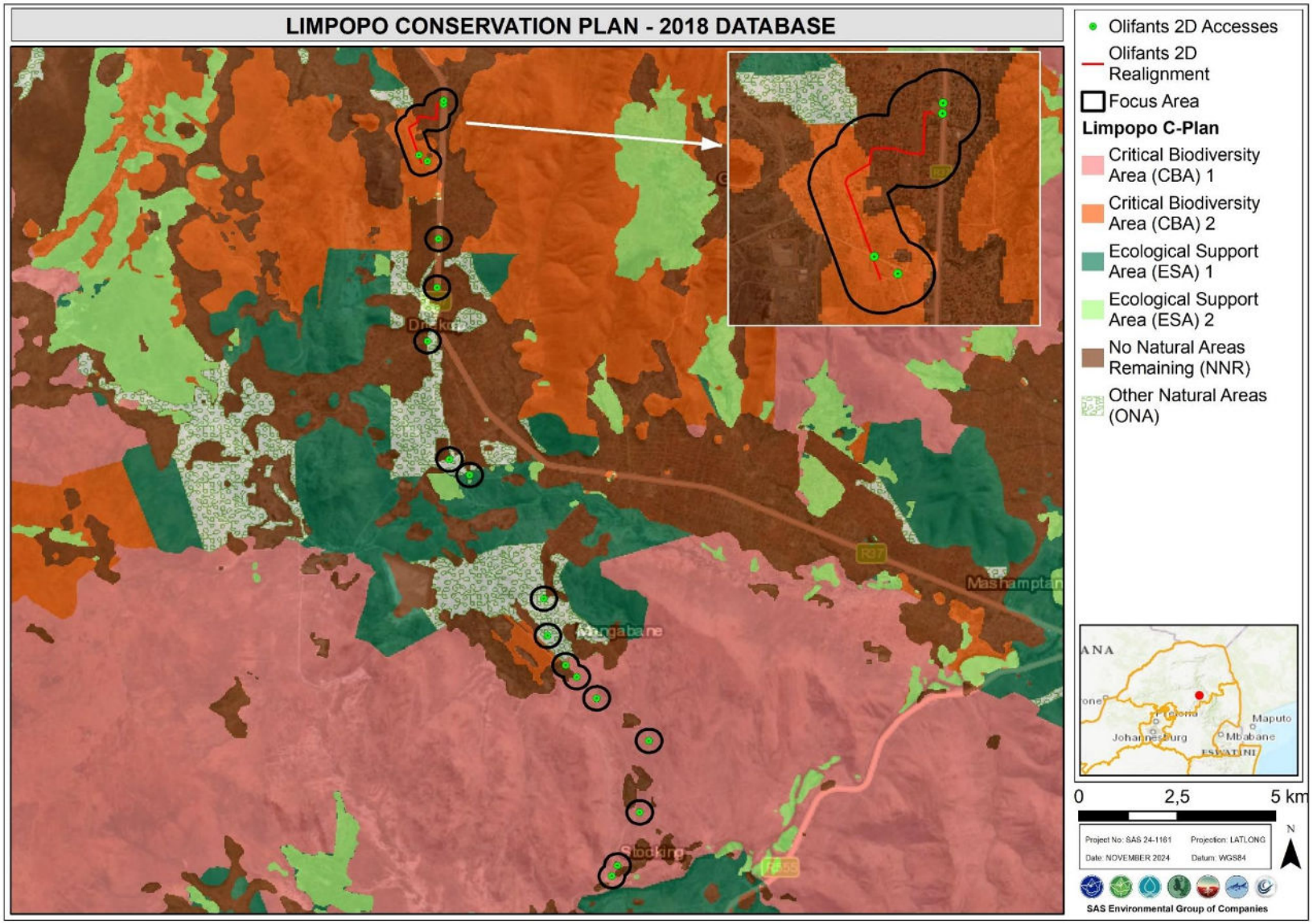


Figure 7-41: Areas of Conservation Importance according to the Limpopo Conservation Plan (2018).

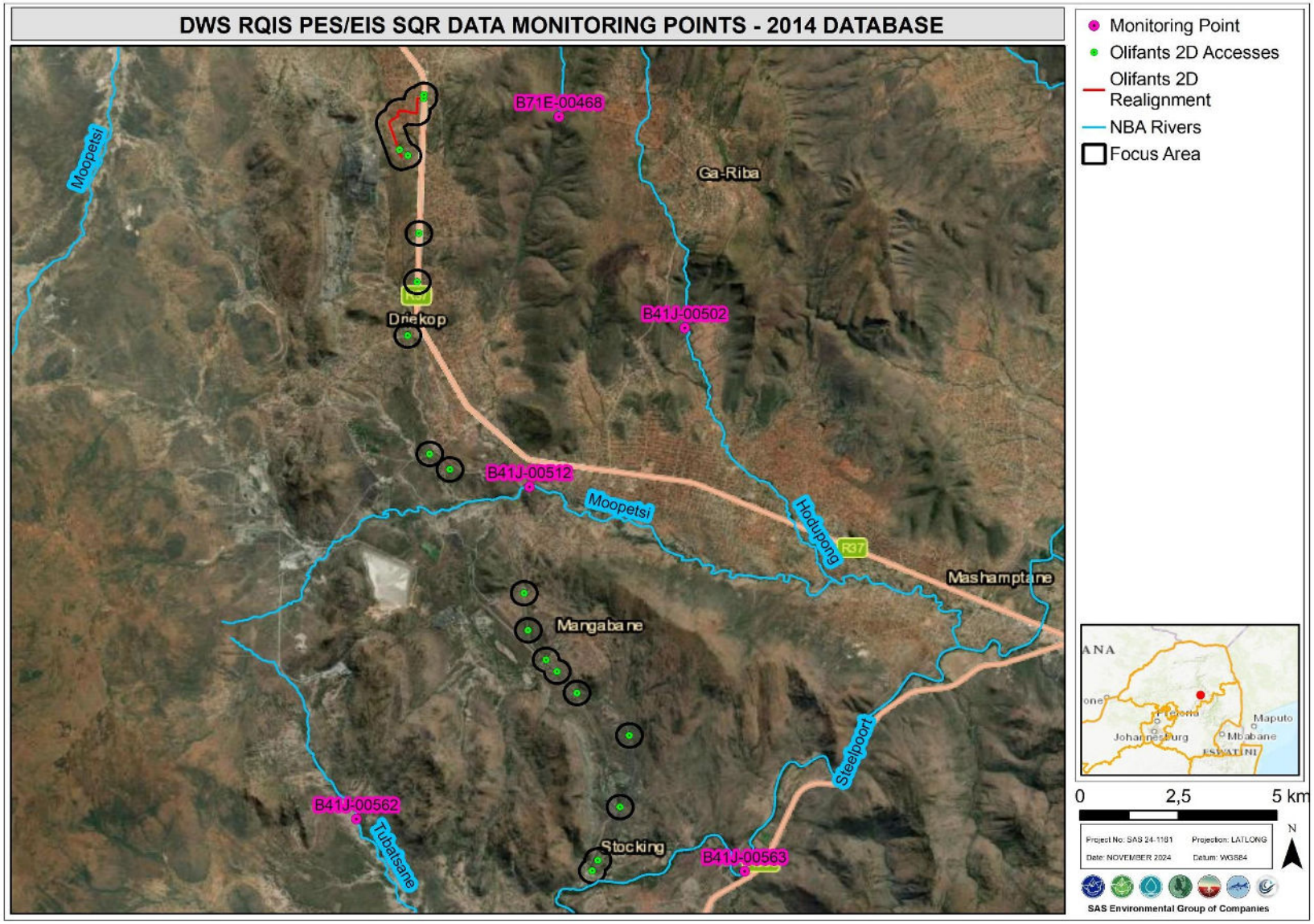


Figure 7-42: DWS RQIS PES/EIS sub-quaternary catchment reach (SQR) Data Monitoring Points in relation to the study and investigation areas.

Aquatic Biodiversity Theme - Screening Report Map

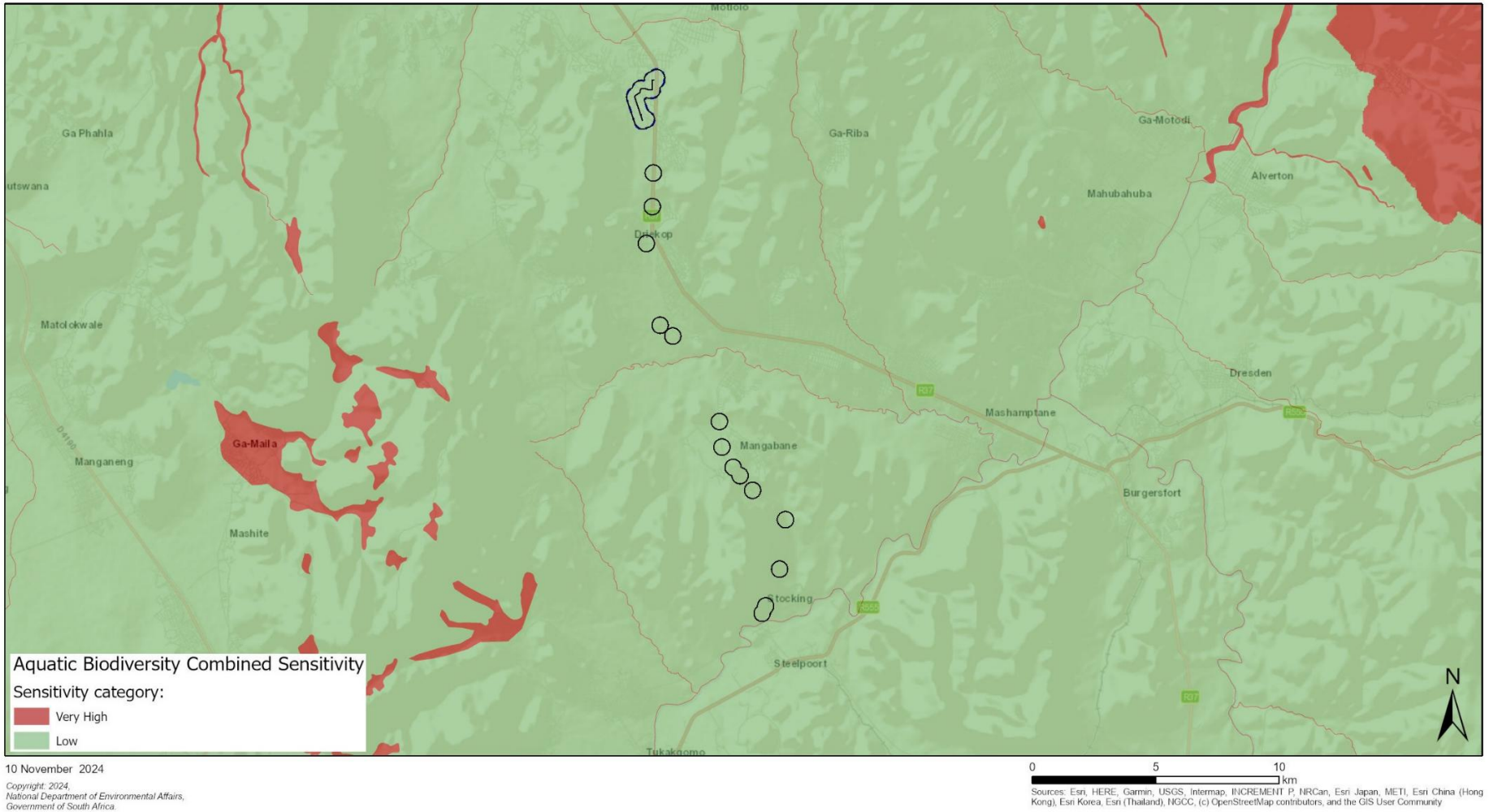


Figure 7-43: Aquatic Biodiversity (Freshwater) Sensitivity associated with the focus area as assigned by the DFFE web-based screening tool.

7.8.2.2 Ecological Status of Sub-Quaternary Catchments (DWS RQS PES/EIS Database

The reach of the rivers that traverse the focus area are located within the Eastern Bankenveld Aquatic Ecoregion within the B71E and B41J quaternary catchments. According to the PES/EIS database, as developed by the DWS RQIS department, the following SQRs are applicable (**Figure** 7-42**)**:

- B71E - 00468 (Matadi River);
- B41J - 00502 (Hodupong River);
- B41J – 00512 (Moopetsi River);
- B41J - 00562 (Tubatsane) River; and
- B41J - 00563 (Steelpoort River).

Key information on aquatic fish species, aquatic macro-invertebrates, and background conditions associated with the above SQR points as contained in this database and pertaining to the PES, ecological importance (EI) and ecological sensitivity (ES) are described in the tables below.

Table 7-17: Freshwater fish species previously collected from or expected in the various SQR monitoring points associated with the SQRs:

Fish species	B71E - 00468 (Matadi)	B41J – 00502 (Hodupong)	B41J – 00512 (Moopetsi)	B41J – 00562 (Tubatsane)	B41J – 00563 (Steelpoort)
Amphilius uranoscopus	-	-	-	-	✓
Chiloglanis paratus	-	-	-	-	✓
Chiloglanis pretoriae	-	-	-	-	✓
Chiloglanis swierstrai	-	-	-	-	✓
Clarias gariepinus	-	-	-	-	✓
Enteromius anoplus	-	-	-	-	✓
Enteromius neefi	-	-	-	-	✓
Enteromius trimaculatus	-	-	-	-	✓
Enteromius unitaeniatus	-	-	-	-	✓
Labeo cylindricus	-	-	-	-	✓
Labeo molybdinus	-	-	-	-	✓
Labeobarbus marequensis	-	-	-	-	✓
Opsaridium peringueyi	-	-	-	-	✓
Oreochromis mossambicus	-	-	-	-	✓
Pseudocrenilabrus philander	-	-	-	-	✓
Tilapia sparrmanii	-	-	-	-	✓

Table 7-18: Freshwater macro-invertebrates previously collected from or expected at the SQRs:

Invertebrate species	B71E - 00468 (Matadi)	B41J – 00502 (Hodupong)	B41J – 00512 (Moopetsi)	B41J – 00562 (Tubatsane)	B41J – 00563 (Steelpoort)
Ancylidae	-	-	-	-	✓
Baetidae > 2 Sp	-	-	-	-	✓
Belostomatidae	-	-	-	-	✓
Caenidae	-	-	-	-	✓
Ceratopogonidae	-	-	-	-	✓
Chironomidae	-	-	-	-	✓
Coenagrionidae	-	-	-	-	✓
Corduliidae	-	-	-	-	✓
Corixidae	-	-	-	-	✓
Culicidae	-	-	-	-	✓
Dytiscidae	-	-	-	-	✓
Elmidae/Dryopidae	-	-	-	-	✓
Empididae	-	-	-	-	✓
Gerridae	-	-	-	-	✓
Gomphidae	-	-	-	-	✓
Gyrinidae	-	-	-	-	✓
Heptageniidae	-	-	-	-	✓
Hirudinea	-	-	-	-	✓

Invertebrate species	B71E - 00468 (Matadi)	B41J – 00502 (Hodupong)	B41J – 00512 (Moopetsi)	B41J – 00562 (Tubatsane)	B41J – 00563 (Steelpoort)
Hydracarina	-	-	-	-	✓
Hydraenidae	-	-	-	-	✓
Hydrometridae	-	-	-	-	✓
Hydrophilidae	-	-	-	-	✓
Hydropsychidae 2 Sp	-	-	-	-	✓
Hydroptilidae	-	-	-	-	✓
Leptoceridae	-	-	-	-	✓
Leptophlebiidae	-	-	-	-	✓
Libellulidae	-	-	-	-	✓
Lymnaeidae	-	-	-	-	✓
Muscidae	-	-	-	-	✓
Naucoridae	-	-	-	-	✓
Nepidae	-	-	-	-	✓
Notonectidae	-	-	-	-	✓
Oligochaeta	-	-	-	-	✓
Perlidae	-	-	-	-	✓
Philopotamidae	-	-	-	-	✓
Pleidae	-	-	-	-	✓
Potamonautidae	-	-	-	-	✓
Simuliidae	-	-	-	-	✓
Tabanidae	-	-	-	-	✓
Tipulidae	-	-	-	-	✓
Tricorythidae	-	-	-	-	✓
Turbellaria	-	-	-	-	✓
Veliidae/Mesoveliidae	-	-	-	-	✓

Table 7-19: Summary of the ecological status of the sub-quaternary catchment reaches in the proximity of the focus area based on the DWS RQS PES/EIS database.

Ecological status	B71E - 00468	B41J – 00502	B41J – 00512	B41J – 00562	B41J – 00563
Synopsis					
PES Category Median	Seriously Modified (Class E)	Largely Modified (Class D)	Seriously Modified (Class E)	Seriously Modified (Class E)	Largely Modified (Class D)
Mean EI[24] class	Low	Low	Low	Low	High
Mean ES[25] class	Low	Moderate	Low	Very Low	High
Length	22.94	16.89	19.43	12.05	19.54
Stream order	1	1	1	1	3

[24] EI = Ecological Importance
[25] ES = Ecological Sensitivity

Ecological status	B71E - 00468	B41J – 00502	B41J – 00512	B41J – 00562	B41J – 00563
Default EC[26]	Low (D)	Moderate (C)	Low (D)	Low (D)	High (B)
PES[27] Details					
Instream habitat continuity MOD[28]	Large	Moderate	Large	Large	Moderate
RIP/wetland zone continuity MOD	Serious	Large	Serious	Serious	Moderate
Potential instream habitat MOD activities	Serious	Serious	Critical	Critical	Serious
Riparian/wetland zone MOD	Serious	Large	Serious	Serious	Moderate
Potential flow MOD activities	Small	Small	Large	Small	Large
Potential physico-chemical MOD activities	Serious	Serious	Critical	Large	Serious
EI[24] Details					
Fish spp/SQ	-	-	-	-	16.00
Fish average confidence	-	-	-	-	2.50
Fish representivity per secondary class	-	-	-	-	High
Fish rarity per secondary class	-	-	-	-	Very High
Invertebrate taxa/SQ	-	-	-	-	43.00
Invertebrate average confidence	-	-	-	-	4.12
Invertebrate representivity per secondary class	-	-	-	-	High
Invertebrate rarity per secondary class	-	-	-	-	High
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating	Very Low	Low	Very Low	Very Low	Very Low
Habitat diversity class	High	Moderate	Low	Low	Low
Habitat size (length) class	Low	Low	Low	Low	High
Instream migration link class	Moderate	High	Moderate	Moderate	High
Riparian-wetland zone migration link	Low	Moderate	Low	Low	High
Riparian-wetland zone habitat integrity class	Low	Moderate	Low	Low	High
Instream habitat integrity class	Low	Low	Very Low	Very Low	Low
Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500 m	High	Moderate	Very High	Very High	Very High
Riparian-wetland natural vegetation rating (expert)	Low	Low	Low	Low	High
ES[26] Details					
Fish physical-chemical sensitivity description	-	-	-	-	Very High

[26] EC = Ecological Category; default based on median PES and highest of EI or ES means
[27] PES = Present Ecological State; confirmed in database that assessments were performed by expert assessors
[28] MOD = Modification

Ecological status	B71E - 00468	B41J – 00502	B41J – 00512	B41J – 00562	B41J – 00563
Fish no-flow sensitivity	-	-	-	-	Very High
Invertebrates physical-chemical sensitivity description	-	-	-	-	Very High
Invertebrates velocity sensitivity	-	-	-	-	Very High
Riparian-wetland-instream vertebrates (excluding fish) intolerance water level/flow changes description	Very Low	Very Low	Low	Very Low	High
Stream size sensitivity to modified flow/water level changes description	High	Very High	Low	Low	Low
Riparian-wetland vegetation intolerance to water level changes description	Low	Low	Low	Low	Low

7.8.3 FRESHWATER RESULTS

7.8.3.1 Freshwater Ecosystem Characterisation

During the assessment, various non-perennial drainage lines were identified in the focus area. The majority of these drainage lines form tributaries of the Steelpoort River and form part of the generally south-ward draining network of drainage that flows into the Steelpoort River to the south of the Phase 2D alignment. Certain of the drainage lines in the northern half of the Phase 2D alignment form tributaries of the Moopetsi River, which confluences with the Steelpoort River west of the town of Burgersfort. Only the northern-most drainage lines located to the north of the realigned section of the Phase 2D alignment fall within the Olifants River catchment, with drainage being aligned to the north.

These freshwater ecosystems were classified according to the classification system (Ollis *et. al.*, 2013) as Inland Systems, falling within the Eastern Bankenveld Aquatic Ecoregion. The focus area falls within the within the Central Bushveld Group 7 Wetland Vegetation Type, which is indicated as near threatened (NT) according to Mbona *et al*. (2015). These freshwater ecosystems were further classified at Level 3 and Level 4 of the classification system as summarised in **Table** 7-20 below.

Table 7-20: Characterisation of the freshwater ecosystems associated with the focus area according to the Classification System (Ollis et. al., 2013).

Freshwater Ecosystem	Level 3: Landscape unit	Level 4: Hydrogeomorphic (HGM) Type
Non-Perennial Drainage Line	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes.	**River**: A linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit.

In addition to the ephemeral / episodic drainage lines, the wider area within which the proposed development is located is characterised by numerous small, poorly defined preferential flow paths, which convey surface water during periods of rainfall but do not retain water for sufficient periods of time to allow for the formation of either riparian or wetland characteristics. Some such preferential flow paths may be indicated on topographic data, or may possess floodlines, but as they do not possess defined riparian zones or wetland characteristics, they are not depicted nor assessed in the freshwater ecological assessment report.

7.8.3.2 Freshwater Ecosystem Delineation

Figure 7-44 below indicates the presence of freshwater ecosystems in relation to the focus area.

The detailed assessment of the freshwater ecosystems within the study and investigation areas are detailed in **Table** 7-20 and **Table** 7-21 below.

Due to the relatively homogenous characteristics and similarities of modifying impacts (that are present within many of the freshwater ecosystems, especially in the more heavily populated northern part of the focus area) which are common to virtually all freshwater ecosystems associated with the focus area, the various HGM units (many of which possess only weakly defined riparian zones) were grouped according to the primary drainage system (sub-catchment) with which they are associated. **Table** 7-20 encompasses the drainage lines associated with accesses 03a, 04a 09, and 10 (all located in a small sub-catchment of a tributary of the Steelpoort River which joins the Steelpoort River north-east of the town with the same name at Mohlakwana) and **Table** 7-21 encompasses the tributaries of the Moopetsi River that are associated with accesses 03,04, 08 and 13. Since the drainage systems all possess very

similar characteristics, the Ecoservices assessment was applied collectively to the drainage lines in the respective sub-catchment, as any variation in the outcome of each individual drainage line unit was to be assessed, is likely to be negligible.

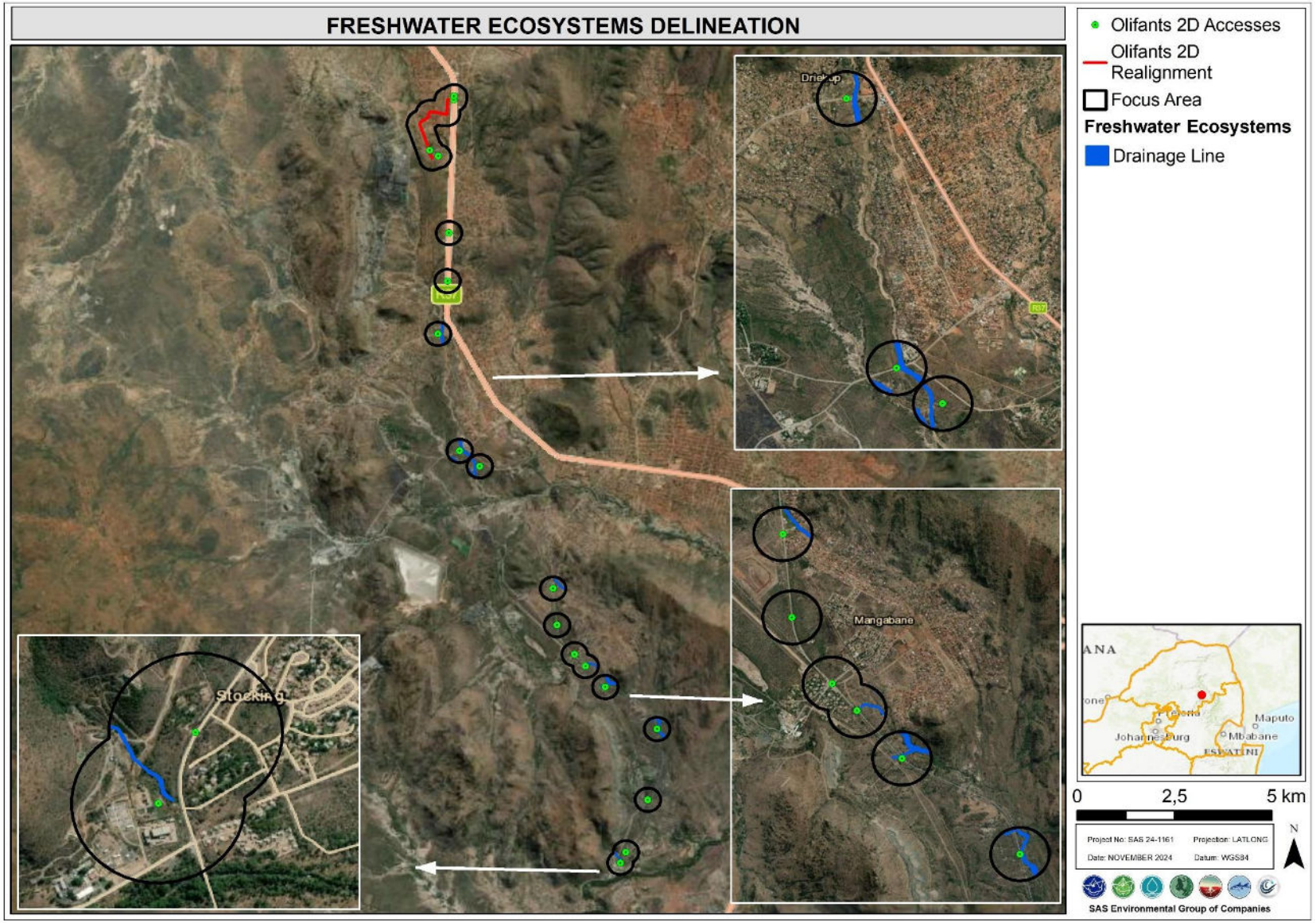
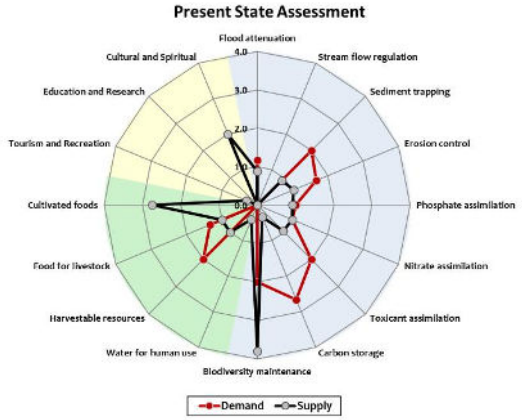


Figure 7-44: Freshwater ecosystem occurrence in the context of the study and investigation areas.

7.8.3.3 Freshwater Detailed Assessment Results

The detailed assessment of the freshwater ecosystems within the focus area is detailed in the tables below.

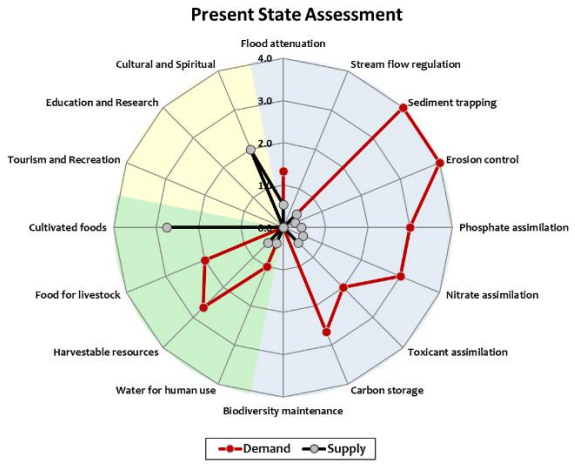
Table 7-21: Summary of the assessment of the non-perennial drainage lines located in the southern part of the 2D alignment associated with accesses 03a, 04a, 09 and 10).

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:
 
</td><td rowspan="2">
Photograph notes: Top left: Bedrock dominated channel of the drainage line east of access point 03a with slight flow along the channel; Top right: A flow bench adjacent to the channel of the same drainage line containing sandy alluvial material; Bottom left: The active channel of the drainage line near access point 04a with flanking Lydenburgia cassinoides shrub; Bottom right: The narrow single thread channel of the drainage line east of / downgradient of access point 10.</td></tr>
<tr><td>Ecoservice provision</td><td>Biodiversity Maintenance – Very High, All other services – Low or Very Low
The reaches of the drainage lines provision biodiversity maintenance at a very high level, with demand being markedly lower than supply. The primary drainage line in the sub-catchment that drains roughly parallel to the Steelpoort-R37 link road displays a riparian zone in a reasonable state of health and the threatened species Lydenburgia cassinoides is located along all the drainage lines assessed in this part of the pipeline alignment. The excessive demand for natural resource utilisation present in the peri-urban conurbation along the R37 is less present in this southern part of the 2D alignment and this has resulted in lower levels of degradation of freshwater ecosystems. Hydrological-related regulating services are all performed to a low degree due to the physical characteristics of the drainage lines, although flow of water in the primary drainage line was noted after an early summer rainfall event and such a flow of water may be related to the potential presence of wetland habitat along part of the reach. Cultural services are all provisioned to a very low degree reflecting the presence of the drainage lines on privately owned property.</td></tr>
<tr><td>PES/</td><td colspan="2">Drainage line at Access Point 03a - Riparian IHI PES Category: C</td></tr>
</table>

<table>
<tr><td>discussion</td><td colspan="3">Drainage line at Access Point 03a - Riparian IHI PES Category: D
Drainage line at Access Point 9 - Riparian IHI PES Category: D
Drainage line at Access Point 10 - Riparian IHI PES Category: C
The main drainage line draining the southern half of the 2D alignment and one of its tributaries have been assigned a riparian PES score of C. This reflects a moderately modified state, which although displaying some impacts, reflects a present state where large areas of relatively intact riparian habitat remain. This retention of natural vegetation in much of the catchment of the reaches of these drainage lines has assisted in the retention of a relatively unimpacted hydrological state. Some areas of the catchment of these drainage lines have been modified from a natural state however through the presence of housing and the Samancor mining operations, along with a very big area of chronic sheet erosion to the north of the 03a access. The level of removal (i.e. felling of riparian trees) is expected to be lower here than in the peri-urban areas to the north as these drainage lines are located on privately owned land. The third drainage line is largely modified, reflecting a greater degree of removal of vegetation and thus greater exposure of substrate, along the erosion of banks and at an informal road crossing upgradient of the access.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category of all drainage lines in the southern sub-catchment: Moderate
Biodiversity and ecological aspects and characteristics of the drainage lines are primarily responsible for the moderate EIS in the southern part of the alignment, including the designations of the wider area as a CBA. Due to their physical characteristics and absence of a laterally extensive riparian zone the, the drainage lines are less important and sensitive in a hydrological context. The very limited degree of importance for direct human benefits relates to the presence of harvestable resources and livestock grazing.</td><td>REC, RMO & BAS Category</td><td>Access points 03a and 10 drainage lines: Recommended Ecological Category (REC) Category: C
Access point 04a and 9: REC Category D
Recommended Management Objective (RMO): Maintain
Best Attainable State (BAS): C/D (Maintain)
Due to their moderate / low EIS twinned with the respective PES scores, the current state of the drainage lines should be maintained. In the context of the development of the accesses to the pipeline, measures to ensure that no direct impact of riparian / instream habitat or pollution of the downgradient drainage lines must be implemented.</td></tr>
<tr><td colspan="4">Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The drainage lines in the southern half of the alignment form part of a relatively small catchment of a small tributary of the Steelpoort River. The catchment consists of a mix of residual natural vegetation, residential settlements and mining operations in hilly terrain on the northern side of the Steelpoort River valley. The largest drainage line drains southwards along the Steelpoort-R37 access road and along within its tributaries is characterised by a steep longitudinal profile with a step-pool morphological profile in places that is typical of mountain streams. Much of the channel bed of the reach of this largest drainage line in the vicinity of access point 03a is characterised by outcropping of bedrock interspersed with small runs of alluvial (gravelly) material. A lateral flood bench with sandy alluvial material was noted along parts of the reach. The shorter tributary smaller drainage lines are characterised by narrow single thread channels consisting mostly of transported alluvial material. The presence of sheet rock and shallow soils means that naturally runoff from the catchment is expected to be reasonably high. However, the physical changes to parts of the catchment (notably in the form of mining and associated slag dumps) mean that a certain degree of natural runoff from catchment are likely to have been stopped from reaching the downstream reaches. The hydrology of the larger stream is expected to be ephemeral; despite the relatively small size of its catchment, residual flows following a recent rainfall event along the length of the reach were noted during the site assessment, suggesting that the certain reaches upstream of this point where Phragmites reedbeds are present may contain wetland habitat and soils which assist in the slow release of water. to be able to slowly release rainfall into the downstream reaches. The smaller tributary drainage lines are however expected to be naturally episodic, only flowing for short periods after large rainfall events. The presence of rock outcropping along much of the reach naturally precludes the presence of extensive riparian thickets and woody vegetation, but a reasonable cover of riparian woody vegetation remains, especially along the larger drainage line in the vicinity of access point 3a. Some felling of trees was noted but larger trees persisted along the reach. The woody riparian vegetation along the smaller drainage line near the 04a access was subject to greater degree of felling, with only L. cassinoides shrubs remaining along some parts of the reach upstream of the road. Herbaceous vegetation is present in both the larger drainage line and its tributary at access point 10, providing a suitable coverage of substrate, however very little herbaceous vegetation coverage was present along the reaches of the access point 04a drainage line both upstream and downstream of the road. Signs of fauna in the form of tracks were present along the larger drainage line and the presence of surface water for longer periods water is likely to attract fauna to the drainage line. As the drainage line is not expected to be perennial, no aquatic faunal assemblage is expected to be present.</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">The access roads at all four access sites are unlikely to directly (physically) impact the drainage lines, with the drainage line at access points 03a being on the opposite side of the Steelpoort-R37 link road, the drainage line at access point 10 being downgradient of the pipeline servitude with the road access on the opposite side, and the access road at access point 04a and 9 being existing tracks located approximately 35 m to the south of the drainage lines. However, due to the proximity of the accesses indirect impacts are possible and mitigation measures stipulated in the report must be adhered to in the construction and development of the accesses.</td></tr>
<tr><td colspan="4">Impact Assessment Outcome & Business Case:</td></tr>
</table>

VERY LOW	The application of the Zutari impact assessment methodology has assessed the level of impact significance posed by the development of the accesses on respective drainage lines the drainage line to be low before mitigation and very low after mitigation measures. This is due to the location of the accesses away from the freshwater ecosystems, thus being highly unlikely to result in a direct impact. Nonetheless the importance of ensuring that mitigation measures are implemented and adhered to is not diminished.

Table 7-22: Summary of the assessment of the non-perennial drainage lines located in the Moopetsi River catchment in the northern part of the Phase 2D alignment associated with accesses 03, 04, 08 and 13).

Ecological & socio-cultural service provision graph: 	
Ecoservice provision	**All services – Low or Very Low** The drainage lines assessed in the Moopetsi River catchment have been collectively assessed to provision no more than a low degree of ecological goods and service provision. This is largely due to the highly degraded state of many of the drainage lines, although certain local reaches that are in a slightly better state remain. As such the ability of the drainage lines to provision services is of such a low level so low that for most metrics demand significantly exceeds supply. Although certain reaches exist which are in a slightly better state, all drainage lines have little to no instream or riparian vegetation (habitat) remaining. Due to their largely / critically modified state the drainage

Photograph notes: **Top left**: View upstream along the drainage line close to access point 04 along the Modikwa Mine access road showing a residual cover of both woody and herbaceous riparian vegetation, representative of a reach which is in a much improved state as compared to the majority of the drainage lines in the Moopetsi catchment; **Top right:** The same drainage line further downstream displaying a residual pool with heavily grazed vegetation within both the pool and removal of woody

<table>
<tr><td></td><td>lines accordingly act as effective flow conduits in the landscape with very few if any hydrological regulating services provisioned.</td><td colspan="2">riparian vegetation within the flanking riparian zone; Bottom left: A part of the riparian zone of the drainage line at access point 13 with little to any remnant vegetation within this part of the riparian zone; Bottom right: A view of the edge of the riparian zone of the same drainage line downstream (at access point 8) with no vegetation and very highly eroded substrate.</td></tr>
<tr><td>PES/ discussion</td><td colspan="3">Drainage line reach encompassing access points 8 and 13 - Riparian IHI PES Category: E
Drainage line reach encompassing access points 03 and 04 - Riparian IHI PES Category: D
The PES of the two drainage line reaches are largely to critically modified. The removal of riparian vegetation through a variety of factors including removal (felling) of woody vegetation, chronic livestock overgrazing and erosion that has resulted in the removal of all topsoil with subsoils universally exposed has led to the effective destruction of the riparian and instream habitat of the drainage lines, especially in close proximity to areas of human settlement. Some reaches of the drainage line in the vicinity of access points 3 and 4 displayed more intact habitat, but these reaches were nonetheless affected by heavy overgrazing, dumping of construction rubble, alien invasive proliferation and woody vegetation removal. The catchments of the drainage lines have been largely modified through industrial development and extensive human settlement and by expansive areas of sheet erosion where little to no natural vegetation remain, thus contributing to a highly altered hydrology where there is little to no infiltration and the spate flows have been greatly increased in volume over a shorter duration.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category of all drainage lines: Low
The EIS of all drainage lines in the Moopetsi River catchment was assessed to be low due to the highly degraded nature of the drainage lines and the effective absence of any areas of significant residual riparian habitat. This level of degradation has resulted in the drainage lines effectively functioning as drainage conduits for stormwater and overland flow and the drainage lines perform very little hydrological functioning. Due to their state of degradation the drainage lines are unable to provide any cultural or social benefits due to the effective absence of any harvestable resources or livestock grazing resources.</td><td>REC, RMO & BAS Category</td><td>REC Category: D
RMO: Maintain (Improve)
BAS: D / E (Maintain)
Any PES score of lower than D is considered ecologically unacceptable (Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater ecosystem fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category). The PES category of the drainage line reach encompassing access points 8 and 13 should theoretically be improved by a class through rehabilitation. However in reality the drainage line is in such a state of degradation with contributing landuse factors of such a nature that this would be practically impossible and the BAS for both would be to maintain the PES and prevent further degradation. In the context of the development of the accesses to the pipeline, measures to ensure that no direct impact of riparian / instream habitat or pollution of the downgradient drainage lines must be implemented.</td></tr>
<tr><td colspan="4">Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The Moopetsi River is a tributary of the Steelpoort River and is located on the northerly slopes of the wider Steelpoort River catchment. The catchment of the river and its tributaries (adjacent to which certain of the access points are located) have been significantly transformed from a natural state, primarily due to the extensive presence of peri-urban human settlements, industrial operations and areas of chronic soil erosion, especially at the head of the tributaries of the Moopetsi. Many of the drainage lines in the catchment, including that in the vicinity of access points 8 and 13 are characterised by a very wide valley-like cross-sectional profile in which the drainage line has historically eroded vertically through very deep soil profiles down to bedrock in the current bed. The drainage line in the vicinity of access point 03 is slightly different in morphological characteristics in that it is characterised by an almost complete bedrock-dominated substrate which has resulted in a step-pool morphology and a very narrow riparian cross-sectional area where the bedrock outcropping naturally limits the density of woody riparian vegetation. The hydrology of the drainage lines is highly episodic in nature. Under reference conditions the drainage lines may have been seasonal in nature, but flows are present only for short durations following flow events. In certain of the reaches, flows were noted in upstream parts of the reach but not downstream, and thus a significant portion of the flows in certain reaches (when they occur) are likely to occur in the alluvial substrate of the drainage line channel.
The significant levels of degradation in the drainage lines and their immediate surrounds, especially the occurrence of chronic gully and sheet erosion which has resulted in the removal of topsoil over large areas, along with the ever-constant grazing and browsing intensity of livestock, especially goats, has resulted in there being little to no woody or herbaceous vegetation present in the riparian zone especially in reaches closer to settlements. As a result, little to no natural biotic assemblage is likely to be present in these reaches, with a slightly more natural assemblage in areas of slightly less impact away from human settlements. Water quality (when water is present as surface flows in the drainage lines) is expected to be poor and highly turbid, although the filtering effect of the alluvial substrate may assist in the polishing of water quality to some degree.</td></tr>
</table>

Extent of modification anticipated	The access roads at all access sites in the northern part of the 2D alignment are unlikely to directly (physically) impact the drainage lines, with the access routes at all four sites either being located directly off an existing road or the with the tracks likely to be used for access (i.e. at access points 03 and 13) being in the catchment of the respective drainage lines, with the pipeline servitude being located between the access and the drainage line. However, due to the proximity of the accesses to the drainage lines or being located in their catchment indirect impacts are possible and mitigation measures stipulated in the report must be adhered to in the construction and development of the accesses. The northern re-aligned section is not located close to any freshwater ecosystem and no notable impact of developing a pipeline along this alignment has been identified.
Impact Assessment Outcome & Business Case:	
VERY LOW	The application of the Zutari impact assessment methodology has assessed the level of impact significance posed by the development of the accesses and the realigned pipeline section on respective drainage lines the drainage line to be low before mitigation and very low after mitigation measures. This is due to the location of the accesses away from the freshwater ecosystems, thus being highly unlikely to result in a direct impact. Nonetheless the importance of ensuring that mitigation measures are implemented and adhered to is not diminished.

7.8.4 LEGISLATIVE ZONES OF REGULATION

The applicable Zones of Regulation (ZoR) for the proposed development can be summarised as follows:

- 32 m ZoR (NEMA EIA Regulations).

The ZoR as stipulated above is depicted in **Figure** 7-45 below.

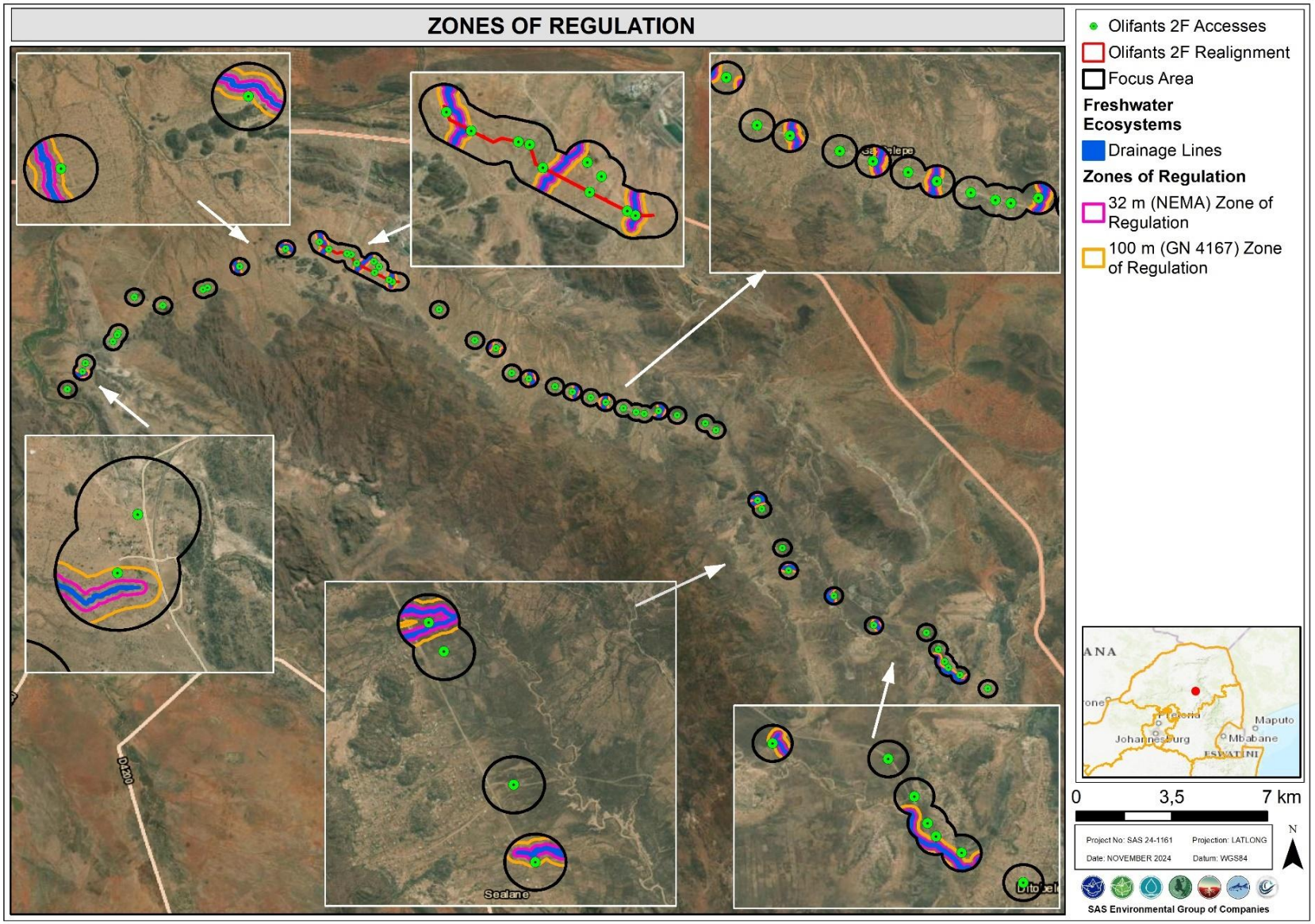


Figure 7-45: GN 4167 Freshwater - related ZoR associated with the focus area.

7.8.5 FRESHWATER SENSITIVITY VERIFICATION

According to the screening tool, the wider alignment is located within an area of low aquatic/ freshwater biodiversity significance (**Figure** 7-43).

Based on the site verification undertaken by SAS and the findings thereof presented in this report, the designation of low sensitivity to freshwater features in the wider area by the DFFE Screening Tool has been confirmed in part and disputed in part through the findings of the freshwater assessment:

- ► All freshwater ecosystems have been confirmed to be associated with high sensitivity and thus in these areas, the sensitivity designation is disputed; and
- ► The designation of low sensitivity to the remainder of the wider area is supported.

Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), for areas of very high aquatic biodiversity sensitivity an Aquatic Biodiversity Assessment must be produced. Such a reporting approach has accordingly been compiled (refer to the SSV report contained in Appendix F of the freshwater ecological assessment report).

7.8.6 IMPACT ASSESSMENT

There are four key ecological impacts on freshwater ecosystems that could occur as a result of the proposed development, namely,

- Loss of freshwater ecosystem habitat and ecological structure;
- Changes to the sociocultural and service provision;
- Impacts on the hydrology and sediment balance of the freshwater ecosystems; and
- Impacts on water quality.

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible.

A summary of the Impact Assessment applied to the construction and operation of the Phase 2D infrastructure development, is provided in the table below.

Table 7-23: Summary of the results of the impact assessment matrix applied to the freshwater ecosystems associated with the construction and operation of the proposed project.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to site clearing, poor stockpile control related to pipeline excavation and poor stormwater management	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	• It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present; • Vegetation clearing must be limited to the pipeline construction servitude and as much indigenous vegetation as possible must be retained (if applicable); • Implementation of construction-phase stormwater controls - e.g. use of silt curtains, berms etc., as part of a multi-phase Stormwater Management Plan (SWMP) for the development; • Stockpiles may not exceed a 2 m height and must be covered with a suitable geotextile (e.g. Geotextile or hessian sheeting) to prevent contamination by hydrocarbons/fuel and to prevent alien invasive encroachment until the excavation trench can be backfilled.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Construction of the pipeline deviation - potential pollution of downgradient drainage lines due to poor cement mixing / batching practices and poor management of hazardous materials such as paint, hydrocarbons	Short-term	Local	Moderate negative	Slightly Detrimental	Unlikely	Very low - negative	• Mobile Machinery must be equipped with drip trays to prevent pollutant spillage on site; • Contractor laydown areas and equipment/material/vehicular storage are to remain at least 100 m outside of all delineated freshwater ecosystems and the precise location must be informed by an ECO in line with creating the least disturbance; • Storage of hazardous materials in a bunded contained space; • Immediate remediation of hazardous material spills. • Mixing of cement must only be undertaken within the construction camp and may not be mixed on bare soils; • Mixing of cement is also to be strictly undertaken within a lined, bound or bunded portable mixer. Ready mix concrete must preferably be used; • A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; • A washout area[29] must be designated within the part of the development site that is located outside of a 100 m buffer of the delineated riparian zone boundary; • Cement bags must be disposed of in the demarcated hazardous waste receptacles; • Liquid cement spillage outside of the demarcated area must be promptly removed and taken to a suitably licenced waste disposal site.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

[29] Concrete washouts are performed at the end of each workday to prevent concrete from hardening inside the trucks, wheelbarrows, and chutes that handle concrete. The area in which this is done is known as a washout area.Usually, water is injected into chutes and tools to remove the concrete mixture, with the resulting mess being placed inside a special bin for disposal.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to poorly executed reinstatement and rehabilitation that could lead to erosion of soils	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	• The topsoil layer of the soil stockpile must be separated from the lower layers and protected from moisture loss and alien vegetation encroachment, using a geotextile such as hessian sheeting, for use during the rehabilitation phase of the river banks; • Backfilled soil must be suitably loosened on completion of construction activities and revegetated to prevent erosion.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative
Access road construction - potential slumping of / dumping of construction waste and excavated material into downgradient drainage lines	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	• A construction right of way must be established to which all construction activities (footprint) must be restricted; this construction right of way must be clearly demarcated; • Establish a formal construction waste control system that is properly controlled and enforced. • It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present; • Vegetation clearing must be limited to the access road construction servitude and as much indigenous vegetation as possible must be retained (where applicable); • Implementation of construction-phase stormwater controls - e.g. use of silt curtains, berms etc., as part of a multi-phase SWMP for the development; • Stockpiles may not exceed a 2 m height and must be covered with a suitable geotextile (e.g. Geotextile or hessian sheeting) to prevent contamination by hydrocarbons/fuel and to prevent alien invasive encroachment until the excavation trench can be backfilled; • All stockpiling of excavated / construction material must be located on the upgradient side of the road construction right of way and not on the downgradient side.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Access road construction - potential pollution of downgradient drainage lines by sediment and other pollutants such as paint / bitumen and cement	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	• Mobile Machinery must be equipped with drip trays to prevent pollutant spillage on site; • Contractor laydown areas and equipment/material/vehicular storage are to remain at least 100 m outside of all delineated freshwater ecosystems and the precise location must be informed by an ECO in line with creating the least disturbance; • Storage of hazardous materials in a bunded contained space; • Immediate remediation of hazardous material spills. • Mixing of cement must only be undertaken within the construction camp and may not be mixed on bare soils; • Mixing of cement is also to be strictly undertaken within a lined, bound or bunded portable mixer. Ready mix concrete must preferably be used; • A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; • A washout area must be designated within the part of the development site that is located outside of a 100 m buffer of the delineated riparian zone boundary; • Cement bags must be disposed of in the demarcated hazardous waste receptacles; • Liquid cement spillage outside of the demarcated area must be promptly removed and taken to a suitably licenced waste disposal site.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low – negative
Proliferation of Alien Invasive Plants (AIPs) in the construction footprint that could encroach into adjacent freshwater ecosystems	Long-term	Local	Moderate negative	Slightly detrimental	Fairly Likely	Low negative	• All existing and emergent alien invasive vegetation must be removed. All such material must be disposed of at a registered garden refuse site and may not be burned or mulched on site	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low – negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Operation -potential alteration of hydrology and geomorphology of adjacent / downgradient drainage lines due to poor operational stormwater management and rehabilitation and thus potential development of erosion in the pipeline deviation servitude	Long-term	Local	Moderate negative	Moderately detrimental	Fairly Likely	Low negative	• The use of stone pitching to reduce velocity of stormwater is strongly recommended; • The proposed stormwater infrastructure must also be incorporated into a suitable and site-specific SWMP; • Rehabilitation and revegetation must by timed to at the end of the dry season to limit the potential for sediment runoff during rehabilitation activities and to allow newly planted vegetation to be assisted by rainfall; and • Revegetation and protection of the soils in the pipeline servitude must occur, especially in sloping areas more prone to erosion. Hydroseeding may be required for this purpose; • It is strongly recommended that the reinstated areas be fenced off for a period (at least 6 months) following reinstatement to prevent livestock from accessing the rehabilitated areas thereby allowing vegetation to become established.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very low – negative
Operation - potential alteration of the hydrology of downgradient drainage lines due to stormwater discharge from access roads	Long-term	Local	Low negative	Moderately detrimental	Fairly Likely	Low negative	• Design measures such as flow breakers to slow the velocity of stormwater must be included in the design of the road at the drainage line crossing point; • The principles of Sustainable Urban Drainages (SUDs) must be incorporated into stormwater discharge off the access roads; • Any developing erosion at stormwater discharge points must be immediately rehabilitated.	Long-term	Local	Low negative	Moderately detrimental	Unlikely	Low – Negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Operation - potential pollution of downgradient drainage lines due to spills and other road / pipeline maintenance activities, such as emergency excavations which could result in sediment transport into downgradient areas	Long-term	Local	Low negative	Moderately detrimental	Unlikely	Low negative	• In the event of the need for emergency excavations, all construction-related mitigation measures must be implemented and adhered to; • An operational monitoring programme that checks for development of erosion within the pipeline servitude must be implemented and adhered to; • All vehicles and machinery involved in operational maintenance must be in good working order and must not be leaking; • All spills of potential pollutants on the road surface must be immediately remediated.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very Low – negative
Proliferation of AIPs and poor operational control of AIPs in the project footprint that could encroach into adjacent freshwater ecosystems	Long-term	Local	Moderate negative	Moderately detrimental	Fairly Likely	Low negative	AIP proliferation is likely to occur within the pipeline servitude and the road reserve of the access roads and as such AIP control must be regularly implemented throughout the operational phase as part of an Alien Plant Control Management Plan.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very Low – negative

All activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a “low” or “very low” degree of impact significance to the freshwater environment. The low impact significance is a result of no proposed infrastructure footprint being located within any freshwater ecosystem that would result in direct impacts on the receiving freshwater environment, with only indirect impacts being likely. Such indirect impacts can be mitigated to result in a very low impact significance provided the suite of mitigation measures specified in this report are implemented and adhered to.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the development of the infrastructure are able to be minimised, assuming that a high level of mitigation takes place. Additional “good practice” mitigation measures applicable to a project of this nature are provided in Appendix H of the Freshwater Biodiversity Impact Assessment report.

7.8.6.1 Cumulative and Residual Impacts

Cumulative impacts: Freshwater ecosystems within the region are under continued threat due to a variety of factors including urban and mining expansion in the surrounding landscape, as well as due to poor landuse practices. In the context of the wider Phase 2D alignment, freshwater ecosystems have been highly degraded where located within areas of peri-urban settlement. The freshwater ecosystems located in the southern part of the Phase 2D alignment are less impacted due to the lower density of human settlement in this area. However, as mining and human settlement would potentially increase into this area, these drainage lines are likely to come under increasing pressure, related to mining-related degradation and increased natural resource demands from local communities. If the proposed development were to further impact freshwater ecosystems along the Phase 2D alignment in the focus area, it would result in a cumulative impact. However, the risk of such an impact materialising has been assessed to be low, and very low after the application of mitigation measures. In this context, no cumulative impact is likely to result because of the proposed development.

Residual impacts arise from activities of which the effects persist long after the activity has ceased due to the self-perpetuating nature of such impacts (e.g. erosion). Residual impacts may cease with human remediation or when the trajectory of ecosystem imbalance caused by such an impact is complete. Residual impacts could also result from the change in runoff and interflow characteristics from the catchment of the drainage lines in the case of open excavations and disturbances associated with the pipeline deviation and accesses. However, due to the ability to adequately mitigate impacts to acceptable levels, such residual impacts are deemed unlikely to occur.

7.8.7 SPECIALIST CONCLUSION AND RECOMMENDATIONS

The assessment was conducted on various non-perennial drainage lines located within the focus area. The results of the detailed assessment of freshwater ecosystems located in the focus area are summarised in the table below:

Table 7-24: Summary of results of the field assessment.

Freshwater Ecosystem Grouping	Present Ecological State (PES) / Ecostatus	Ecoservices	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category / Recommended Management Objective / Best Attainable State
Drainage Lines located in the catchment of an unnamed tributary of the Steelpoort River (southern part of the 2D	• Drainage line at Access Point 03a - Riparian IHI PES Category: C • Drainage line at Access Point 03a - Riparian IHI PES Category: D	Very High to Very Low	Moderate	REC Category: C / D BAS Category: C / D RMO: Maintain

pipeline alignment)	• Drainage line at Access Point 9 - Riparian IHI PES Category: D • Drainage line at Access Point 10 - Riparian IHI PES Category: C			
Drainage Lines located in the Moopetsi River catchment (northern part of the 2D pipeline alignment)	• Drainage line reach encompassing access points 8 and 13 - Riparian IHI PES Category: E • Drainage line reach encompassing access points 03 and 04 - Riparian IHI PES Category: D	Low / Very Low	Low	REC Category: D BAS Category: D/E RMO: Drainage line reach encompassing access points 8 and 13 - Improve Drainage line reach encompassing access points 03 and 04 – Maintain

All activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a “low” or “very low” degree of impact significance to the freshwater environment. The low impact significance is a result of no proposed infrastructure footprint being located within any freshwater ecosystem that would result in direct impacts on the receiving freshwater environment, with only indirect impacts being likely. Such indirect impacts can be mitigated to a very low impact significance provided the suite of mitigation measures specified in this report are implemented and adhered to.

Based on the proviso that all mitigation measures are implemented, it is the professional opinion of the freshwater ecologist that the proposed development can be granted environmental authorisation.

7.9 TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT (EKOINFO CC ENVIRONMENTAL, 2024)

EkoInfo CC and its associate, Pachnoda Consulting, were appointed to update the terrestrial biodiversity component of the entire Phase 2D alignment. EkoInfo CC and Pachnoda Consulting had previously assisted in the preparation of baseline information in 2016 for Aurecon. This update also takes into account the requirements of IFC PS 6. To assist with IFC PS 6 mapping, the entire alignment for the Phase 2D pipeline was revisited, as IFC PS 6 was not a requirement in the previous studies.

The IFC PS 6 guideline document requires the consideration of the following key elements:

1. Identification of Critical Habitats: Mapping areas that qualify as critical habitats, including those with high biodiversity value or that support rare, threatened, or endangered species. The developer must ensure that these areas are clearly identified, and conservation efforts are integrated into project planning.
2. Habitat Assessment and Baseline Surveys: The project should map natural and modified habitats within its area of influence. Baseline biodiversity surveys and habitat assessments are essential to understand the pre-project conditions.

A field investigation to ground-truth the desktop findings was conducted during the week of the 4th of November 2024.

7.9.1 STUDY AREA

The Phase 2D pipeline, along with its permanent and temporary servitudes, represents the disturbance footprint of the project and is located within the landscape presented by quaternary catchments B41J and B71E (**Figure** 7-46).

The current alignment mainly follows the original alignment, except in the north where a deviation occurs (**Figure** 7-47). Only results for this deviation area was provided in the screening report supplied with regards to flora (**Figure** 7-48), fauna (**Figure** 7-49) and terrestrial biodiversity (**Figure** 7-50). According to the screening tool, the deviation is in an area of medium sensitivity for plant species, medium sensitivity for animal species, and very high sensitivity for terrestrial biodiversity. The relevance of these sensitivity classes was verified during the site visit.

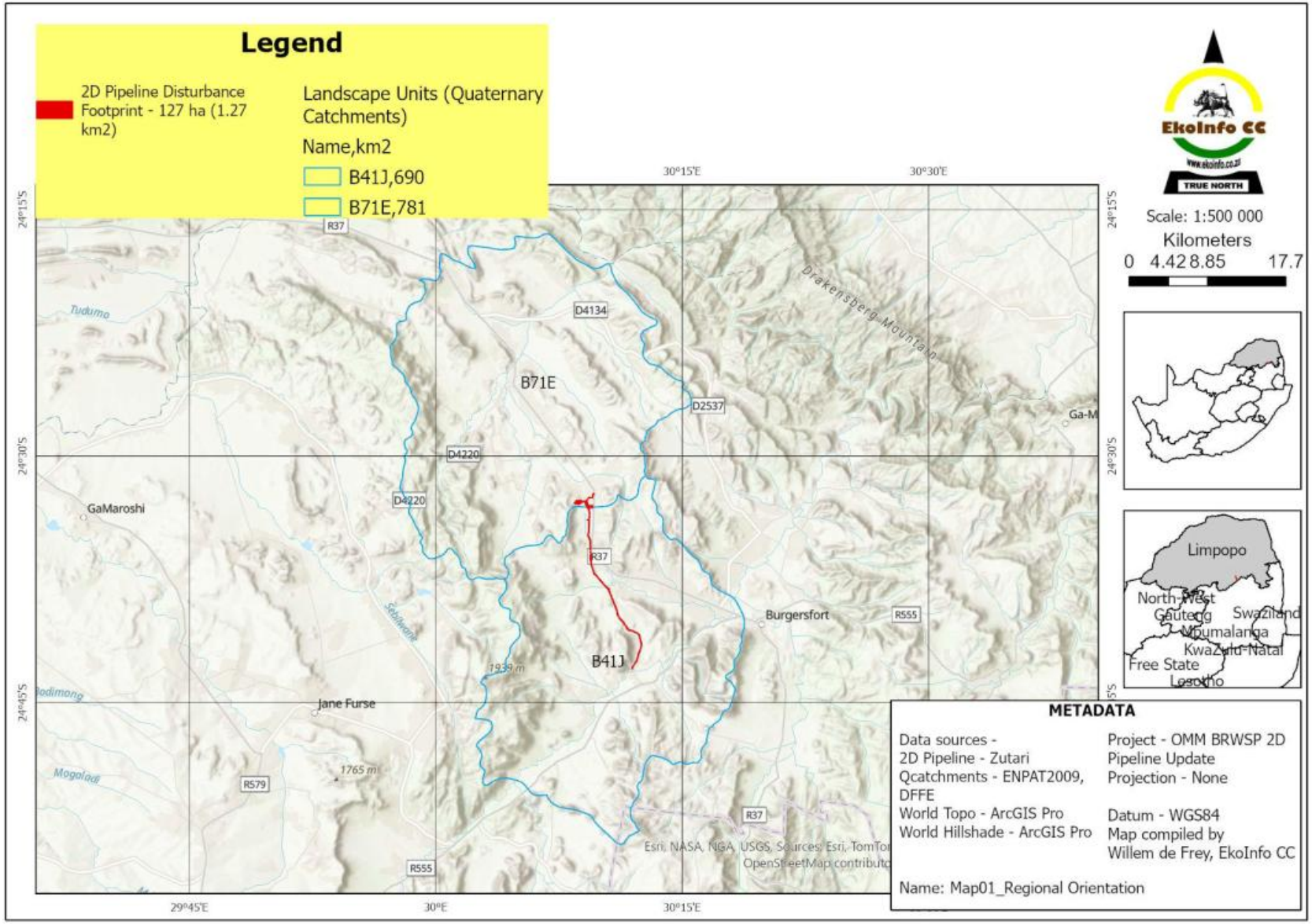


Figure 7-46: Regional orientation of the study area consisting of the 2D pipeline disturbance footprint, Limpopo Province.

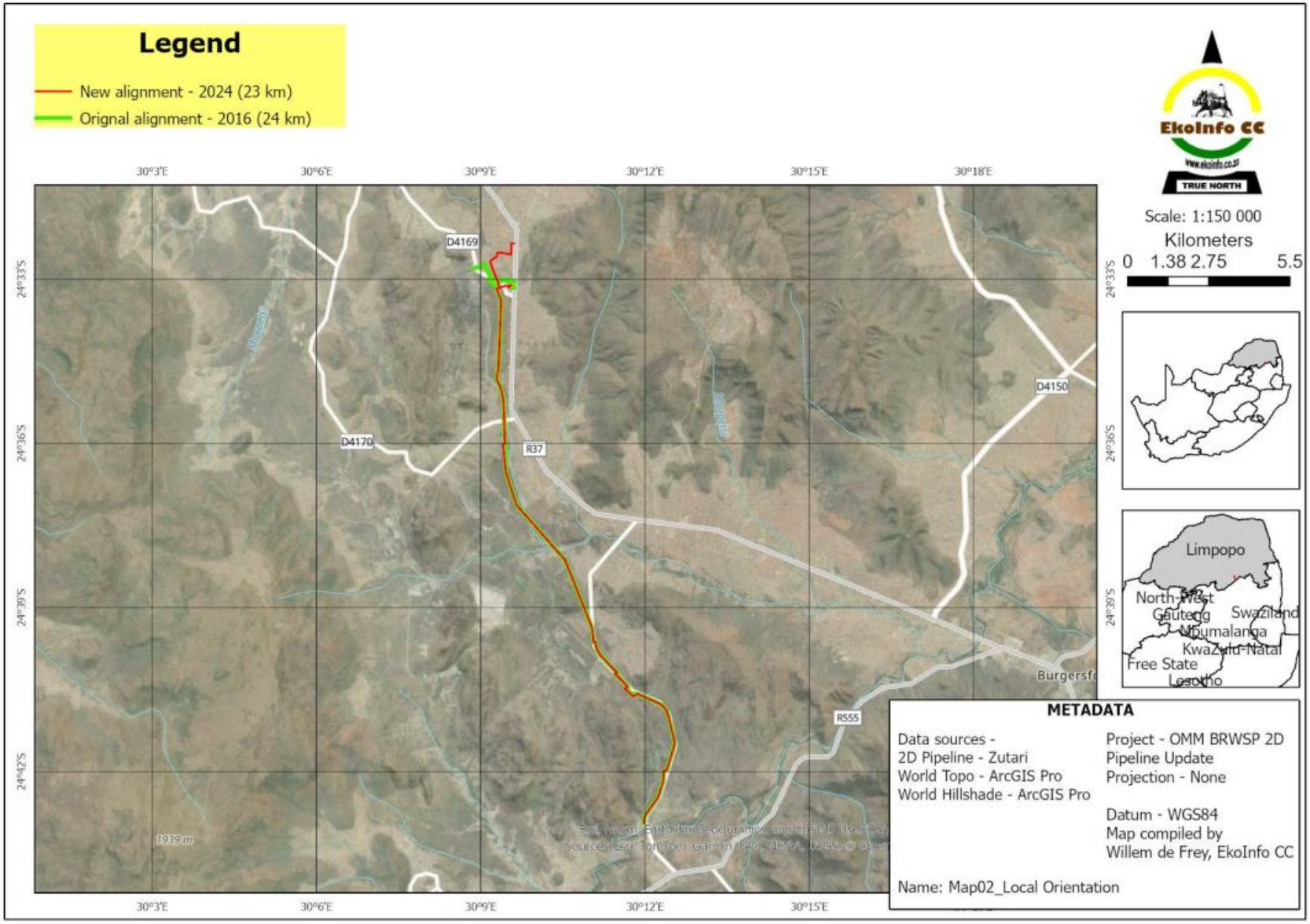


Figure 7-47: Local orientation of the 2D pipeline with the current deviation in the north.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

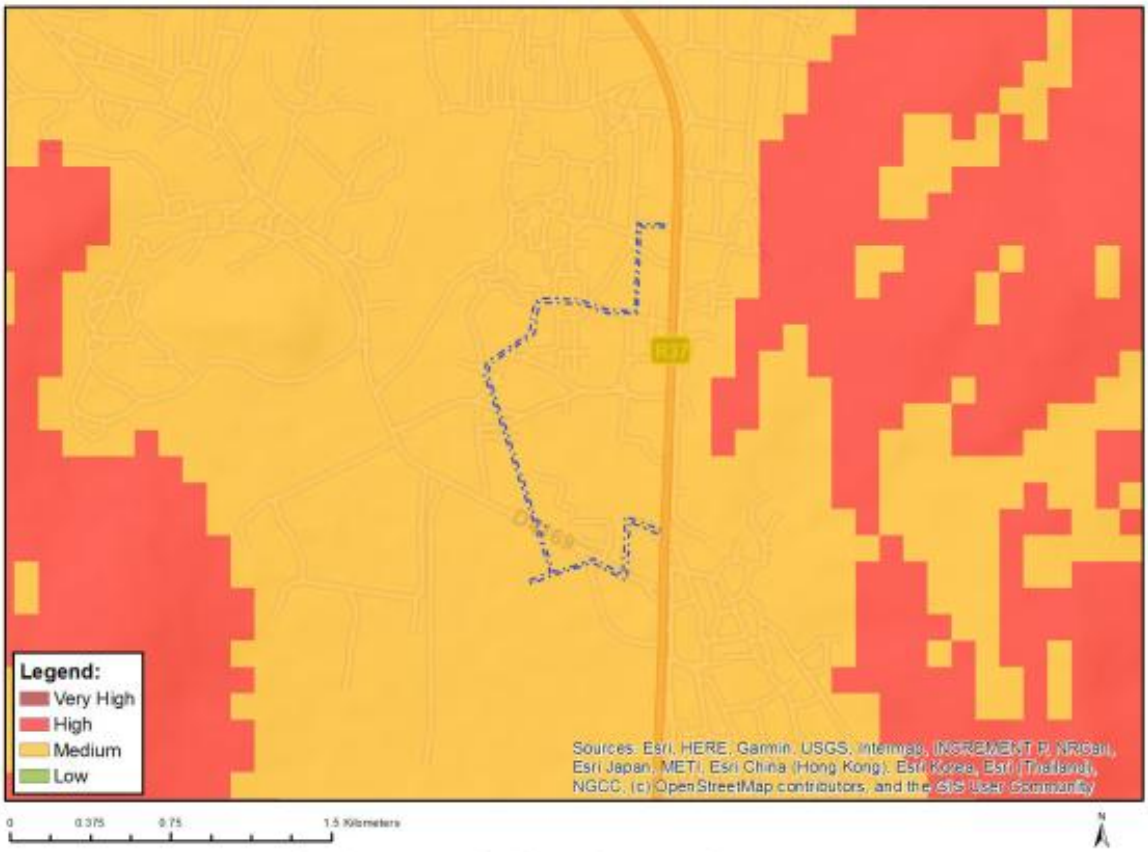
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 1252
Medium	Sensitive species 1033
Medium	Asparagus sekukuniensis
Medium	Polygala sekhukhuniensis
Medium	Searsia batophylla

Figure 7-48: Screening tool results for the major deviation area - plant species theme.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Reptilia-Kinixys lobatsiana
Medium	Invertebrate-Aroegas fuscus

Figure 7-49: Screening tool results for deviation area - animal species theme.

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 2
Very High	EN_Sekhukhune Plains Bushveld

Figure 7-50: Screening tool results for deviation area – terrestrial biodiversity theme.

7.9.2 RESULTS: FLORA COMPONENT

7.9.2.1 Persistence Analysis

7.9.2.1.1 Natural Vegetation/Biodiversity Habitat

Using Idrisi Selva's Land Change Modeller, it was possible to determine the changes in the landscape from 2016 to the present (2024), utilising the 1995, 2000, 2009, 2014, and 2020 national land cover datasets (refer to **Figure** 7-51).

According to the Land Change Modeller analysis between 2014 and 2020, most of the natural areas were lost to cultivation and transformation (human settlements) (refer to **Figure** 7-52). In total, 31 ha (35%) of natural vegetation within the proposed pipeline servitude areas persisted since 2014 (refer to

Table 7-25). Of the proposed servitude, 47 ha (54%) underwent change, most likely from natural vegetation to transformation (human settlements) or cultivation.

Figure 7-53 illustrates the distribution and extent of areas where natural vegetation (biodiversity habitat) experienced gains, losses, and persistence between 2014 and 2020. Based on this analysis, it is evident that 45 ha (51%) of the natural vegetation (biodiversity habitat) within the proposed pipeline servitude has been lost since 2014, with only 2% (1.95 ha) representing a gain or secondary vegetation (**Table** 7-26).

This analysis highlights the significant pressure on the remaining natural vegetation (biodiversity habitat) in the landscape, resulting in habitat fragmentation on a regional scale, which places populations at risk (Turner et al., 2001; Wiens et al., 2006). **Figure** 7-54 and **Table** 7-27 support this conclusion, with 64% of the landscape associated with the study area being transformed. Only 34% (83,736 ha) represents persistent primary/climax vegetation, primarily found in the high-lying and steep areas of the landscape **(Figure** 7-55).

The temporary disturbance caused by pipeline construction, if adequately rehabilitated, will affect less than 1% of the remaining persistent natural vegetation (climax biodiversity habitat) within the landscape (**Table** 7-27).

7.9.2.1.2 Limpopo Province Sector Plan 2014/2018

Since the 2016 assessment, the Limpopo Province Biodiversity Sector Plan has been updated. This update primarily resulted in a decrease in the CBA 1 class (**Figure** 7-56) and a substantial increase in the CBA 2 class. In 2018, 35% (52,096 ha) of the landscape was classified as CBAs (**Table** 7-28), with only 30% (44,540 ha) considered transformed.

The temporary disturbance caused by pipeline construction, if adequately rehabilitated, will affect less than 1% of the remaining persistent areas of conservation concern (CBA and ESAs) within the landscape (**Table** 7-28).

7.9.2.1.3 Core Climax Habitat

Core climax habitat areas are natural vegetation areas that, according to five land cover classifications from 1995 to 2020, have never been transformed and have consistently been classified as representing natural vegetation with 100% confidence (**Figure** 7-58).

Once again, the proposed temporary disturbance caused by pipeline construction will affect less than 1% of these high-confidence persistent land cover classes, specifically, the climax natural areas (**Table** 7-29), provided the area is rehabilitated and restored effectively.

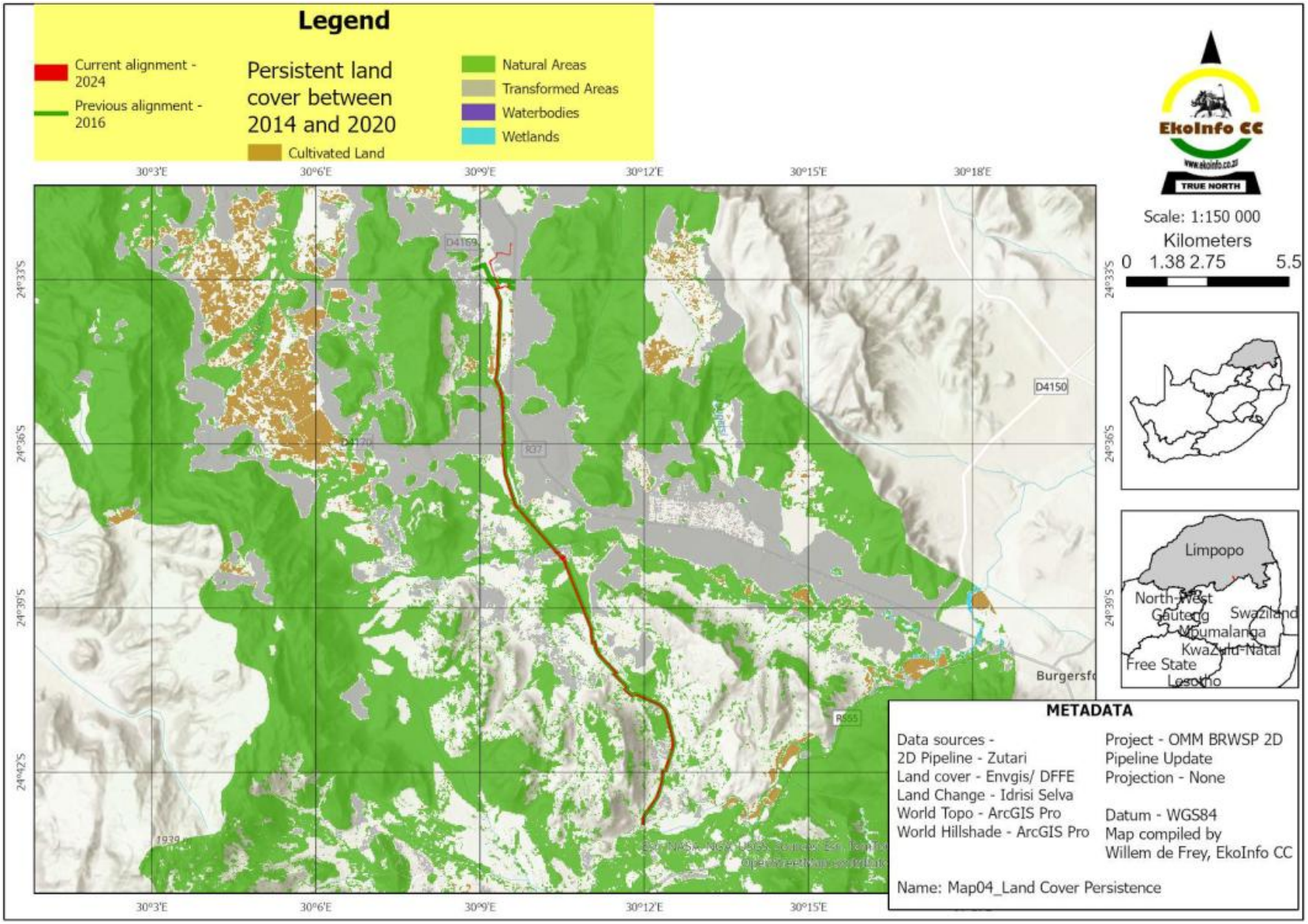


Figure 7-51: Distribution and extent of persistent land cover classes between 2014 and 2020.

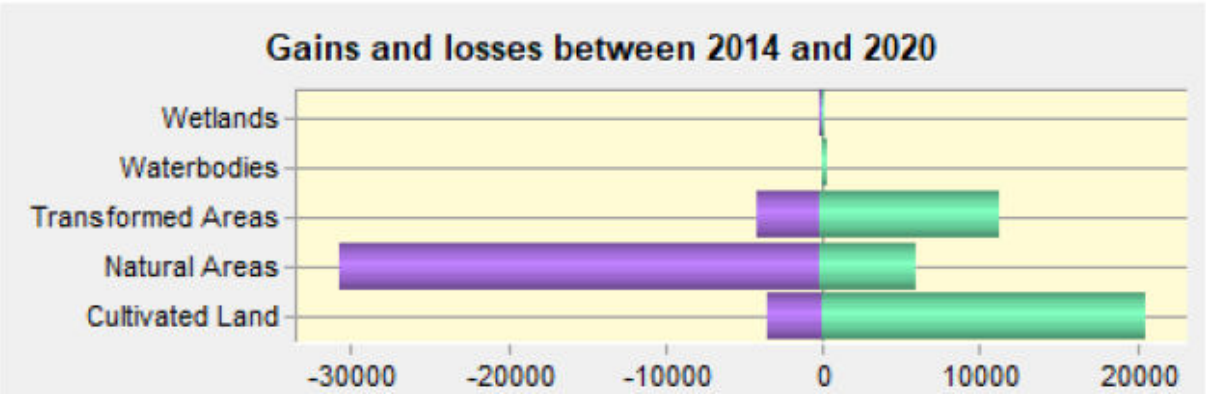


Figure 7-52: Histogram showing the gains and losses in land cover classes between 2014 and 2020 in hectares on a landscape scale (quaternary catchments).

Table 7-25: Overview of the surface area and percentage cover of persistent land cover classes within the currently proposed pipeline's permanent and temporary servitude.

Broad Land Cover Classes Derived from the 2014 and 2020 Land Cover Classes	Hectares	% Cover
Cultivated fields	0.9302	1%
Natural vegetation areas	30.5452	35%
Transformed areas	9.3916	11%
Changed areas	47.1681	54%
Total permanent and temporary servitude footprint	**88.0351**	**100%**

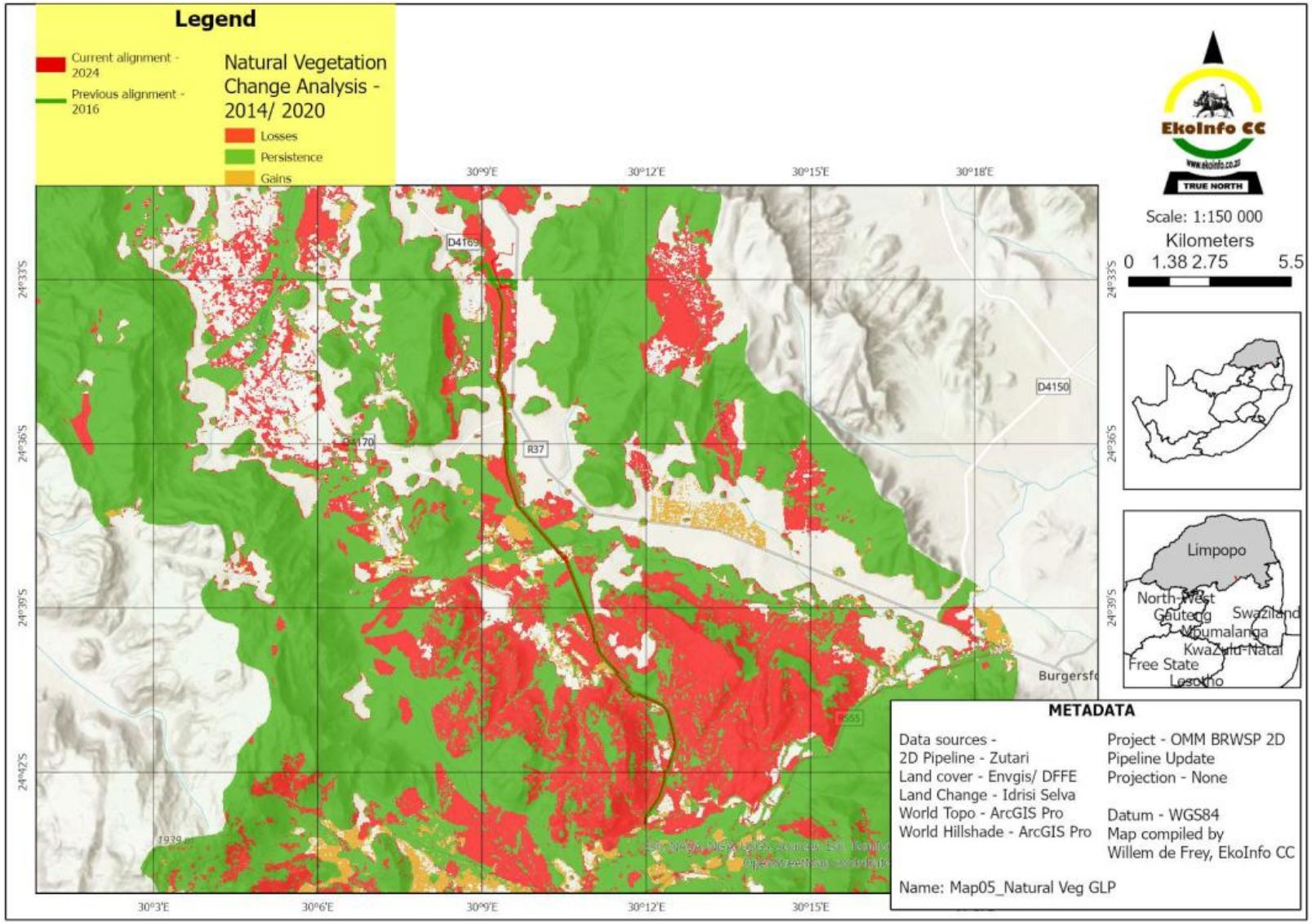


Figure 7-53: Distribution and extent of areas of gains, loses and persistence with regards to natural vegetation (biodiversity habitat) along the proposed current 2D pipeline.

Table 7-26: Overview of the surface area and percentage cover of natural vegetation change analysis categories within the servitude extent.

Natural Vegetation Change Category	Hectares	% Cover
Losses	45.0377	51%
Persistence	30.5452	35%
Gains	1.9503	2%
Other land cover classes (Cultivation, Transformation)	10.5018	12%
Total permanent and temporary servitude footprint	**88.0351**	**100%**

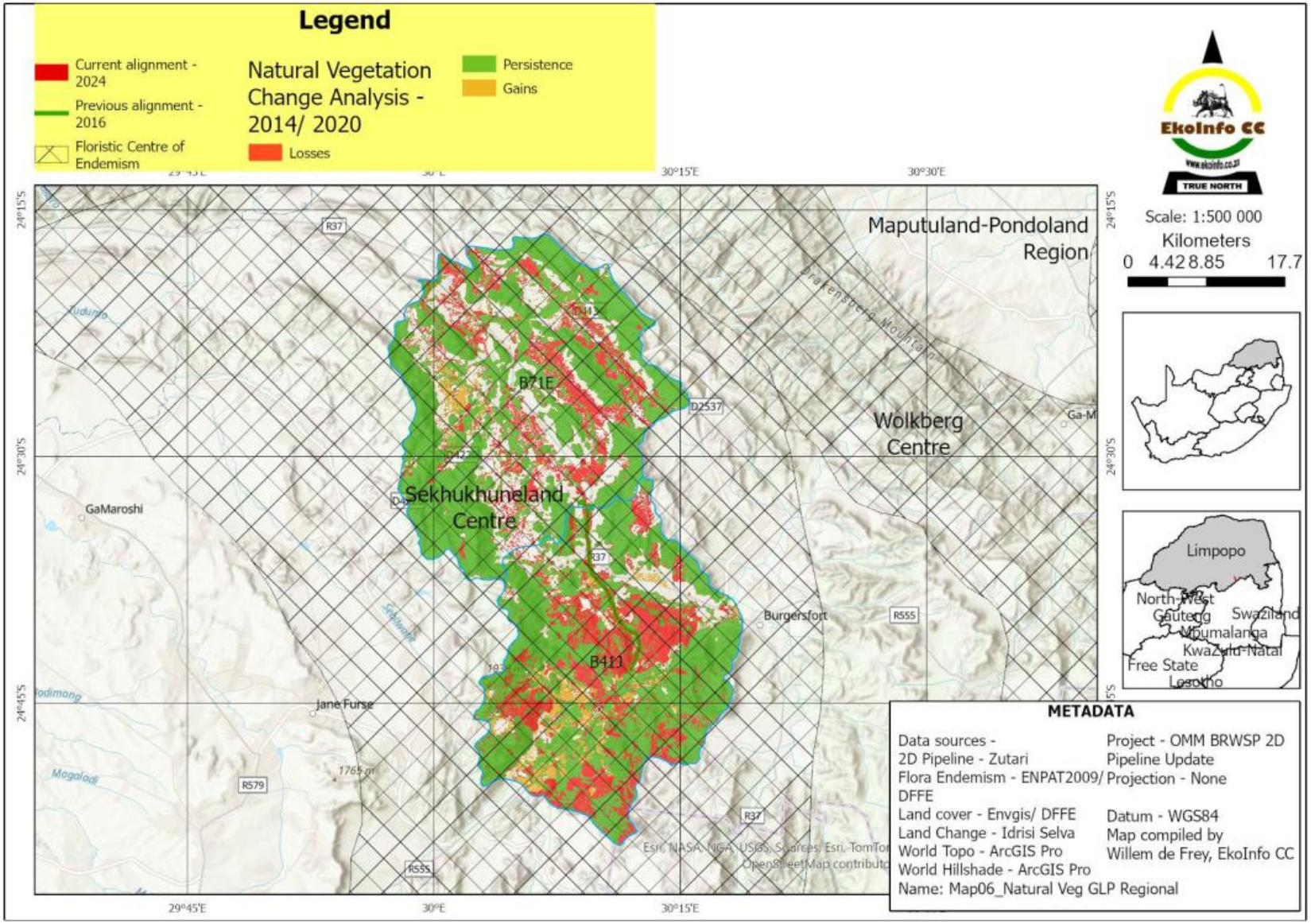


Figure 7-54: Overview of the level of biodiversity habitat loss within the landscape associated with the study area.

Table 7-27: Overview of the surface area and percentage cover of natural vegetation (biodiversity habitat) within the landscape associated with the study area (Regional context).

Natural Vegetation Change Analysis - Regional	Regional Context (Landscape Level)		Derived Ecological Status			Temporary Pipeline Disturbance	
	Hectares	% Cover	Transformed (Habitat Loss)	Natural Vegetation (Biodiversity Habitat)		Hectares	% of Landscape
				Persistent/Primary	Secondary		
Other land cover classes	127 917	51%	127 917			10.5018	0.01%
Losses	30 795	12%	30 795			45.0377	0.15%
Persistence	83 735	34%		83 735		30.5452	0.04%
Gains	6 145	2%			6 145	1.9503	0.03%
Landscape Level Total – Quaternary Catchment: B41J, B71E	**248 592**	**100%**	**158 712**	**83 735**	**6 145**	**88.0351**	
			64%	34%	2%		

Figure 7-55: Photographic evidence of the remaining persistent natural vegetation mainly on the high lying steep areas of the landscape.

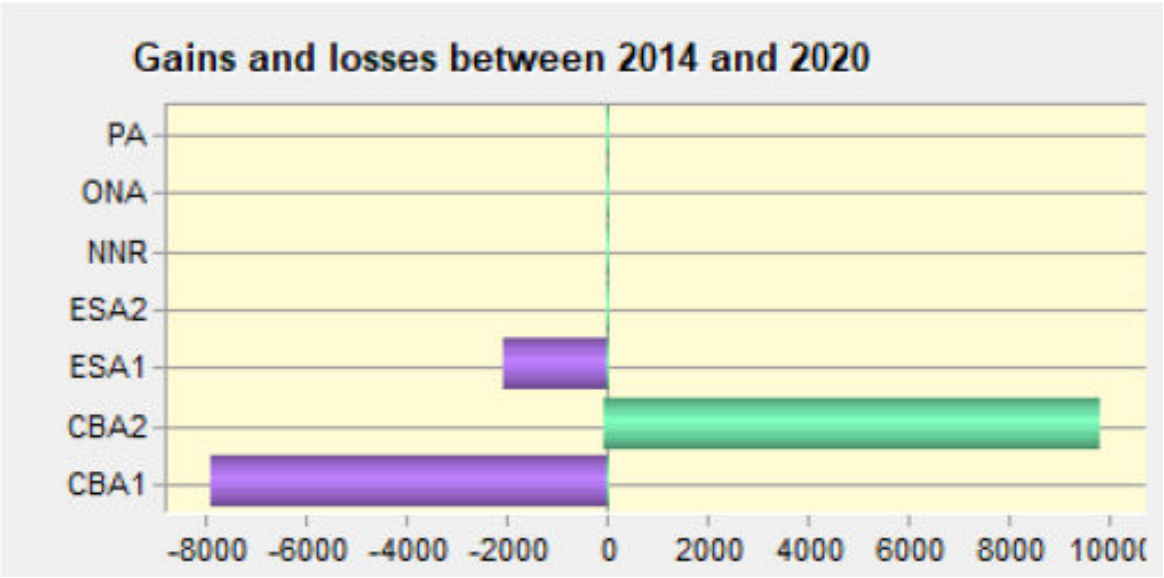


Figure 7-56: Histogram showing the gains and losses in Limpopo Province Biodiversity Spatial classes between 2013 and 2018 in hectares on landscape level (quaternary catchments).

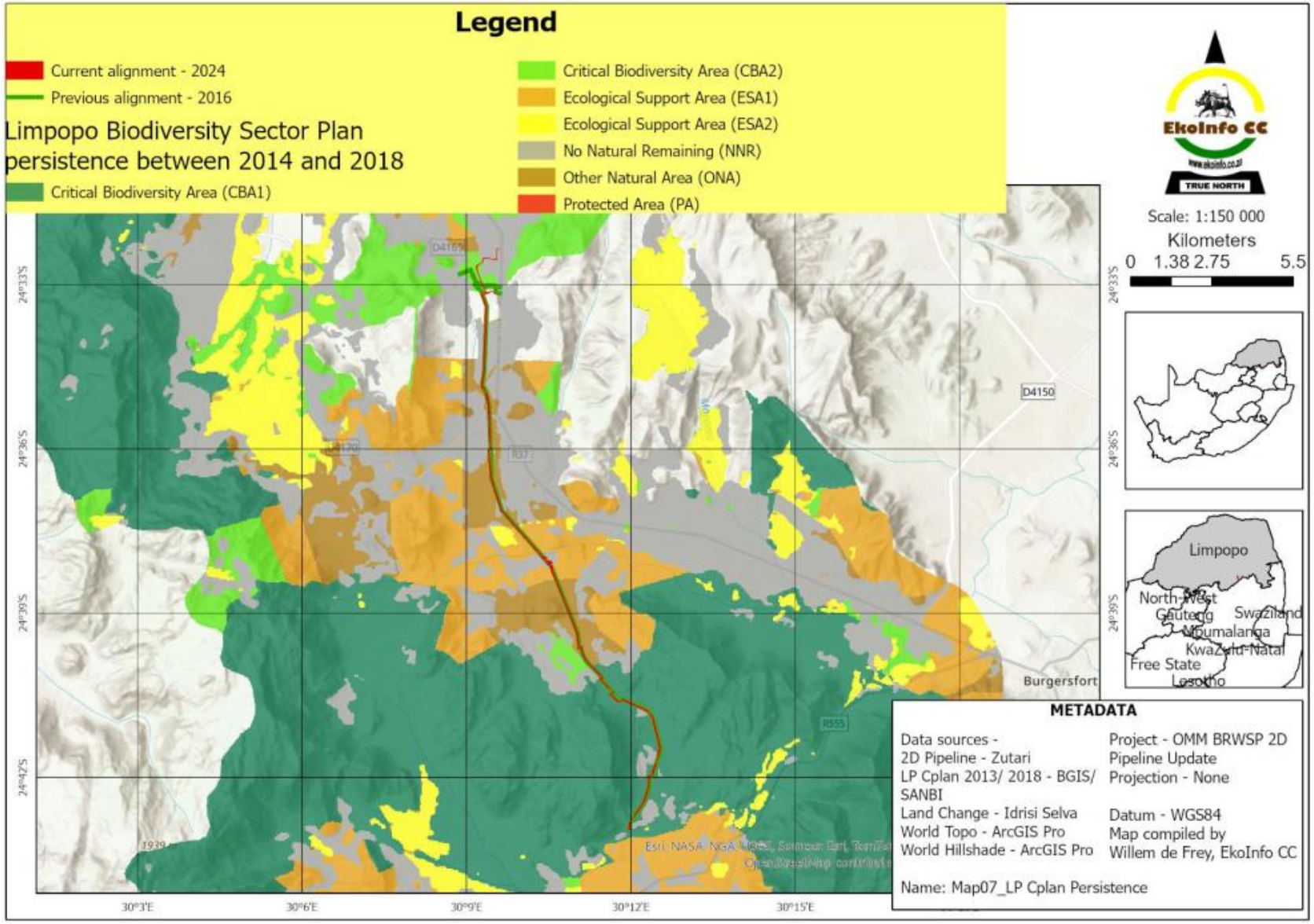


Figure 7-57: Distribution and extent of persistent Limpopo Province Spatial Biodiversity classes between 2013 and 2018.

Table 7-28: Overview of the surface area and percentage cover of areas of conservation concern (CBA, ESA) within the landscape associated with the study area (Regional context).

Regional Context (Landscape level)								
Limpopo Province Biodiversity Spatial Classes	Hectares	% Cover	Natural Vegetation/Biodiversity Habitat			Transformed Areas	Temporary Pipeline Disturbance	
			Critical Biodiversity Areas	Ecological Support Areas	Other Natural Areas	No Natural Remaining	Hectares	% of Landscape
CBA 1	43 619	30%	43 619				23.9341	0.05%
CBA 2	8 478	6%	8 478				1.9803	0.02%
ESA 1	29 105	20%		29 105			6.3411	0.02%
ESA 2	12 851	9%		12 851			0.2900	0.00%
ONA	8 508	6%			8 508		26.5045	0.31%
NNR	34 653	24%				34 653	23.1940	0.07%
Areas that experienced change	9 887	7%				9 887	5.7910	0.06%
Total Landscape Area	**147 100**	**100%**	**52 096**	**41 956**	**8 508**	**44 540**	**88.0351**	
			35%	29%	6%	30%		

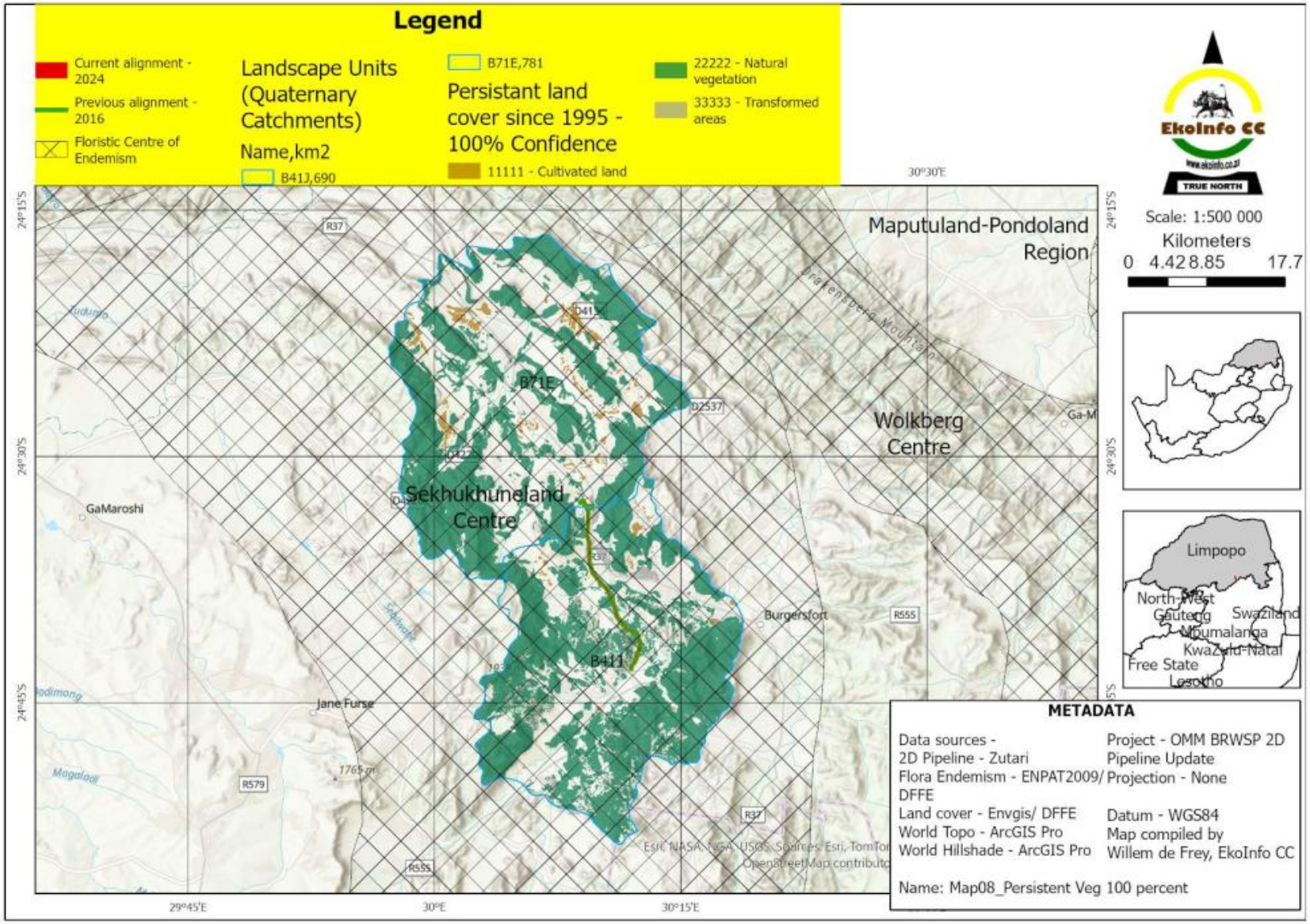


Figure 7-58: Distribution and extent of land cover classes which were persistent since 1995 with 100% confidence.

Table 7-29: Overview of the surface area and percentage cover of national land cover classes which had been 100% persistent since 1995 in the landscape.

Regional Context (Landscape Level)			Derived Ecological Status		Temporary Pipeline Disturbance	
Land cover classes with 100% confidence since 1995	**Hectares**	**% Cover**	**Transformed areas**	**Climax Natural Vegetation**	**Hectares**	**% of Landscape**
11111 - Cultivated land	1 372	1%	1 372		0.8606	0.06%
22222 - Natural vegetation	68 058	46%		68 058	19.3838	0.03%
33333 - Transformed areas	499	0%	499			
Areas who experienced change	77 170	52%	77 170		67.7907	0.09%
Total landscape area	**147 100**	**100%**	**79 042**	**68 058**	**88.0351**	
			54%	46%		

7.9.2.2 Species of Conservation Concern

7.9.2.2.1 Screening Report – Species of Conservation Concern

The screening report lists five plant SCC, whose presence or suitable habitat needed to be verified during the site visit. The identities of two of these species cannot be disclosed due to the potential threat they face. One species is an herbaceous climber with a rootstock, and the other is a succulent shrub. The remaining three species are *Asparagus sekukuniensis, Polygala sekhukhuniensis,* and *Seersia batophylla*. Four of the five species are endemic to Sekhukhuneland (**Table** 7-30), and all four are classified as threatened Red Data plants, specifically categorised as Vulnerable (VU).

During the site visit, only one of the five species was verified: the shrub *Seersia batophylla*. This species was recorded in three of the surveyed plots **(** **Figure** 7-59). Using the available Sentinel 2A data from April 2024 and unsupervised iso-cluster analysis, it was possible to link these occurrences to both broad and fine clusters. Based on these models, it is evident that this species, along with other Sekhukhuneland endemics, has a very localised distribution. **Figure** 7-60 provides context for the habitat associated with this species, which is found in erosion gullies and drainage lines.

Due to the timing of the surveys (November 2024, prior to the commencement of the rainy season - **Figure 6**), it was not possible to verify the presence or absence of the other four species. However, these species prefer steep, rocky areas and dense vegetation cover (**Figure** 7-61), characteristics that are not prevalent along the proposed pipeline servitude.

7.9.2.2.2 National Protected Trees

The following National Protected Trees in terms of the NFA were observed within the proposed temporary disturbance servitude and surrounding landscape:

1. *Sclerocarya b*irrea subsp. *caffra* (Marula tree) (**Figure** 7-62)
2. *Balanites maughamii* subsp. *maughamii* (Torchwood) (**Figure** 7-63)

Both of these species have a wide potential distribution in the landscape, which explains their Least Concern (LC) conservation status in terms of the IUCN Red Data list on a national level.

A permit is required for the destruction, removal or trimming of these species.

Table 7-30: Overview of the five SCC listed in the screening report whose presence or suitable habitat had to be verified during the site visit.

Species	Family	Endemic Status	Threat Status	Habitat Preference	Growth Form
Sensitive species 1252	*Dioscoreaceae*	Not endemic (Southern Africa)	Least Concern (LC)	Forests and shaded woodlands	Climbing herb (twining vine)
Sensitive species 1033	*Euphorbiaceae*	Endemic to Sekhukhuneland	Vulnerable (VU)	Rocky slopes and outcrops	Succulent shrub
Asparagus sekukuniensis	*Asparagaceae*	Endemic to Sekhukhuneland	Vulnerable (VU)	Rocky bushveld or grasslands	Spiny, scrambling shrub
Polygala sekhukhuniensis	*Polygalaceae*	Endemic to Sekhukhuneland	Vulnerable (VU)	Iron-rich soils in savanna	Herbaceous perennial
Seersia batophylla	*Anacardiaceae*	Endemic to Sekhukhuneland	Vulnerable (VU)	Dry, rocky hills and plains	Small tree or shrub

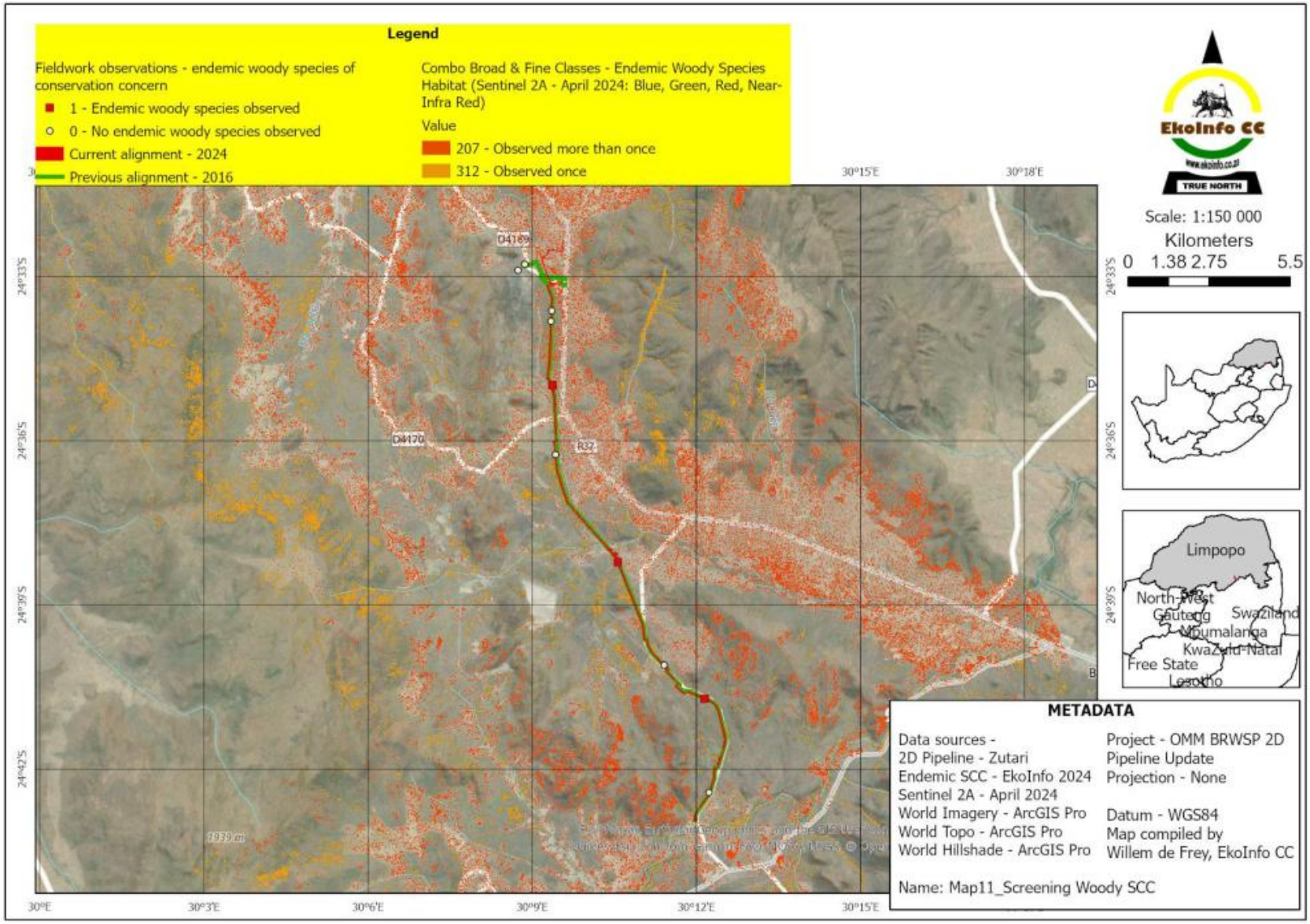


Figure 7-59: Distribution and extent of potential habitat for the observed Vulnerable endemic shrub *Seersia batophylla*.

Figure 7-60: Aerial based oblique images taken at the three plots where *Seersia batophylla* were observed.

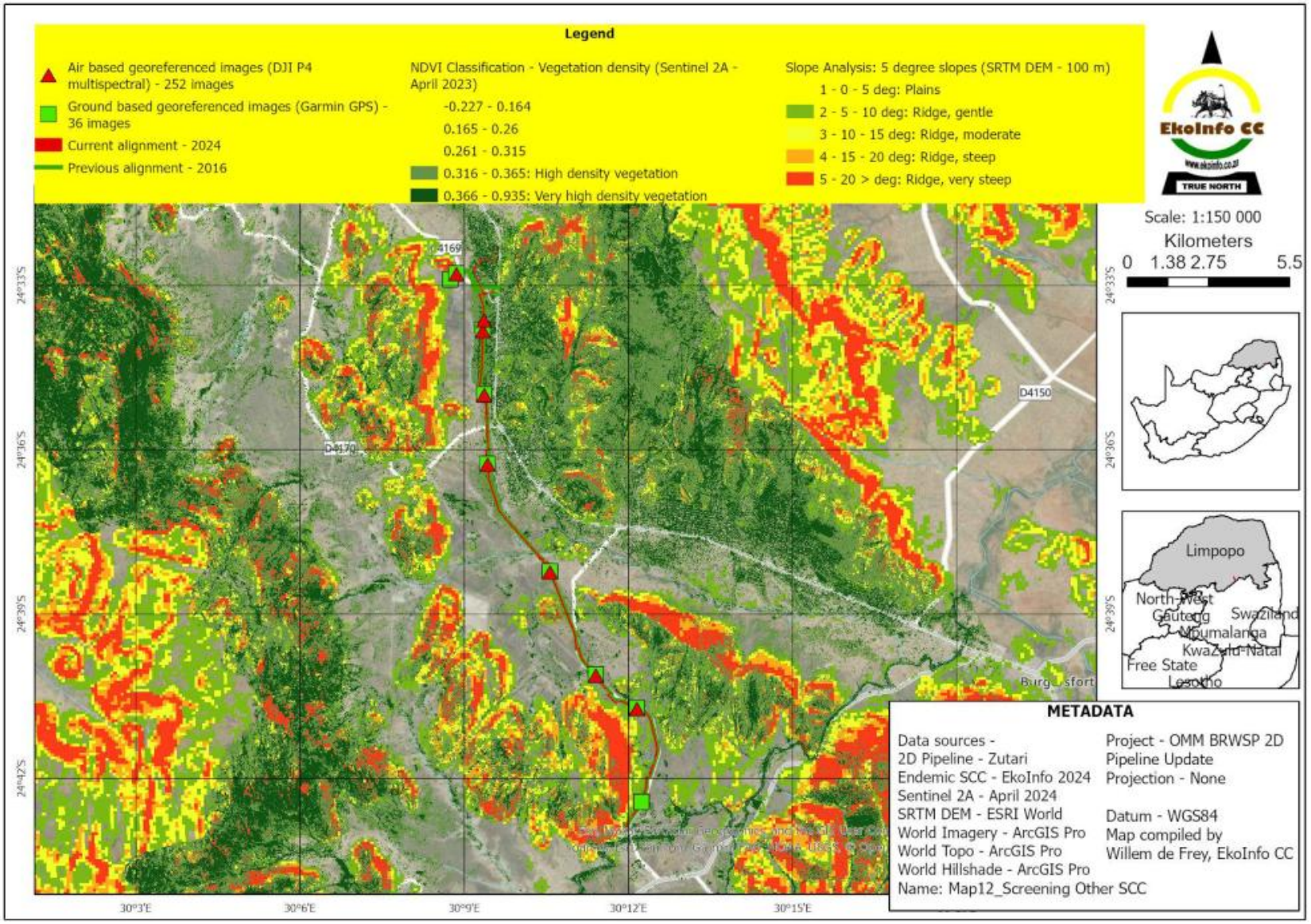


Figure 7-61: Distribution and extent of potential habitat for the remaining four plant SCC.

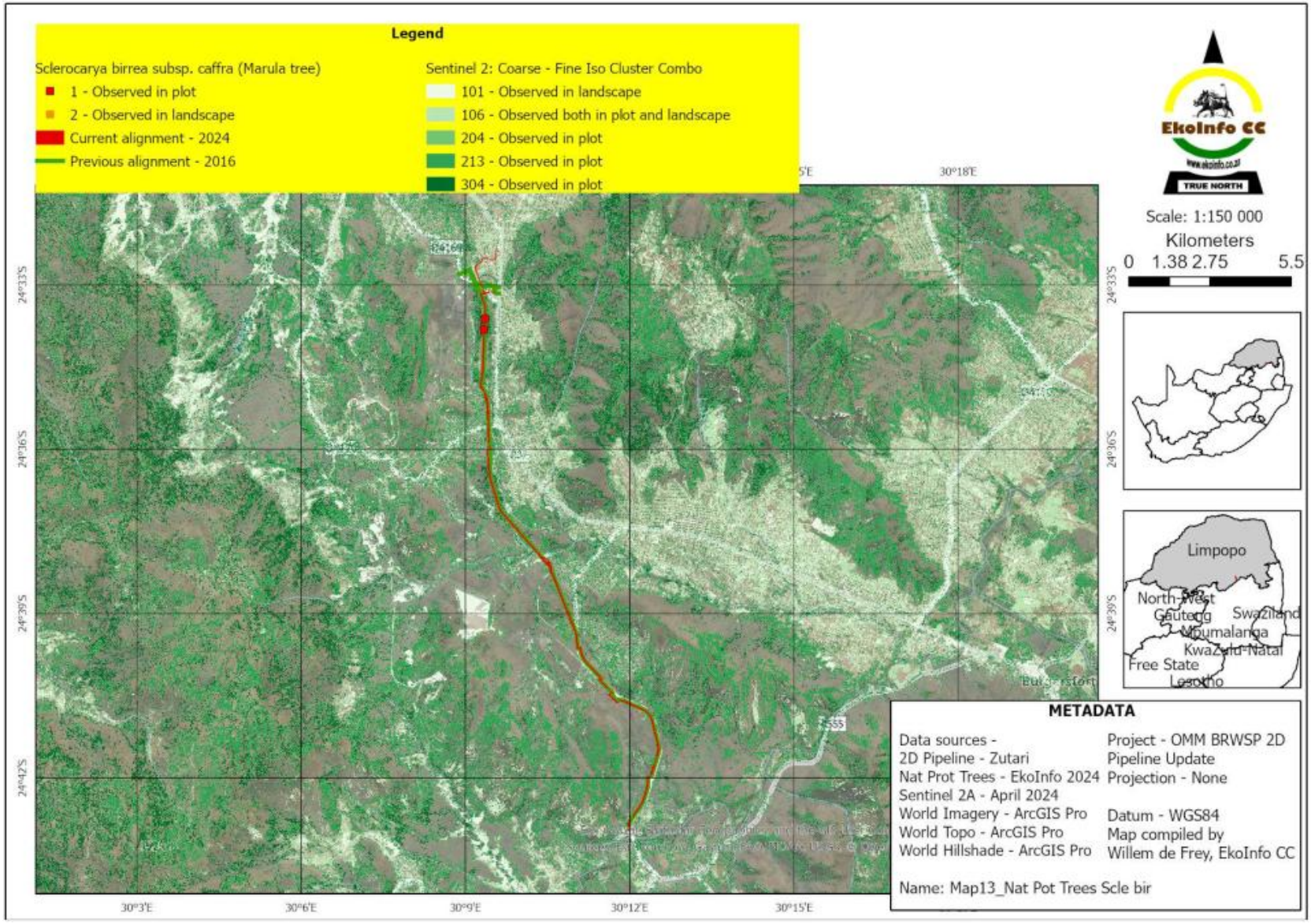


Figure 7-62: Sentinel 2 derived iso clusters associated with the occurrence of the National Protected Tree: *Sclerocarya birrea subsp. caffra*.

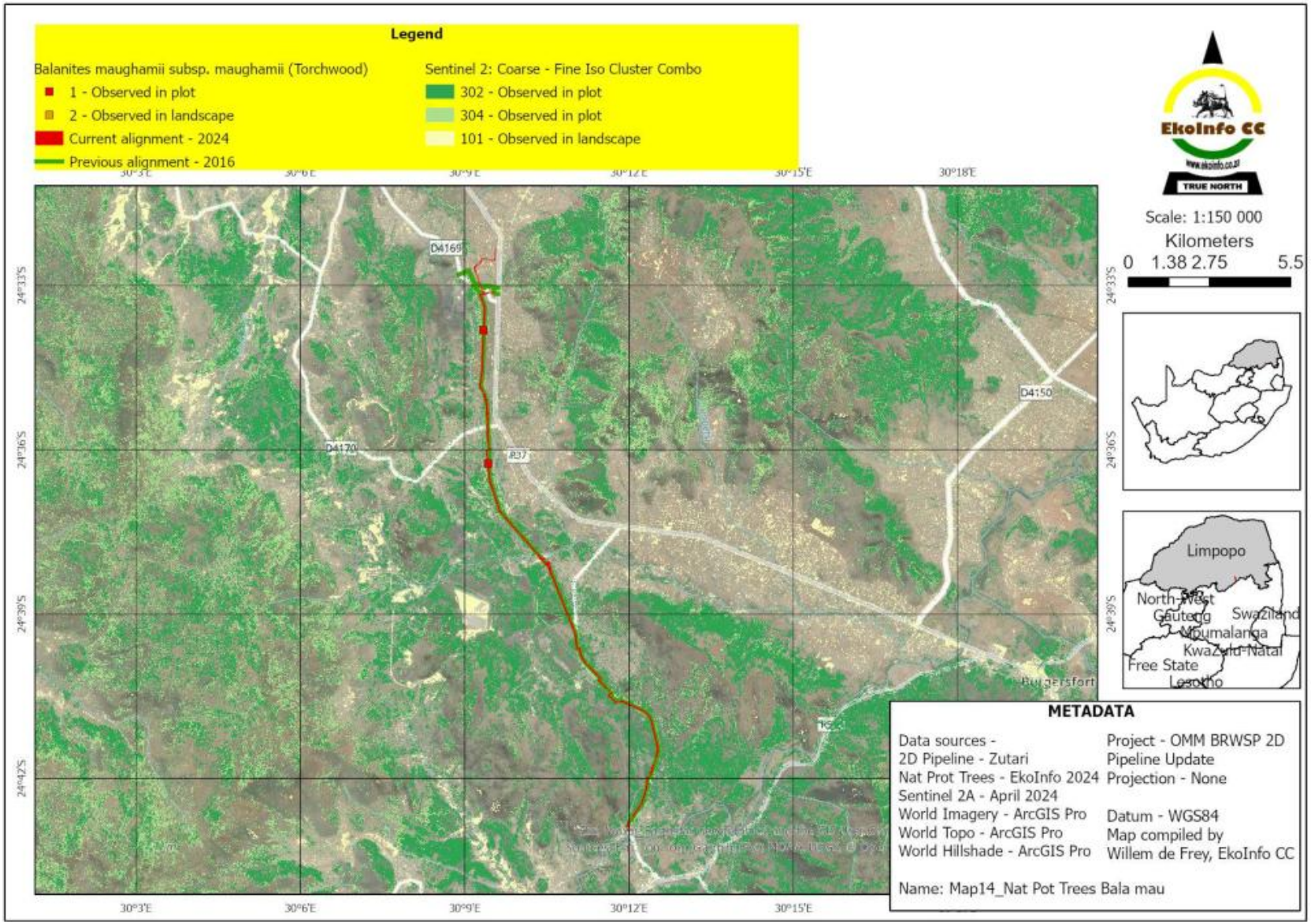


Figure 7-63: Sentinel 2 derived iso clusters associated with the occurrence of the National Protected Tree: *Balanites maughamii subsp. Maughamii.*

7.9.3 RESULTS: FAUNA COMPONENT

7.9.3.1 Screening Report – Species of Conservation Concern

The screening report lists four animal SCC whose presence or suitable habitat had to be verified during the site visit. These include two vulnerable mammal species (Makwassie Musk Shrew *Crocidura maquassiensis* and Robert's Marsh Rat *Dasymys robertsii*), one vulnerable reptile species (Lobatse Hinged Tortoise *Kinixys lobatsiana*) and the endangered Brown False Shieldback (*Aroegas fuscus*).

7.9.3.2 Makwassie Musk Shrew (*Crocidura maquassiensis*)

The taxonomic status of *Crocidura maquassiensis* remains uncertain, with suggestions that it may be a variant of *C. cyane*a or *C. suaveolens (Meester, 1986)*, or part of a species complex due to ecological divergence between populations in Maputaland's low-lying Sand Forest and those along the highland grassland Drakensberg Escarpment (Taylor et al., 2016). It was also thought to be related to *C. pitmani* of Zambia, although its phylogenetic relationship to this species remains unresolved (Skinner & Chimimba, 2005). The species was first described from the type locality at Klipkuil, Makwassie in the North West Province in 1928.

C. maquassiensis is a rare species with limited morphometric data. It is difficult to distinguish from *C. cyanea* and *C. silacea*, and identification requires multivariate morphometric analysis (Taylor et al., 1994). It is a very small species (c. larger than *C. fuscomurina* and smaller than *C. cyanea*), measuring about 100 mm in total length (with a tail length of 41%) and weighing approximately 6 g, making it one of the smaller members of the Crocidura genus in South Africa (see Skinner & Chimimba, 2005).

Globally, *C. maquassiensis* is listed as Least Concern (LC) (Cassola, 2016), but it is considered Vulnerable (VU) (B2ab(ii,iii,iv)) in South Africa due to its rarity, fragmented distribution, and loss of suitable habitat. The species faces threats from habitat degradation, including the loss of moist grasslands caused by urban expansion, overgrazing in montane areas, and the abstraction of surface water (Taylor et al, 2016).

The species is known from a few scattered localities in South Africa, eSwatini, and Zimbabwe (refer to **Figure** 7-64), including areas in Limpopo (Motlateng, Blouberg and Soutpansberg Mountains), Mpumalanga (Loskop Dam), North West (Makwassie) KwaZulu-Natal (KZN) (Kosi Lake, Sibaya Lake, Giants Castle, Royal Natal and Chase Valley), and Gauteng (Krugersdorp, Roodeplaat Dam and Heuningklip) in South Africa, and Bulawayo and Inynaga in Zimbabwe, and Matenga Falls in eSwatini. Currently, it occurs on grassy rocky mountainsides, mountain grasslands, and bracken-grassland mosaics, as well as coastal forests, indicating a potential tolerance for various habitat types, including urban landscapes. However, most records are from montane or rocky habitats at higher altitudes.

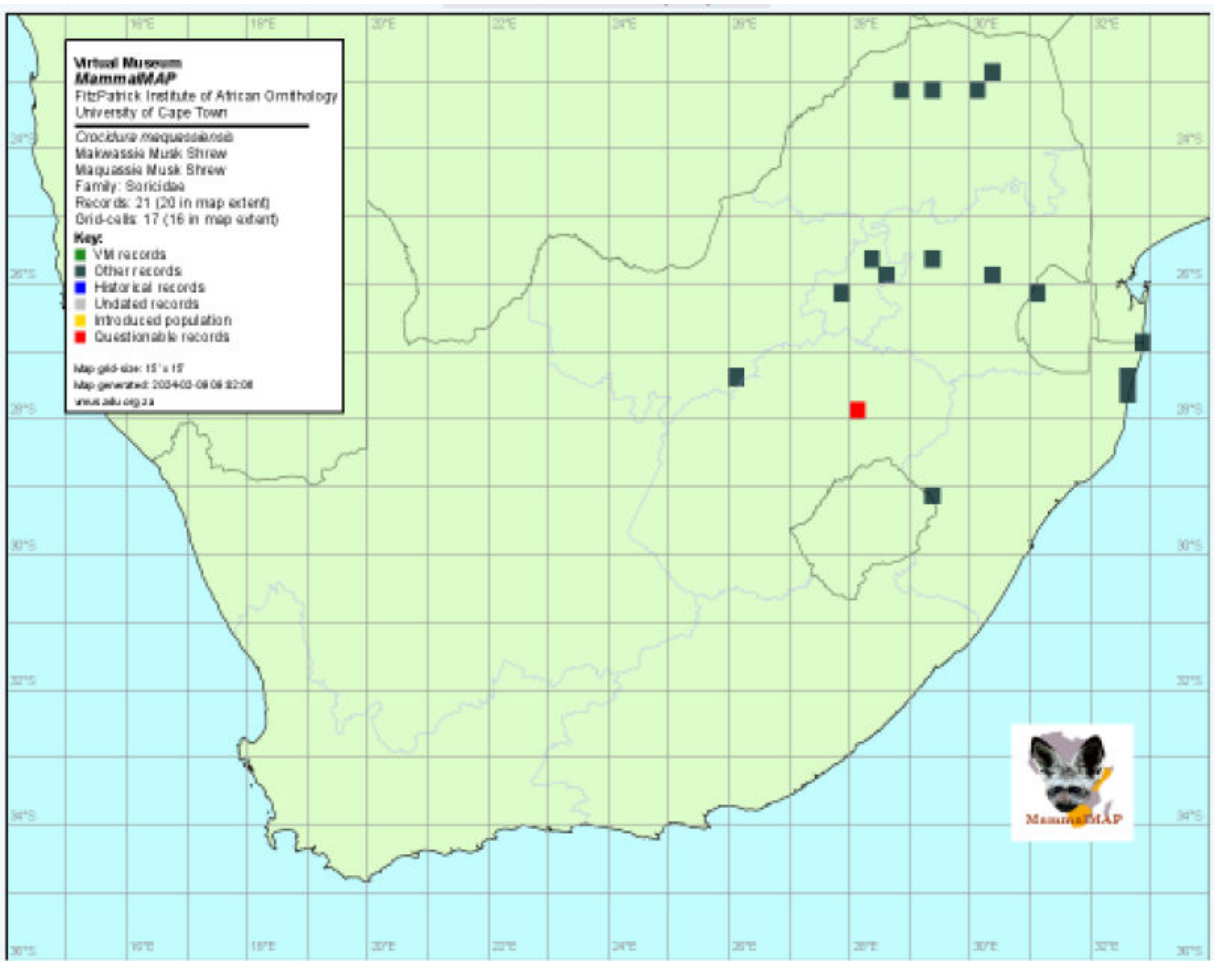


Figure 7-64: The distribution range of Crocidura maquassiensis according to substantiated (confirmed) and museum records (map courtesy and copyright of the ADU and MammalMap).

7.9.3.3 Robert's Marsh Rat (*Dasymys robertsi*)

There are currently no recent observations of the vulnerable Robert's Marsh Rat (*Dasymys robertsii*) from the study area and immediate surroundings (sensu MammalMap), which suggest that this species could be uncommon or absent along the pipeline alignment owing to the absence of suitable habitat. The Robert's Marsh Rat (*Dasymys robertsii*) is listed as regionally vulnerable (sensu Child et al., 2016), although Taylor (1998) stated that it is probably not as rare as previously thought, at least within KZN where the population forms part of the genetically distinct species *D. cf incomtus.* Marsh rats have been recorded in a wide variety of habitat types, although it prefers well-vegetated wetland habitat. Skinner and Chimimba (2005) also reported that they also utilise reedbeds along rivers and streams. It is therefore possible that this species is easily overlooked based on its shy and elusive habits and life history traits which explains its ominous absence from many parts of South Africa.

Potentially suitable habitat for this species to be present is absent from the study area (as per the Screening Report locality), thereby suggesting that the probability for this species to occur is low.

7.9.3.4 Lobatse Hinged Tortoise (*Kinixys lobatsiana*)

Kinixys lobatsiana is vulnerable and near-endemic to South Africa and Botswana where it mainly occurs in bushveld areas in the Limpopo, Gauteng, and marginally also northern Mpumalanga Provinces. It also occurs in extreme south-eastern Botswana (e.g. the type locality). In South Africa, its distribution range includes three primary clusters, of which the largest is located in the bushveld regions of the Waterberg and associated mountain ranges, the Bankenveld areas of Gauteng from Midrand and

Centurion to Pretoria including the Bronberg Ridge, the Magaliesberg Mountain, and eastern Mpumalanga, as well as bushveld areas near Zeerust. It occurs primarily in rocky hills consisting of mixed thornveld (*Vachellia* and *Senegalia* Bushveld) and *Combretum* woodland. The presence of surface rock is a critical habitat feature for this species to survive fires and to "hibernate" during the austral winter. In addition, it is invariably collected as food and for cultural purposes, which may result in local extinctions.

Although this species was not observed during the site visit (owing to most individuals being dormant during the dry conditions preceding the spring rains), its distribution range is sympatric to the study site, and suitable habitat (e.g. rocky bushveld) was present along the southern section of the pipeline route, its occurrence is regarded as high along the southern section of the route. However, the northern section which also corresponds to the proposed pipeline deviation was primarily disturbed with a high frequency of anthropogenic activities, where it is believed that this species could be absent. In addition, likely, it is frequently collected/utilised by people in the area.

7.9.3.5 Brown False Shieldbug (*Aroegas fucus*)

The Brown False Shieldbug is endangered with an area of occurrence estimated to be 10 km^2. It is only known from two locations, and the number of locations is expected to be in decline. This species only occurs in Mesic Highveld Grasslands at an elevation above 1200 m. These areas are also suitable for cultivation with timber plantations and human development, so its distribution is likely to decrease in the future. The most likely threats to the species are increased grazing by livestock, cultivation with timber plantations or non-perennial crops, or human development. Due to its small body size, low motility, and current distribution at high elevations, this species cannot be expected to shift its range in response to changes in its habitat.

Based on the above, the probability that this species could occur along the pipeline route, especially along the proposed deviation is regarded as low (owing to the absence of high altitude mesic grassland habitat.

7.9.4 IFC PS 6 MAPPING UNITS

7.9.4.1 Identification of Critical Habitats

Figure 7-65 shows the distribution and extent of IFC PS6 critical habitat along the proposed pipeline alignment. The temporary disturbance of the pipeline servitude during the construction will affect less than 1% of the critical habitat within the landscape (**Table** 7-31).

7.9.4.2 Habitat Assessment and Baseline Surveys

Figure 7-66 shows the distribution and extent of IFC PS 6 natural and modified areas along the proposed pipeline alignment. The temporary disturbance of the pipeline servitude during the construction will affect less than 1% of the remaining natural areas within the landscape (**Table** 7-32).

It is evident from this latest land cover classification from the National Department of Environmental Affairs[30] that the proposed pipeline cuts mainly through a landscape that experienced 56% modification, with the pipeline servitude temporarily affecting 36% natural areas. Therefore, the temporary disturbance of the pipeline servitude if effectively rehabilitated will influence less than 1% of the landscape, which is clearly not a significant impact.

[30] https://egis.environment.gov.za/

Also evident from this analysis is that currently, cultivation is the main driver of habitat loss in the landscape, with 39% of the landscape modified due to cultivation (**Table** 7-32).

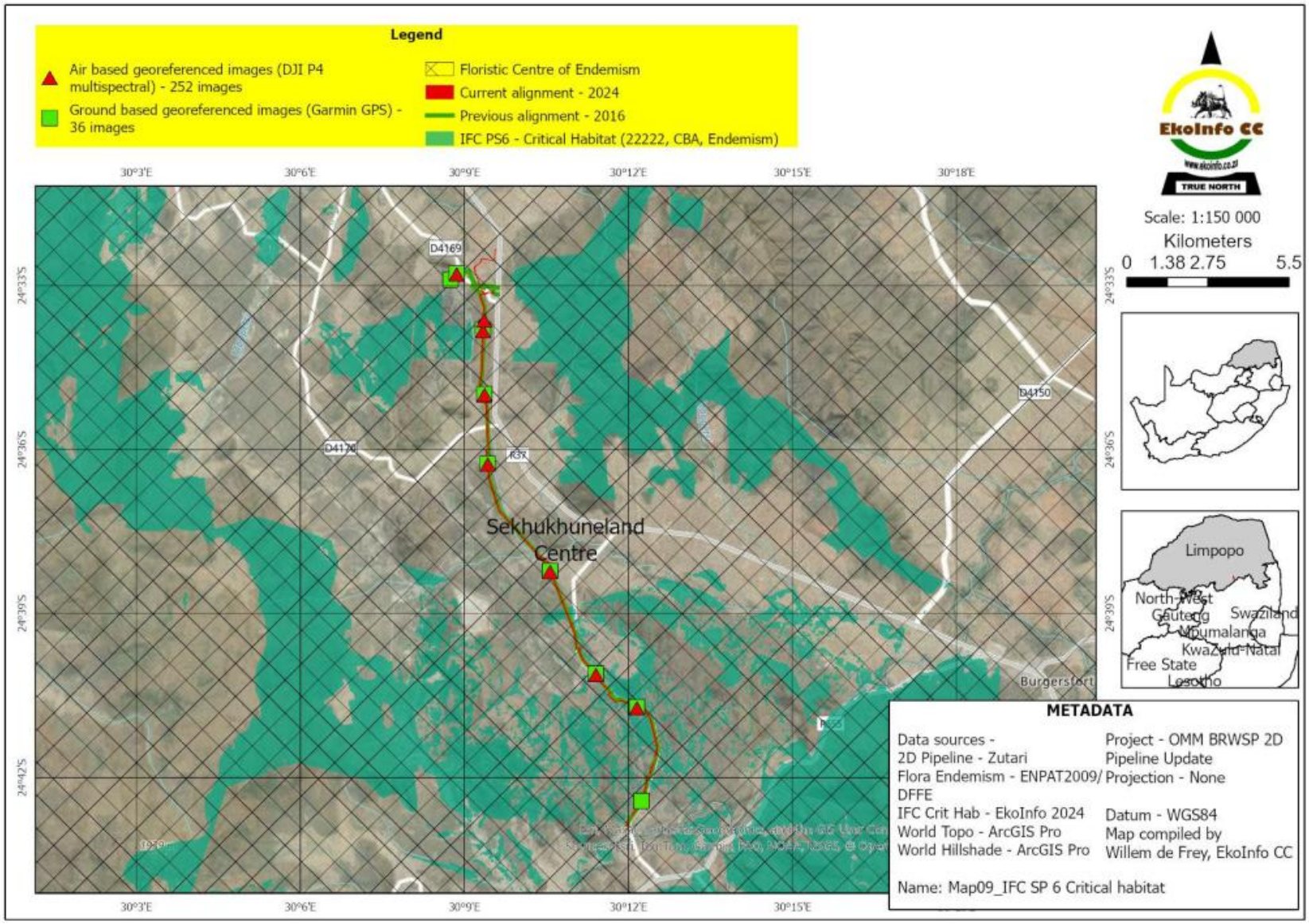


Figure 7-65: Distribution and extent of the IFC PS 6 Critical Habitat along the proposed current alignment.

Table 7-31: Overview of the surface area and percentage cover of IFC PS 6 based critical habitat within the landscape associated with the study area.

Regional Context (Landscape Level)			**Temporary Pipeline Disturbance**	
IFC PS 6 Habitat Units	**Hectares**	**% Cover**	**Hectares**	**% of landscape**
Critical Habitat (22222, CBA, Endemism)	46 375	32%	10.4969	0.02%
Non-critical habitat	100 725	68%	77.5382	0.08%
Total landscape area	**147 100**	**100%**	**88.0351**	

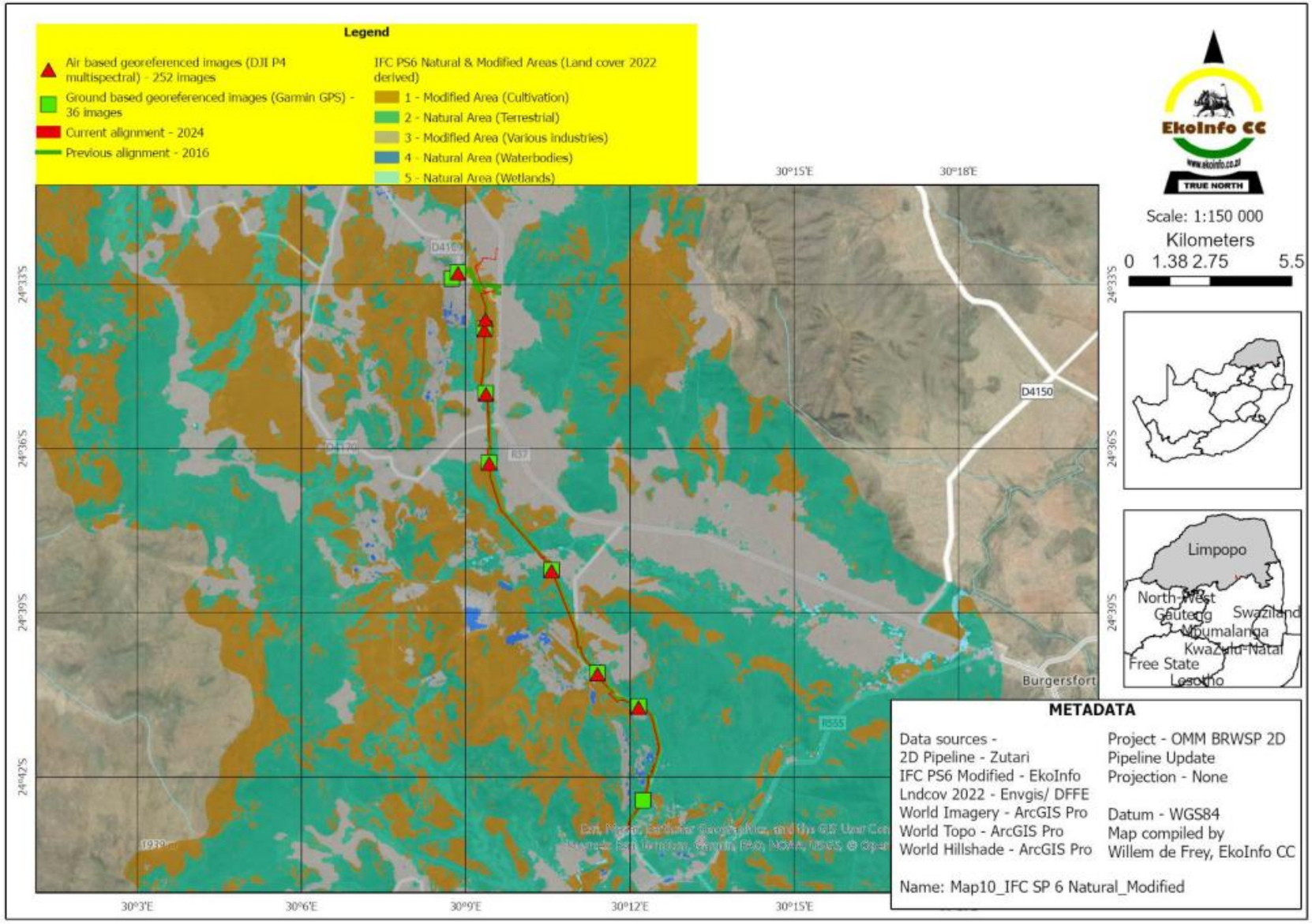


Figure 7-66: Distribution and extent of IFC PS6 natural and modified areas along the proposed current alignment.

Table 7-32: Overview of the surface area and percentage cover of IFC PS 6 based natural and modified areas within the landscape associated with the study area.

Regional Context (Landscape Level)					Temporary Pipeline Disturbance		
IFC PS 6 Natural and Modified Areas (Land cover 2022 derived)	Hectares	% Cover	IFC PS 6 Mapping Units		Hectares	% Cover	% of landscape
			Modified Area	Natural Area			
1 – Modified Area (Cultivation)	57 285	39%	57 285		45.3798	52%	0.08%
2 – Natural Area (Terrestrial)	64 112	44%		64 112	31.9807	36%	0.05%
3 – Modified Area (Human settlement)	25 429	17%	25 429		10.4261	12%	0.04%
4 – Natural Area (Waterbodies)	297	0%		297			
5 – Natural Area (Wetlands)	148	0%		148			
Total Landscape area	**147 271**	**100%**	**82 714**	**64 558**	**87.7866**	**100%**	
			56%	44%			

7.9.5 ENVIRONMENTAL IMPACT ASSESSMENT

7.9.5.1 Flora Component

The impacts associated with the bulk water supply line construction are localised and temporary and will influence less than one per cent of the remaining natural vegetation within the landscape, whether critical habitat or not.

If the topsoil is effectively managed, this impact will be even less as the above ground disturbance will be restored through natural succession. It is critical that the topsoil should be stored separately from the subsoils and placed on top of the subsoils. The removed topsoil should be replaced in the same vicinity from which it had been removed.

Once the topsoil had been replaced within the same area, the servitude can be maintained with local labour and soft water infiltration techniques.

If effective and disciplined topsoil management can be implemented, then the system should effectively restore over time because of the seedbank and soil micro-organisms present in the system.

Use of non-regionally indigenous species and fertiliser should be limited, as it results in local livestock concentrating on these areas. In the absence of fertiliser, the domestic animals utilise the areas as normal and move on once they have removed the above ground biomass.

The section below highlights the value of effective topsoil management and risk of using pasture species and fertiliser in rehabilitation/ restoration.

7.9.5.1.1 Effective Topsoil Management in Natural Areas: Benefits and Risks in Rehabilitation

Rehabilitation and restoration of natural areas after infrastructure development, such as pipelines or construction projects, rely heavily on proper topsoil management. The careful handling of topsoil offers numerous ecological and economic benefits by preserving the natural seed bank, nutrients, and soil structure necessary for successful vegetation recovery. However, combining topsoil with pasture grasses and fertilizers introduces risks that can undermine these efforts, particularly when livestock or game are attracted to the rehabilitated area.

1. Benefits of Effective Topsoil Management

Preservation of Native Seed Banks

Natural topsoil contains a diverse range of indigenous plant seeds and microorganisms that are uniquely adapted to the local environment. By carefully stripping, storing, and reapplying topsoil after construction, the natural vegetation has a greater chance of re-establishing itself, reducing the need for costly reseeding or planting.

Enhanced Soil Stability and Water Retention

Reapplied topsoil provides a stable, organic-rich layer that supports root growth and reduces soil erosion. Its natural structure also improves water infiltration and retention, minimising irrigation requirements during the early stages of rehabilitation.

Support for Biodiversity and Natural Succession

Using the existing topsoil promotes the recovery of a diverse plant community suited to the local conditions. This supports long-term ecological succession, creating a self-sustaining ecosystem that integrates seamlessly with the surrounding environment.

Cost-Effective Rehabilitation

By utilising the natural resources already present in the topsoil, there is less need for imported soil amendments, fertilisers, or intensive management, resulting in significant cost savings.

2. Risks of using Pasture Species and Fertilisers

While fertilisers and pasture grasses may seem like convenient tools to accelerate vegetation growth, their use in natural areas often creates significant ecological challenges:

Attraction of Livestock and Game

Fertilised areas and planted pasture species are highly palatable to livestock and wildlife. This can lead to:

- Overgrazing: Animals can quickly strip vegetation from rehabilitated areas, exposing soil to erosion and delaying recovery.
- Soil Compaction: Heavy grazing and trampling by animals compact the soil, reducing its water-holding capacity and making it harder for vegetation to re-establish.
- Localised Habitat Degradation: Concentrated grazing pressure can damage not only the rehabilitated area but also adjacent ecosystems, spreading the impact.

Proliferation of Weeds

Fertilisers often favour fast-growing, invasive species or weeds that outcompete native plants. This reduces biodiversity and prevents natural succession, resulting in a vegetation community dominated by opportunistic species.

Disruption of Native Plant Establishment

Many indigenous species are adapted to nutrient-poor soils. Excessive fertiliser use creates conditions unsuitable for these species, hindering their ability to establish and delaying the recovery of a stable native ecosystem.

Increased Maintenance Costs

The proliferation of weeds, the need to manage grazing animals, and the failure of native species to thrive may result in ongoing maintenance and higher costs over time.

3. Balancing Rehabilitation Practices

To maximise the benefits of topsoil management while minimising the risks associated with fertilisers and pasture species, the following practices are recommended:

Prioritise Natural Recovery

Focus on reapplying natural topsoil to support the regrowth of indigenous vegetation without relying heavily on fertilisers or non-native species.

Use Fertilisers Sparingly

Apply only minimal amounts of fertiliser to address specific nutrient deficiencies in severely degraded areas. Avoid broad-scale fertilisation to prevent weed proliferation and the disruption of native plant communities.

Manage Livestock and Game

Implement measures such as temporary fencing, rotational grazing, or exclusion zones to prevent overgrazing and soil compaction in rehabilitated areas.

Monitor and Remove Weeds

Actively monitor for the spread of invasive species or weeds and remove them early to prevent them from dominating the landscape.

Encourage Native Plant Growth

Utilise locally sourced seeds and plants that are well-adapted to the area, ensuring they can thrive in the existing soil conditions and form a stable, self-sustaining plant community.

4. Conclusion

Effective topsoil management is critical to the success of rehabilitation and restoration in natural areas, providing a foundation for the recovery of native vegetation and soil stability. However, the introduction of pasture species and fertilizers can attract livestock, leading to overgrazing, soil compaction, and ecological imbalance. By prioritizing natural processes, minimising fertiliser use, and controlling grazing, rehabilitation efforts can achieve long-term ecological and economic sustainability.

5. Impact Assessment

The following expected impacts have been evaluated:

1. Loss of flora diversity in natural areas
2. Loss of endemic plant species in natural areas
3. Loss of threatened plant species in natural areas
4. AIP encroachment
5. Removal of regionally indigenous woody species
6. Removal of National Protected Trees with the servitude footprint
7. Loss of floristic microhabitat associated with outcrops

Only the construction phase is evaluated because if the nature of the disturbance is temporary in nature for most of the pipeline servitude, and if the topsoil is well managed, and effectively returned to the disturbance footprint, the need for maintenance and monitoring during the operational phase will be minimal.

It should be highlighted that the pipeline is located within the Savanna Biome of South Africa, where the dominant and prominent growth form is woody species. Therefore, working towards a post construction servitude that looks like grassland or pasture is not representative of the natural system prior to the construction of the pipeline.

Figure 7-67 provides an overview of the impact risk associated with the flora component due to the bulk water supply pipeline construction without any mitigation. Most of the impacts are certain to occur, with slight to high consequences. **Figure** 7-68 shows that it is very likely that the required mitigation will be implemented and that it would result in slight to moderate consequences.

The main areas where high impacts or negative consequences can occur are in association with outcrops (boulders or sheet) and existing eroded areas with a high presence of endemic plants.

Alternative construction methods as highlighted in Appendix D of the Terrestrial Biodiversity report should be considered.

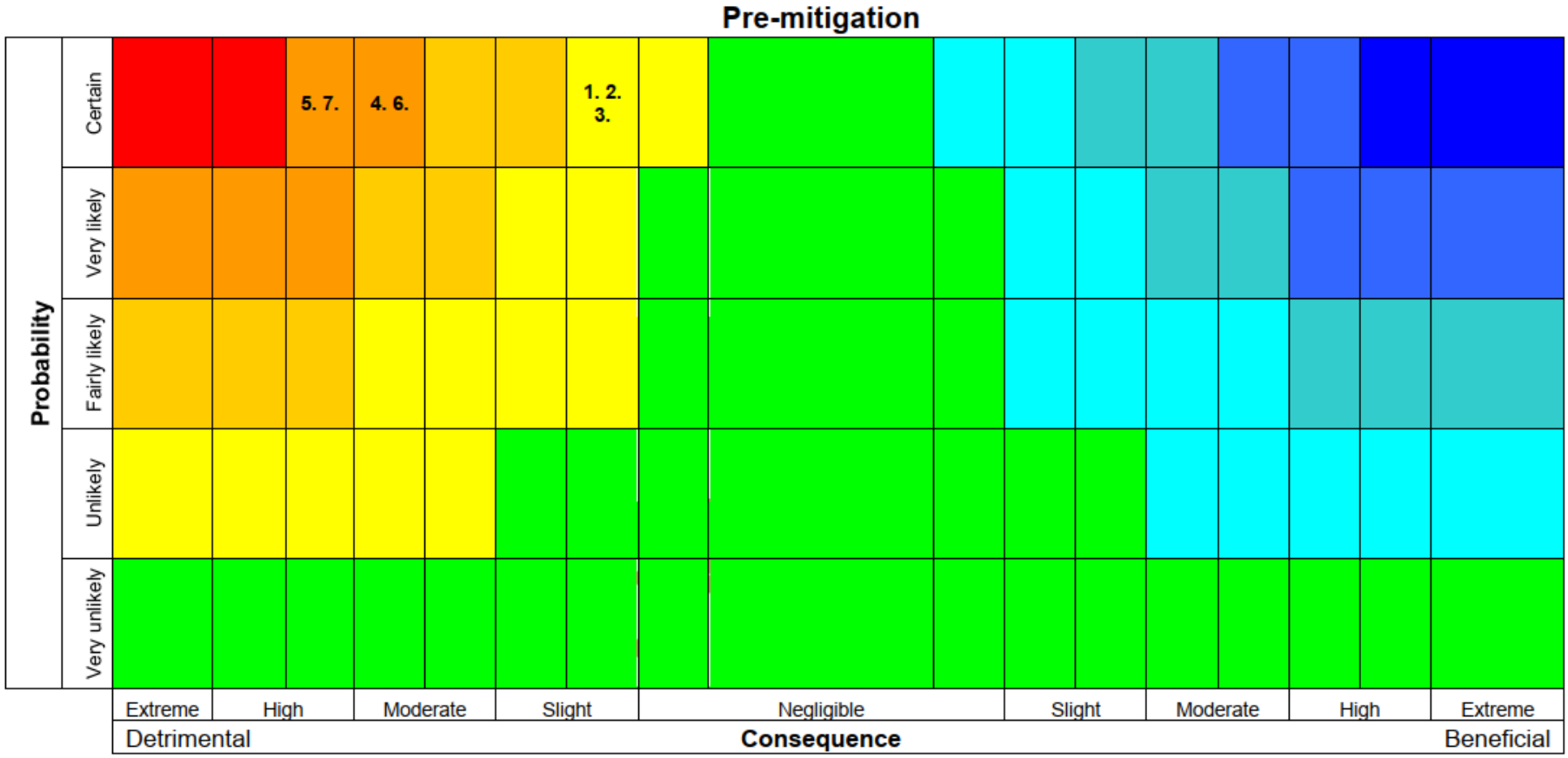


Figure 7-67: Overview of the impact risks associated with the flora component prior to mitigation.

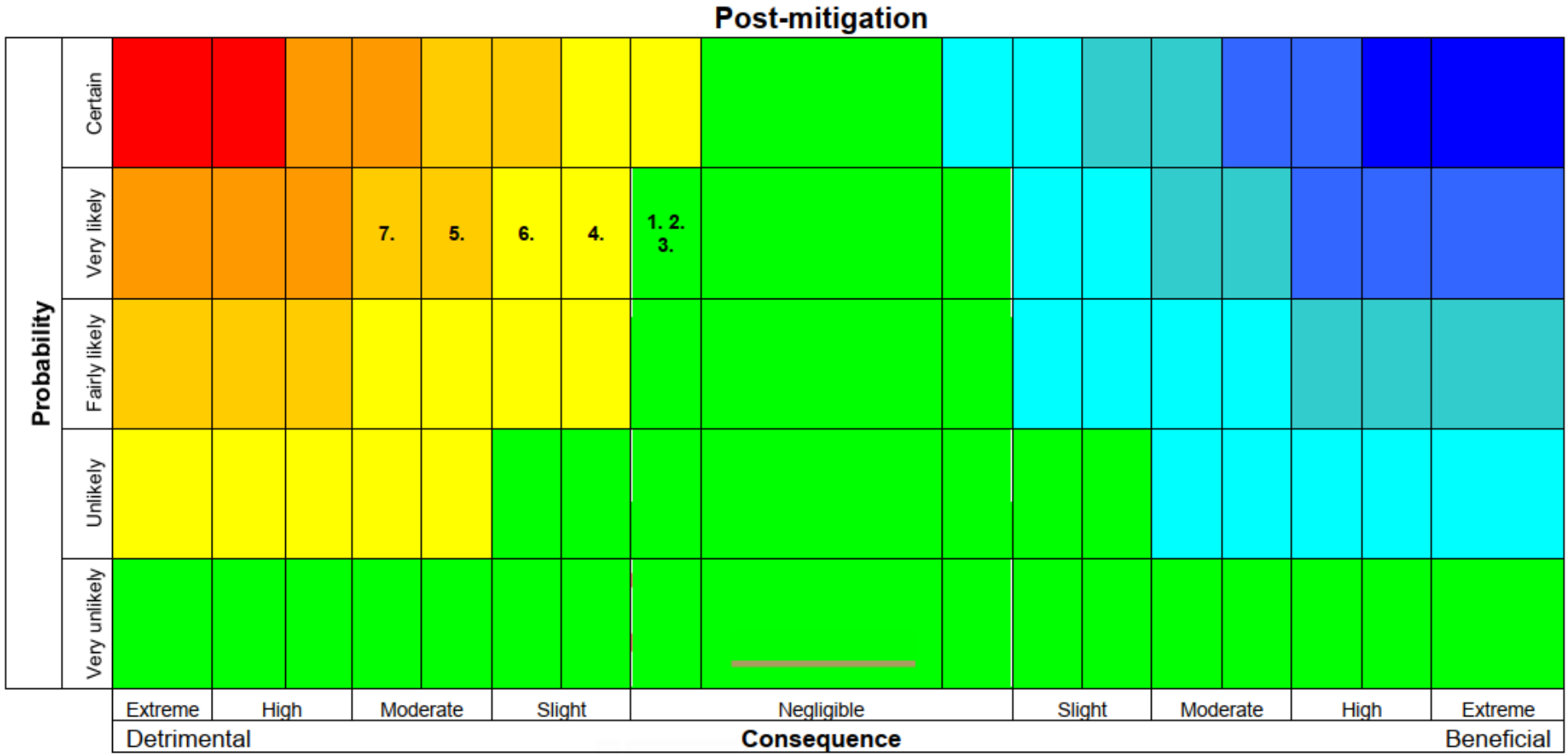


Figure 7-68: Overview of the impact risks associated with the flora component post mitigation.

7.9.5.2 Fauna Component

The impacts associated with the bulk water supply line construction are localised and temporary and will influence less than 1% of the remaining natural habitat units within the landscape, whether critical habitat or not (see Appendix C of the Terrestrial Biodiversity report).

It is especially small and less mobile species that depend on specific habitats for food, shelter, and breeding. Such species are particularly vulnerable to habitat destruction, fragmentation, and direct disturbances caused by construction activities.

7.9.5.2.1 Loss of habitat and displacement of fauna taxa

The proposed construction of the pipe will result in the loss and clearing of natural vegetation.

Recommended Mitigation measures

No plausible mitigation is possible to prevent the direct loss of habitat and subsequent loss and displacement of faunal SCC. The only viable option within the Mitigation Hierarchy is avoidance and or by placing the pipeline above ground in sensitive areas.

Mitigation of residual impacts persisting after avoidance:

- Implement a rehabilitation management plan with the objective to manage rehabilitated sections after construction through conservative grazing, fire management and continual eradication of alien plant species. Sustainable grazing at conservative stocking rates (by domestic livestock or game) is an essential environmental factor in maintaining veld condition and floristic diversity. Overgrazing can however be detrimental to the vegetation, and the carrying capacity of such areas of the rehabilitated areas should be estimated to ensure that overgrazing is prevented.
- Landscaping should make use of indigenous plant species, preferably of species native to the project area and immediate surroundings. The plant species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
- If any faunal species of conservation concern (especially *Kinixys lobatsiana*) are exposed during the construction phase, a natural scientific professional registered in the field of zoological science and/ or ecological science who specialises in the species of concern will be appointed to assist with its capture, translocation and safe release to nearby suitable habitat with the relevant permits obtained from the authority.
- Screen sections of the pipeline prior to construction for individuals of *Kinixys lobatsiana* - if found these should be released into suitable habitat adjacent to the pipeline property.
- All domestic waste generated (if present) during construction should be removed from the project area as soon as possible and be disposed of at an authorised landfill to reduce the risk of colonization by feral mammals, scavengers or competitively superior bird species (e.g. *Pied Crows Corvus albus*).
- Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring in the project area.

7.9.5.2.2 Disruption of ecological connectivity and faunal dispersal

Construction activities could aggravate fragmentation and the disruption of natural ecological corridors in the area, thereby impeding the dispersal of faunal species as well as the potential for re-colonisation and recruitment of fauna species to the project area during rehabilitation. It is especially sub-populations

of large-bodied mammal species that are at risk of becoming fragmented if natural connectivity is disrupted and when the surface area of natural corridors is reduced to the point that these animals can no longer disperse across the project area.

Recommended Mitigation measures

- Ensure that construction activities do not overspill onto adjacent natural habitats in order to provide displaced fauna with the opportunity to disperse into suitable habitats (although potential dispersal by small animals is highly limited).
- The construction area should be barricaded with permeable fencing to allow for the free movement of animal species.
- It is recommended prior to the commencement of barricading, to ensure that no animal species are trapped within any fenced area.

7.9.5.2.3 Illegal utilisation of faunal resources

The presence of labour within the project area during construction activities will increase the risk of illegal utilisation of fauna resources, such as hunting of small antelope and trapping of small mammals and birds. It is assumed that labour will be accommodated in nearby towns/villages and not on site, which would lower this risk of hunting and poaching considerably.

In addition, the project may also result in increased utilisation of natural resources due to potential human encroachment and accessibility to the project area owing to people seeking jobs. This could result in the establishment of illegal settlements in areas consisting of natural habitat in the project area where active construction is absent.

Recommended Mitigation measures

- Contractors and labour should be accommodated off-site (in other words not in the project area), reducing the risk of illegal harvesting of natural resources.
- Labour supervisors and Safety, Health, and Environmental (SHE) officials should monitor the activities of labourers when working away from infrastructure in natural habitat.
- Personnel and staff should be advised by means of environmental awareness training on the biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring on the project area.
- Regular monitoring of the project area, especially areas of natural habitat where active construction/rehabilitation activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the project's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.

7.9.5.2.4 Direct faunal mortalities

Construction of the pipeline will result in the creation of deep trenches that could result in "death" traps for smaller less mobile animals (e.g. reptiles and frogs). Any animal that may have fallen into the pipeline trench could perish over time if not rescued.

Recommended Mitigation measures

- Implement daily (preferably in the morning) checks of exposed trenches for animal species that may have fallen into the trench. If so, such animals should be captured and safely released into suitable adjacent habitat by the ECO.

- If any venomous snake species are trapped within the pipeline trench, then the services of a certified snake handler should be sought for the safe capture and release of the snake.
- Personnel and staff should be advised by means of environmental awareness training on the
- biodiversity importance of the area. The intentional killing of any faunal species (in particular invertebrates, reptiles and snakes) should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of conservation issues pertaining to the taxa occurring in the project area.
- Regular monitoring of the project area, especially areas of natural habitat where active construction/rehabilitation activities are absent, is advised to identify areas where illegal settlement may occur. If any illegal erecting of housing occurs, the project's public liaising officer should immediately advice on a resolution, which may involve a re-location strategy.

Figure 7-69 provides an overview of the impact risk associated with the fauna component due to the bulk water supply pipeline construction without any mitigation, most of the impacts are certain to occur, with slight to high consequences. **Figure** 7-70 shows that it is very likely that the required mitigation will be implemented and that it would result in slight to moderate to low consequences.

The main areas where high impacts or negative consequences can occur are in association with outcrops (boulders or sheets) and existing eroded areas with a high presence of SCC. Alternative construction methods as highlighted in Appendix D of the Terrestrial Biodiversity report should be considered.

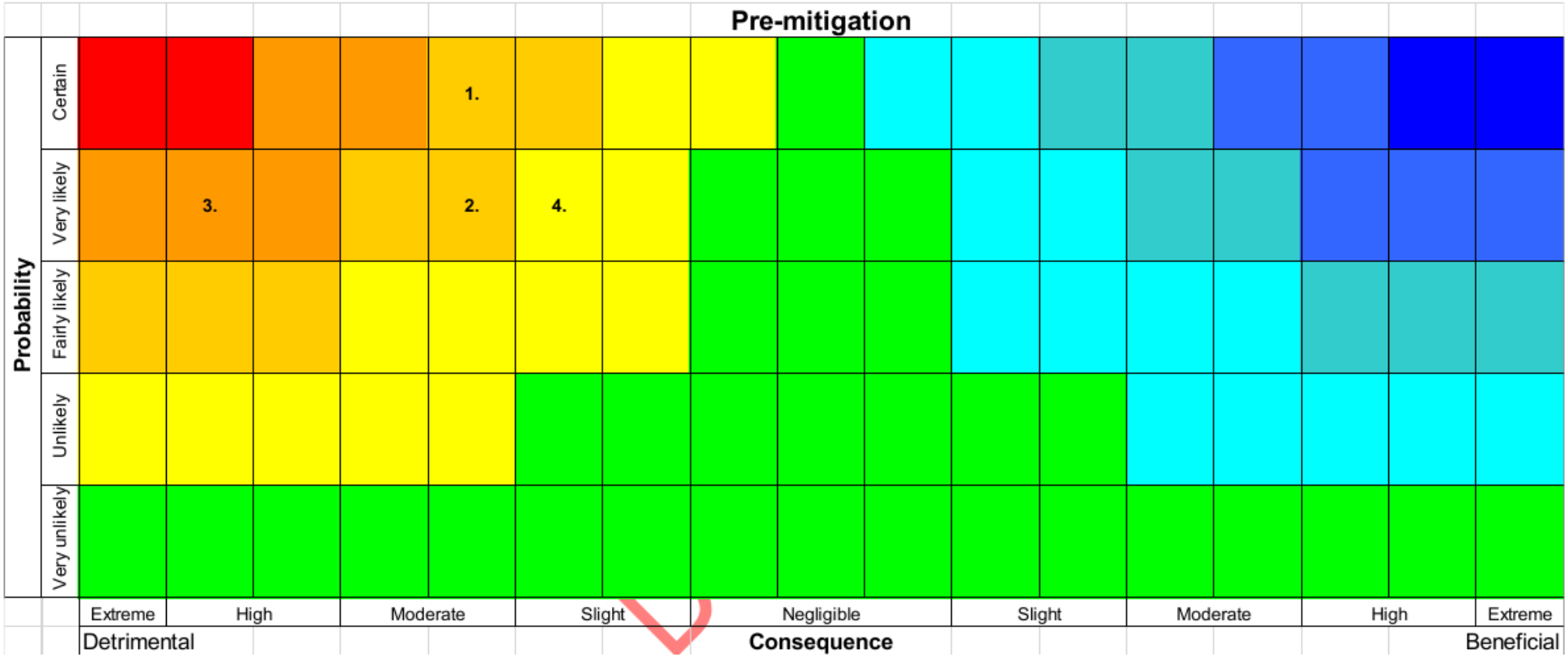


Figure 7-69: Overview of the impact risks associated with the fauna component prior to mitigation.

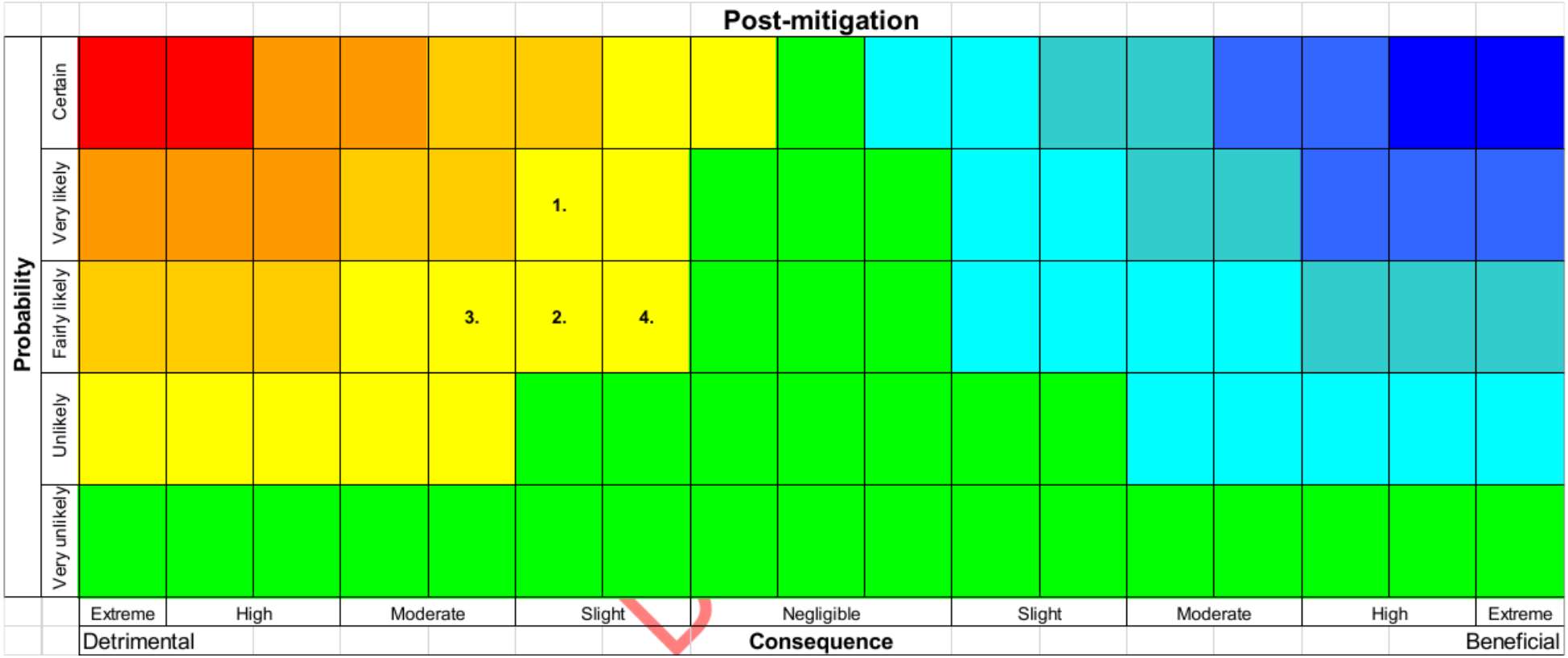


Figure 7-70: Overview of the impact risks associated with the fauna component post mitigation.

7.9.6 SPECIALIST RECOMMENDATIONS

7.9.6.1 Flora Component

The following recommendations are made:

1. A detailed rehabilitation plan should be compiled showing areas where topsoil management is critical and non-negotiable for example natural areas, potential critical habitats (eroded areas) and outcrops (boulders and sheet). The rehabilitation plan should be compiled by a registered scientific professional in the fields of botanical science and/ or ecological science with experience in botany and plant rehabilitation/ restoration with a minimum of 10 years' experience. This will require detail mapping at a scale of 1: 10 000 or larger along the approved pipeline servitude.
    a. The mapping should form part of the pre-construction baseline, and the following areas within the natural areas should be highlighted:
        i. Eroded areas
        ii. Stream/ river crossing
        iii. Wetlands
        iv. Steep areas – more than 8% or 5° slopes v. Outcrops – boulders and sheets
    b. The mapping should be done during the optimal flowering time from January to March.
    c. The rehabilitation plan should incorporate the results of the soil assessment with regards to soil form, soil texture and soil depth.
2. To apply for the removal of national protected trees a registered scientific professional in the field of ecological science with a minimum of 5 years' experience should do surveys along the approved pipeline servitude using plotless methods to document the height of the individuals in the following height classes up to a distance of 50 m along the centre of the permanent servitude:
    a. Seedlings: 0 – 0.5 m
    b. Juveniles: 0.5 – 1 m
    c. Young adults: 1 – 3 m
    d. Mature adults: 3 – 6 m (Fire tolerant)
    e. Reproductive adults: 6 m > (Fire tolerant)
    f. The survey should be done during the optimal flowering time from January to March
    g. The survey plots should be at least 250 m apart within natural areas or at least one plot per 2 ha of remaining natural vegetation (**Table** 7-28) within the approved temporary and permanent servitude
3. Areas with permanent footprints (valve chambers, scour chambers) exceeding 1 ha **within natural areas** should be surveyed in detail for species of concern as indicated in the screening report during the optimal flowering time from January to March.

7.9.6.2 Fauna Component

The following recommendations are made:

1. Implement a rehabilitation management plan with the objective to manage rehabilitated sections
2. after construction through conservative grazing, fire management, and continual eradication of alien plant species. Sustainable grazing at conservative stocking rates (by domestic livestock or game) is an essential environmental factor in maintaining veld condition and floristic diversity. Overgrazing can however be detrimental to the vegetation, and the carrying capacity of such areas of the rehabilitated areas should be estimated to ensure that overgrazing is prevented.
3. Landscaping should make use of indigenous plant species, preferably of species native to the project area and immediate surroundings. The plant species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
4. If any faunal SCC (especially *Kinixys lobatsiana*) are exposed during the construction phase, a natural scientific professional registered in the field of zoological science and/ or ecological

science who specialise in the species of concern will be appointed to assist with its capture, translocation and safe release to nearby suitable habitat with the relevant permits obtained from the authority. Please refer to proposed fauna mitigation above.

7.10 SOCIAL IMPACT ASSESSMENT (ZUTARI, 2024)

Zutari (Pty) Ltd compiled the SIA report. A site visit was conducted on the 31st of October and on the 1st of November 2024.

7.10.1 GEOGRAPHIC DESCRIPTION OF THE PROJECT AREA

The re-alignment of Phase 2D and its associated developments is proposed in the FTLM, which falls within the SDM in the Limpopo Province.

Limpopo is South Africa's northernmost province, covering an area of 125,754 km². It shares international borders with Mozambique, Zimbabwe, and Botswana, and also borders the Gauteng, Mpumalanga, and Northwest Provinces. The FTLM was established after the amalgamation of the Greater Tubatse Local Municipality and the Fetakgomo Local Municipality in 2016. FTLM is classified as a Category C municipality.

The FTLM municipal area spans approximately 4,550 km^2. The municipality is predominantly rural, with only six (6) proclaimed townships and 342 villages. FTLM faces challenges such as inadequate infrastructure, significant service backlogs, a weak economic base, dispersed human settlements, and high levels of poverty (The Final IDP/Budget – 2024/2025 FTLM). There is a strong presence of Traditional Authorities in the region, with them overseeing the daily management of these areas.

According to the FTLM IDP (2024/25), the municipal region has a significant presence of mining activities along the R37 and R555. The mining sector is particularly prominent in Burgersfort, where approximately 60% of the mines in the municipal region are operational.

7.10.2 ANTICIPATED SOCIAL IMPACTS: PRE-CONSTRUCTION AND CONSTRUCTION

7.10.2.1 Land Acquisition

Phase 2D re-alignment and associated developments are proposed on four farm portions. These farm portions are owned by SAMANCOR Mine and the National Government of the Republic of South Africa (with Kgoshi Maroga as the custodian), respectively. Accordingly, it is anticipated that the developer will require land access prior to the commencement of construction. Securing access to the identified land will enable the development of the proposed pipeline.

Table 7-33 outlines the impact rating and mitigation measures related to land acquisition, both before and after mitigation.

Table 7-33: Land Acquisition pre-construction and construction impact.

IMPACT DESCRIPTION: Land Acquisition		
Predicted for project phase:	Pre-construction and Construction	
PRE-MITIGATION		
Dimension	**Rating**	**Motivation**

Duration	Short-term	Land acquisition will be required prior to the construction of the pipeline, and the associated consultations and negotiations will be conducted over a short-term period.	Consequence: Slightly beneficial	Significance: Moderate - negative
Extent	Local	The impact will prevail at a local level with all the affected landowners.		
Intensity	Moderate - negative	Limited dependency on the land is assumed, hence the moderate rating.		
Probability	Certain	Land acquisition is certain as the developer doesn't own the affected land portions.		
MITIGATION:				
As per IFC PS5, land should always be accessed or acquired in consultation and negotiation with the affected people. LWUA has already initiated the process with the Traditional Authority and private landowners.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Land acquisition will be required prior to the construction of the pipeline, and the associated consultations and negotiations will be conducted over a short-term period.	Consequence: Slightly beneficial	Significance: Low -negative
Extent	Local	Impact will prevail at a local level with all the affected landowners.		
Intensity	Low - negative	The on-going engagements and the presence of compensation schemes mitigates the intensity of the loss.		
Probability	Certain	Land acquisition is certain as the developer doesn't own the affected land portions.		

7.10.2.2 Temporal Disturbance to Grazing Land

During the construction phase of the underground water pipeline, grazing land for cattle and goats may be temporarily disturbed due to excavation, machinery movement, and restricted access. This disruption could affect livestock grazing patterns and reduce forage availability. However, once construction is complete, the land can be rehabilitated and restored to its original condition, ensuring minimal long-term impact on livestock farming.

Table 7-34 outlines the impact rating and mitigation measures related to the temporal disturbance to grazing land, both before and after mitigation.

Table 7-34: Temporal disturbance to grazing land.

IMPACT DESCRIPTION: Temporal disturbance to grazing land				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact is anticipated happen during the construction phase.	Consequence: Slightly detrimental	Significance: Low - negative

Extent	Site-specific	Disturbance anticipated to happen on site.		
Intensity	Moderate - negative	The anticipated project phase activities will result in temporal disturbance for grazing.		
Probability	Certain	Temporal disturbance is certain.		

MITIGATION:

It is recommended that the contractor actions the following measures;

- Engage with livestock owners in advance to communicate construction timelines and potential disruptions;
- Implement a phased construction schedule to minimise the extent of land disturbance at any time;
- Maintain access routes to grazing areas where feasible and implement controlled crossing points for livestock. Should grazing be deemed as not feasible during construction phase, alternative grazing arrangements should be in place, such as identifying and providing temporary alternative grazing areas for affected livestock owners; and
- Restoring disturbed land after construction by regrading, reseeding with native grass species, and ensuring soil stabilization to promote regrowth of forage.

POST-MITIGATION

Dimension	Rating	Motivation		
Duration	Short-term	Impact is anticipated to be short-term.	Consequence: Negligible	Significance: Low - negative
Extent	Site-specific	Impact likely to be site-specific.		
Intensity	Low - negative	Impact likely to be low following the recommended mitigation measures.		
Probability	Certain	Temporal disturbance is certain.		

7.10.2.3 Resettlement of Households

While the re-aligned route has mitigated large-scale displacement, some household resettlement will still occur, resulting in social and economic impacts. Affected families may experience disruptions to their livelihoods, access to services, social networks, and cultural ties to the land.

Table 7-35 shows the resettlement of households' impact rating and mitigation measures, pre and post mitigation.

Table 7-35: Resettlement of households.

IMPACT DESCRIPTION: Resettlement of households				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	It is anticipated that the resettlement process will be undertaken prior to construction over a short-term period.	Consequence: Moderately detrimental	Significance: High - negative
Extent	Local	It is anticipated that the extent of the impact will be local.		
Intensity	Very high - negative	Anticipated resettlement is likely to be high negative if not managed.		

Probability	Certain	The proposed route has been realigned to reduce the number of affected households.	

MITIGATION:
It is recommended that resettlement should be guided by international best practices and accompanied by a comprehensive Resettlement Action Plan (RAP). It goes beyond solely adhering to the legislative compensation requirements. According to the best practices, IFC PS5 encourages project sponsors to plan and execute involuntary resettlement as a development initiative to ensure that the livelihoods and living standards of project affected people are improved.

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	It is anticipated that the resettlement process will be undertaken prior to construction over a short-term period.	Consequence: Slightly detrimental	Significance: Moderate - negative
Extent	Local	It is anticipated that the extent of the impact will be local.		
Intensity	Moderate - negative	The intensity of this impact likely to be reduced to moderate if managed accordingly.		
Probability	Certain	The proposed route has been re-aligned to reduce the number of affected households.		

7.10.2.4 Employment Opportunities

It is anticipated that employment opportunities will be created for skilled, semi-skilled, and unskilled workers during the construction phase. The number of locally employed individuals will depend on the developer's project activities and associated recruitment policy during the construction phase of the proposed development. The developer's project activities and associated recruitment policy will determine the number of locally employed people during the construction phase of the proposed development, it is anticipated that other skilled positions will be sourced nationally.

Table 7-36 shows the employment opportunities impact rating and mitigation measures, pre and post mitigation.

Table 7-36: Employment opportunities**.**

IMPACT DESCRIPTION: Employment opportunities				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	Rating	Motivation		
Duration	Short-term	The impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately beneficial	Significance: Moderate - positive
Extent	Regional	Impact likely to extend regionally.		
Intensity	Moderate - positive	The benefit likely to be moderate should a clear & sound policy not be in place.		
Probability	Certain	Employment opportunities are certain during the construction of any development project.		

MITIGATION:				
It is recommended that the contractor should carry out the recruitment process in accordance with South African laws that regulate labour rights, working conditions and employer responsibilities. Additionally, to maximise local employment benefits, the IFC PS 2 recommends that: • Preference should be granted to qualified local workers • Local sourcing should be prioritised • Skills development such as training should be planned and facilitated for selected people who will be employed during the construction phase • Equal opportunities should be granted to both males and females • Compensation should be competitive, and a safe working environment should be ensured • Establish a system of addressing labour concerns.				
POST-MITIGATION				
Dimension	Rating	Motivation		
Duration	Short-term	The impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately beneficial	Significance: High - positive
Extent	Regional	Procurement likely to extend regionally.		
Intensity	High - positive	The benefit likely to be very high should a clear and sound policy be in place.		
Probability	Certain	Employment opportunities are certain during the construction of any development project.		

7.10.2.5 Procurement of Good and Services

During the construction phase, development projects typically require the procurement of goods and services. Therefore, it is anticipated that this project will also necessitate the procurement of various goods and services for the proposed development, including equipment and building supplies. This demand is expected to create economic opportunities for existing Small, Micro, and Medium Enterprises (SMMEs), as well as for new SMMEs in the area. The proposed development is likely to lead to the establishment of new SMMEs. While some goods and services may need to be sourced from outside the project area, this could result in the procurement of goods and services from SMMEs located outside the area as well.

Table 7-37 shows the procurement of goods and services impact rating and mitigation measures, pre and post mitigation.

Table 7-37: Procurement of goods and services.

IMPACT DESCRIPTION: Procurement of goods and services				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately beneficial	Significance: Moderate - positive
Extent	Regional	Procurement likely to extend regionally.		
Intensity	Moderate - positive	Benefit likely to be moderate should a clear & sound policy not be in place.		

Probability	Certain	Procurement of goods and services is certain during construction of any development project.	

MITIGATION:
Procurement of goods and services will be conducted in accordance with the existing OMM Procurement Policy, which aims to support and develop local communities, suppliers, and previously disadvantaged groups for economic upliftment. Additionally, the procurement process will be guided by the Preferential Procurement Policy Framework Act, No. 5 of 2000. The contractor will be required to implement quality control measures to ensure that all goods and services meet the required standards of quality. It is essential that the contractor notes that The IFC Performance Standards require responsible procurement by ensuring fair, transparent, and competitive sourcing, prioritizing local suppliers, and managing social and environmental risks in supply chains. Companies must prevent forced labour, child labour, and unsafe working conditions, promote ethical labour practices, and ensure contractor compliance with environmental and social standards while supporting sustainable local economic development.

POST-MITIGATION				
Dimension	Rating	Motivation		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately beneficial	Significance: High - positive
Extent	Local	Procurement likely to extend regionally.		
Intensity	Very high - positive	The benefit is likely to be very high should a clear and sound policy be in place.		
Probability	Certain	Procurement of goods and services is certain during construction of any development project.		

7.10.2.6 Community Expectations

Development projects often raise local communities' expectations, and it is anticipated that these expectations for employment will be particularly high during the construction phase. The proposed project spans parts of the western area of FTLM, a municipality with high unemployment rates. As a result, the local communities are expected to have elevated expectations regarding employment and business opportunities. If these expectations are not met, individuals and community groups may mobilise against the project or disrupt its progress by holding the project office accountable for unmet employment demands.

Table 7-38 shows the community expectations impact rating and mitigation measures, pre and post mitigation.

Table 7-38: Community expectations.

IMPACT DESCRIPTION: Community expectations				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately detrimental	Significance: High - negative
Extent	Local	Local communities are likely to have expectations.		
Intensity	Very high - negative	Expectations are likely to be very high if not managed.		
Probability	Certain	Expectations are certain during the construction of any development project.		
MITIGATION:				

To effectively manage community expectations, project information should be made accessible to local residents. This information should include detailed requirements for employment, procurement, and other project-related opportunities. An information center should be strategically located to provide project-related details and serve as a place where community members can submit grievances through a grievance mechanism. The contractor should also gather information on wages paid to locals in previous projects within the area and clearly communicate the proposed wages and benefits to the community. This communication should take place before the recruitment process begins, helping to manage community expectations regarding the wages and benefits associated with the project.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Local	Local communities are likely to have expectations.		
Intensity	Low - negative	Expectations likely to be low-negative to minor if managed.		
Probability	Certain	Expectations are certain during the construction of any development project.		

7.10.2.7 Damage to Local Roads and Access Roads

Based on the site visit, the local road (Lebidike Road), from the Winterveld Club to the recently upgraded R37, is in extremely poor condition. Lebidike Road is riddled with potholes, which may be the result of heavy-duty truck traffic from nearby mines. According to the Traffic Impact Assessment (TIA), Phase 2D is expected to generate an estimated 90 vehicle trips during both the AM and PM peak periods, with 68 of these being heavy vehicles per day during construction. During the construction phase, it is anticipated that the increase in traffic could damage the local and access roads, as well as reduce their capacity. Heavy-duty trucks and construction vehicles may further deteriorate the road conditions and contribute to increased dust and congestion.

Table 7-39 shows the damage to local roads and access road impact rating and mitigation measures, pre and post mitigation.

Table 7-39: Damage to local and access roads.

IMPACT DESCRIPTION: Damage to local and access roads				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase.	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	Impact likely to affect local social receptors and mine related transportation.		
Intensity	Very high - negative	Impact likely to be very high if not managed, resulting in roads remaining in poor condition.		
Probability	Very likely	Damage to local access road very likely if not managed.		
MITIGATION:				

The contractor is required to conduct a condition assessment of the road both prior to the commencement of construction and upon completion of the works. Additionally, the contractor shall design and construct the access roads in accordance with the *Standard Specifications for Roads and Bridge Works for State Road Authorities* (1998), as prepared by the Committee of Land Transportation Officials (COLTO). It is recommended that the mitigation measures outlined in the TIA report be implemented by the contractor throughout the construction phase.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	Impact likely to affect local social receptors and mine related transportation.		
Intensity	Moderate - negative	Impact likely to be moderate if managed.		
Probability	Fairly likely	Damage to local access road fairly likely if not managed.		

7.10.2.8 Health, Safety and Security

Construction projects are generally known to have negative impacts on the health and safety of both communities and employees. It is anticipated that similar impacts will arise from the proposed development. During the construction phase, nearby communities and employees may be exposed to increased dust, noise, visual disturbances, and other nuisances from construction vehicles and man-machine interfaces. Dust will likely be generated by activities such as excavation, cement mixing, and the transportation of materials or waste. This dust may pose a risk to the respiratory health of those exposed. Construction noise will primarily result from machinery and transportation vehicles. While the noise is unlikely to cause hearing damage, it may reach nuisance levels for those in the surrounding community. Additionally, an influx of job seekers and opportunity seekers, often male-dominated, can bring higher health risks, including an increased burden of disease and higher HIV/AIDS rates (Daniel Owens, *et al.).*

Construction activities may also attract criminals to the area, compromising the security of nearby farm owners, communities, and employees. It is anticipated that criminal activities, including property trespassing, will escalate during the construction phase. Safety measures will be necessary for excavations to prevent livestock or community members from falling into exposed areas.

Table 7-40 shows the health, safety and security impact rating and mitigation measures, pre and post mitigation.

Table 7-40: Health, safety, and security.

IMPACT DESCRIPTION: Healthy, safety, and security				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	Impact likely to extend to local communities.		
Intensity	High - negative	Impact likely to be high if not managed.		

Probability	Very likely	Health, safety, and security impacts are likely during the construction phase.	

MITIGATION:

Impact related to health and safety will be managed as per the recommendations made in other specialist studies, such as the TIA, and as per the duties as defined in the Construction Regulations (Occupational Health and Safety Act). It is recommended that the contractor should:

- implement safety measures such as having appropriate signage and fencing/barricades on site to keep local community members and livestock away from falling into the dugout ditches.
- Use flaggers and barriers to separate work zones from public areas
- Implement dust and noise control measures
- Implement traffic management plans to prevent accidents with construction vehicles Plan and facilitate a community health and safety workshop, including a similar workshop employees
- Develops an Emergency Prevention and Response Plan for potential fire, flooding, cave-ins and hazardous material spills
- Appoint a Health & Safety Officer to oversee compliance, including conducting regular inspections and audits to identify and correct hazards
- deploys Security personnel stationed at the project site to avoid vandalism/ site specific criminal activities, protecting the broader community will remain the responsibility of the South African Police Service (SAPS).
- Engage with the Provincial commissioner to assist with handling potential construction mafia[31].

POST-MITIGATION

Dimension	Rating	Motivation		
Duration	Short-term	Impact will prevail during the construction phase, which is anticipated to be short-term.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Local	Impact likely to extend to local communities.		
Intensity	Moderate - negative	Impact likely to be moderate following the application of the recommended mitigation.		
Probability	Fairly likely	Health and safety impacts are fairly likely if managed during the construction phase.		

7.10.2.9 Modification of the Sense of Place

During the construction phase, the presence of heavy construction vehicles and potential displacement will trigger a modification of the sense of place impact. The potential disruption to be caused by the pipeline's construction activities, such as site clearing, noise, dust, and the presence of heavy machinery, can alter the physical and social landscape, affecting how local residents connect with and perceive their environment. Additionally, the resettlement of selected households could further displace people from their familiar surroundings, leading to a sense of loss and dislocation. These changes may affect the community's social ties, cultural connections, and mental well-being, particularly in rural or culturally significant areas. The temporary disruption of familiar landscapes and daily routines may lead to feelings of loss, dislocation, or anxiety, particularly for those whose livelihoods and homes are directly impacted by the project. Additionally, the construction phase could result in decreased aesthetic value of the land and disturbance of cultural or social spaces used by community members, leading to potential social tension.

Table 7-41 shows the modification of the sense of place impact rating and mitigation measures, pre and post mitigation.

[31] Construction mafias, are also known as business forums, are networks that employ violence and other illegal means to control access to public sector procurement opportunities. These groups invade construction sites, demanding money or a stake in development projects. They are often involved in systemic extortion.

Table 7-41: Modification of the sense of place.

IMPACT DESCRIPTION: Modification of the sense of place				
Predicted for project phase:	Pre-Construction & Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, it is the short-term as the disruption will be temporary.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site specific	Impact anticipated to be site specific.		
Intensity	High - negative	Impact likely to be high if not managed.		
Probability	Very likely	It is very likely that the project will have an impact on the affected households and the temporary disruption of the familiar landscape.		
MITIGATION:				
The contractor should aim at minimising disruption during construction by involving the community in the planning process and ensuring that the landscape is restored to its original state after construction to preserve the community's sense of place. The households which are likely to experience resettlement should be supported during livelihood restoration to help preserve their connection to the land.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will prevail during the construction phase, it is the short-term as the disruption will be temporary.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	Impact likely to be site specific.		
Intensity	Moderate - negative	Impact likely to be low if managed.		
Probability	Very likely	It is very likely that the project will have an impact on the project affected households and the temporary disruption of familiar landscape.		

7.10.2.10 Disruption of Social Infrastructure and Community Cohesion

During the construction phase, the proposed pipeline will have a direct impact on several social receptors. These receptors include a few household yards, a visitor's parking at a secondary school, an agricultural field and a soccer field. The disruption to these areas may have various social consequences, particularly affecting social networks and community structures. The removal or disruption of household yards and agricultural fields can impact household livelihoods and social cohesion, potentially leading to the weakening of community ties and household connections to family groups. Furthermore, the disruption of the soccer field and school parking area may affect recreational and social activities, which are integral to local community engagement and cohesion. This impact can alter the daily routines and interactions of affected individuals, potentially leading to social fragmentation and a decline in the quality of life for those directly impacted.

Table 7-42 shows the limited access to social receptors impact rating and mitigation measures, pre and post mitigation.

Table 7-42: Limited access to social receptors.

IMPACT DESCRIPTION: Limited access to social receptors				
Predicted for project phase:	Pre-construction and Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact anticipated to prevail during the construction phase.	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Site-specific	The impact will prevail at site, affecting community members and access to social receptors.		
Intensity	High - negative	Impact is anticipated to negatively influence community members.		
Probability	Certain	It is certain that community members will have limited access to social receptors.		
MITIGATION:				
It is recommended that the contractor adopt a phased approach, if possible, to section the construction of the pipeline. Additionally, the contractor should communicate with the affected communities, stakeholders, and heads of households to inform them when construction activities will impact their daily lives. Alternative recreational spaces should also be provided to ensure continued community engagement during the construction phase.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact anticipated to prevail during the construction phase.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	The impact will prevail at site, affecting community members and access to social receptors.		
Intensity	Low - negative	Impact is anticipated to negatively influence community members.		
Probability	Certain	It is certain that community members will have limited access to social receptors.		

7.10.3 ANTICIPATED SOCIAL IMPACTS: OPERATION

7.10.3.1 Access to potable water for defined communities

FTLM has the highest population in the SDM, which leads to higher demands for water supply. Serious water shortages may be accompanied by chronic illnesses, resulting in applied pressure on the local health care facilities. A secure water supply reduces health-related costs in a society. In most developing countries people spend a third of their income on medical costs mostly from water-related diseases such as malaria and diarrhoea. Further, water supplies the individual with the opportunity to do everyday activities such as drinking water, cooking, bathing, and cleaning.

Table 7-43 shows the access to potable water for defined communities impact rating and mitigation measures, pre and post mitigation.

Table 7-43: Access to potable water for defined communities.

IMPACT DESCRIPTION: Access to potable water for defined communities

Predicted for project phase:	Operational			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	Impact will prevail during the operation phase, which is anticipated to be long-term.	Consequence: Moderately beneficial	Significance: Moderate - positive
Extent	Local	Local defined communities are likely to benefit from Potable water.		
Intensity	Low - positive	The benefit likely to be low if pipeline not constructed accordingly.		
Probability	Certain	It is certain that the defined communities will have access to potable water.		
MITIGATION:				
An experienced and qualified service provider should be appointed to construct the pipeline. The SDM Water Master Plan and Water Sector Plan to be updated with defined communities which will benefit from the OMM Programme to receive potable water.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	Impact will prevail during the operation phase, which is anticipated to be long-term.	Consequence: Highly beneficial	Significance: High - positive
Extent	Local	Local defined communities are likely to benefit from Potable water.		
Intensity	High - positive	The benefit likely to be high provided that the pipeline is constructed accordingly.		
Probability	Certain	It is certain that the defined communities will have access to potable water.		

7.10.3.2 Access to bulk raw water for Mine members

During the operational phase, it is anticipated that the mine members[32] will have a reliable supply of bulk raw water, essential for their operation. Access to a reliable water supply allows a mine to optimise its operations, minimise significant financial loss and mitigate environmental impacts. Water used for industrial purposes is becoming increasingly scarce in Southern Africa (Mining Industry Association Southern Africa, 2022). While receiving criticism that the mining industry wastes water. Mines face numerous different water management challenges, these challenges can be due to the environment, climate and geopolitical circumstances which a mine can face throughout the mine's life cycle. Effective water management has become more of a strategic imperative than just an operational requirement.

Table 7-44 shows the access to bulk raw water for mine members' impact rating and mitigation measures, pre and post mitigation.

Table 7-44: Access to bulk raw water for mine members.

IMPACT DESCRIPTION: Access to bulk raw water for mine members

[32] OMM Programme Mine members include; African Rainbow Minerals, Anglo American Platinum, Assore (Dwars River), Bushveld Minerals, Cheetah Chrome, Corridor Resources, Glencore-Merafe, Implats (Marula), Ivanplats, Modkiwa Platinum Mine, Northam Platinum, Sibanye-Stillwater, Sylvania Platinum, Tameng Mining & Exploration, Two Rivers Platinum, Vanadium Resources and Zijin Platinum.

Predicted for project phase:	Operation			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact is likely to be long-term.	Consequence: Highly beneficial	Significance: High - positive
Extent	Regional	Impact will prevail at the regional level.		
Intensity	Low - positive	The benefit is likely to be low if the pipeline is not constructed accordingly.		
Probability	Certain	It is certain that the mine members in the affected project phase will receive bulk raw water during operations.		
MITIGATION:				
The SDM Water Master Plan and Water Sector Plan to be updated and include the mine members of the OMM Programme to receive bulk raw water supply for their mine operations.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact is likely to be long-term.	Consequence: Highly beneficial	Significance: Very High - positive
Extent	Regional	Impact will prevail at the regional level.		
Intensity	High - positive	The benefit is likely to be high, provided that the pipeline is constructed accordingly.		
Probability	Certain	It is certain that the mine members in the affected project phase will receive bulk raw water during operations.		

7.10.3.3 Employment Opportunities

During the operational phase, employment opportunities will be minimal, as the project will require only a small workforce for routine inspection, maintenance, and repairs. Unlike the construction phase, which involves a larger labour force, the operational phase will be limited to specialised roles such as pipeline monitoring, technical maintenance, and occasional rehabilitation work. As a result, the project is unlikely to generate significant long-term employment for local communities. However, where possible, priority should be given to local workers for maintenance activities, and skills development programs during construction could help equip local labourers with the necessary competencies for these roles.

Table 7-45 shows the employment opportunities impact rating and mitigation measures, pre and post mitigation.

Table 7-45: Employment opportunities.

IMPACT DESCRIPTION: Employment opportunities				
Predicted for project phase:	Operation			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	Maintenance anticipated to happen throughout the operation phase.	Consequence: Highly beneficial	Significance: Moderate - positive

Extent	Regional	Impact likely to extend regionally to source specialised skills.		
Intensity	Moderate - positive	Intensity anticipated to be low, opportunities will be limited to maintenance activities.		
Probability	Fairly Likely	It is likely that employment opportunities can benefit the communities during this project phase.		
MITIGATION:				
It is recommended that the developer engage with the affected communities to implement sustainable SED initiatives in the area, ensuring that community members are not solely dependent on the project.				
POST-MITIGATION				
Dimension	Rating	Motivation		
Duration	Long-term	Maintenance anticipated to happen throughout the operation phase.	Consequence: Highly beneficial	Significance: High -positive
Extent	Regional	Impact likely to extend regionally.		
Intensity	High - positive	Impact to be high when the local community are considered for the opportunities in this phase.		
Probability	Very likely	It is likely that maintenance will be required.		

7.10.3.4 Health and Safety

It is anticipated that, during the operational phase, some activities associated with the maintenance of the pipeline and the Mooihoek BPR will rely on human labour. Therefore, it is expected that minimal to no injuries will occur due to incorrect handling of equipment and materials. However, it is recommended that the developer ensure the implementation of required protective equipment and gear during maintenance of the infrastructure. Additionally, all excavated areas should be rehabilitated once construction is completed.

Table 7-46 shows the health and safety impact rating and mitigation measures, pre and post mitigation.

Table 7-46: Health and safety.

IMPACT DESCRIPTION: Health and safety				
Predicted for project phase:	Operation			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	It's anticipated that the impact will prevail for a short term, only during maintenance.	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Site-specific	Impact likely to be site specific.		
Intensity	Moderate - negative	If not managed, the impact will be low.		
Probability	Fairly likely	Probability for incidents and injuries is almost certain if not manged.		
MITIGATION:				
It is recommended that the developer develop a health and safety plan that outlines the safety measures and procedures implemented when undertaking maintenance of the project's infrastructure.				

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	It's anticipated that the impact will prevail for a medium-term during the operation of the development.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	Impact is likely to be site-specific.		
Intensity	Low - negative	If managed, the impact will be low, as the maintenance team will be required to adhere to the health and safety plan.		
Probability	Fairly likely	The probability of incidents and injuries is almost fairly likely if not managed.		

7.10.4 DECOMMISSION PHASE

The decommissioning of an underground water pipeline is a complex process that requires careful planning to mitigate potential environmental and social impacts. While decommissioning is technically feasible, it is generally not the preferred option unless unavoidable due to factors such as structural failure, regulatory requirements, or redundancy. However, for the purpose of this assessment, decommissioning is assumed to evaluate its potential impacts and necessary mitigation measures. Despite this assumption, the specialist recommends exploring alternative solutions such as rehabilitation, maintenance, or repurposing to minimise negative effects on communities.

7.10.4.1 No access to potable water

Social water users will not have access to potable water should the proposed development be decommissioned. Specifically, the selected defined communities. This could likely have severe consequences for households, schools, healthcare facilities, businesses, and agricultural activities that depend on the pipeline as their primary or sole water source. The decommissioning could lead to increased water insecurity, forcing affected communities to seek alternative and potentially less reliable or unsafe water sources, which may result in health risks, higher costs, and social strain.

Table 7-47 shows the no access to Potable water impact rating and mitigation measures, pre and post mitigation.

Table 7-47: No access to potable water.

IMPACT DESCRIPTION: No access to potable water				
Predicted for project phase:	Decommissioning			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	It is anticipated that the impact will prevail during the decommissioning phase, provision alternative water source is assumed following decommissioning.	Consequence: Moderately detrimental	Significance: High - negative
Extent	Local	It is anticipated that the lack of water will extend to the local beneficiaries.		

Intensity	Very high-negative	It is anticipated to be very high if not managed.		
Probability	Certain	The impact is certain should the development be decommissioned.		
MITIGATION:				
Prior to the decommissioning of the potable water the beneficiaries should be notified. The district municipality should have an alternative source of potable water.				
POST-MITIGATION				
Dimension	Rating	Motivation		
Duration	Short-term	It is anticipated that the impact will prevail during the decommissioning phase, provision alternative water source is assumed following decommissioning.	Consequence: Slightly detrimental	Significance: Moderate - negative
Extent	Local	It is anticipated that the lack of water will extend to the local beneficiaries.		
Intensity	Moderate - negative	If managed impact is anticipated to be moderate.		
Probability	Certain	Impact is certain should the development be decommissioned.		

7.10.4.2 No access to bulk raw water

Mine members will no longer have access to bulk raw water should the proposed development be decommissioned. This could likely have severe consequences for the operations of the mine members and could lead to significant financial losses which include a loss on the return of investment.

Table 7-48 shows the no access to bulk raw water impact rating and mitigation measures, pre and post mitigation.

Table 7-48: No access to bulk raw water.

IMPACT DESCRIPTION: No access to bulk raw water				
Predicted for project phase:	Decommissioning			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short term	It is anticipated that the impact will prevail during the decommissioning phase.	Consequence: Highly detrimental	Significance: High - negative
Extent	Regional	It is anticipated that the lack of water will extend to the mine members of the OMM Programme.		
Intensity	Very high - negative	It is anticipated to be very high if not managed.		
Probability	Certain	Impact certain should the development decommission.		
MITIGATION:				
Prior to the decommissioning of the bulk raw water the mine members should be notified. The district municipality should have an alternative source of bulk raw water.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		

Duration	Short term	It is anticipated that the impact will prevail during the decommissioning phase.	Consequence: Moderately detrimental	Significance: High - negative
Extent	Regional	It is anticipated that the lack of water will extend to the mine members of the OMM Programme.		
Intensity	Moderate - negative	The mine members will rely on the district municipality for alternative arrangements.		
Probability	Certain	Impact certain should the development decommission.		

7.10.5 ASSESSMENT OF NO-GO ALTERNATIVE AND CUMULATIVE IMPACTS

As per the requirements of the NEMA, the alternative of not proceeding with the proposed project must be assessed as an alternative. The no-go alternative implies that the Phase 2D re-alignment and associated developments do not proceed, hence the current status quo remains the same. This section defines a situation which would result should the proposed project not proceed.

The Minister of Human Settlement and Water and Sanitation published the National Water and Sanitation Master Plan for South Africa which specifically indicated that South Africa as a country is experiencing a water crisis by insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, deteriorating water quality, and a lack of skilled water engineers.

The proposed development is part of the OMMP-BRWSP. The OMMP-BRWSP intends to build, operate, and maintain bulk and potable water infrastructure in the Eastern and Northern Limb of the Limpopo Province. Additionally, to comply with government instructions that every person living in South Africa has a constitutional right of access to at least basic water. The OMMP-BRWSP aims to provide quality water. As such, this would address the water crisis caused by insufficient water infrastructure maintenance and investment identified in the Water Master Plan.

It is also essential to note that the OMMP-BRWSP is aligned with the National Infrastructure Plan (NIP), 2050 (Phase I), and the goals of the NDP 2011. The NDP anticipates, amongst others, universal and reliable access to water of acceptable quality and quantity in support of a strong, inclusive economy and a healthy environment by the year 2030.

The overall impact associated with not proceeding with the proposed development would entail the failure of the OMMP-BRWSP to fully align with the country's plan for infrastructure development, especially the provision of potable water to social users.

Table 7-49 below, presents the no-go assessment associated with the proposed Phase 2D re-alignment and associated development.

Table 7-49: No-go assessment associated with the proposed re-alignment and associated developments.

Code	Impact	Pre-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance
1	No-go alternative	Long-term	Regional	Very high - negative	Extremely detrimental	Certain	Very high - negative

7.10.6 POTENTIAL CUMULATIVE IMPACTS

The potential cumulative impacts for the proposed realignment of the proposed pipeline and associated development include:

- **Impacts related to multiplier effects on the local economy:**

The proposed development promotes diversifying employment opportunities in the dominant mining region. This will result in several economic benefits for local communities through direct and multiplier effects. These effects are usually stimulated by wage bills, local and regional procurement spending, and investment into Local Economic Development (LED) and skills development.

- **Impacts related to community health:**

The impacts could be permanent duration due to the nature of HIV/AIDS and other sexually transmitted infections (STIs) that are incurable. The spatial scale is local but infected persons from the community, as well as construction teams who are mobile, could infect more people in other parts of the country.

- **Impacts related to population influx:**

The proposed development will attract opportunity seekers to the project area as the municipality has a high unemployment rate. Applying pressure on local resources, infrastructure, and services: The capacity of social service delivery is generally under threat in the proposed project areas. Any additional influx of job and business seekers into the area, combined with the construction and operational workforce, will place great pressure on local social services and infrastructure such as roads, clinics, schools, sanitation and water access, and housing.

Increased informal settlements: An influx of temporary opportunity seekers into the area also has the potential to increase the formation of informal settlements, those who cannot afford rental property or experience an inability of bonds on tribal land will likely resort to residing in informal dwellings. This consequently lowers the property value of formal houses which are located in proximity to the informal settlements.

7.10.7 SPECIALIST CONCLUDING REMARKS

The findings of the SIA indicate that, with the implementation of the recommended mitigation measures, the significance of identified negative impacts can be effectively reduced to acceptable levels. At the same time, the project's positive impacts, such as improved water access, job creation, and economic opportunities, can be significantly enhanced to maximise benefits for surrounding communities.

Given these considerations, it is strongly recommended that the developer carefully integrate the proposed mitigation and enhancement measures outlined in this report. This will ensure that adverse effects on local communities are minimised, while the full potential of positive impacts is realised.

Furthermore, the specialist recommends that the proposed development be authorised, as the no-go alternative would obstruct the implementation of national strategic plans aimed at improving water security and access to potable water for social and economic use. Such an outcome would not only hinder development objectives but could also exacerbate existing challenges related to water scarcity and community well-being.

7.11 VISUAL AND LANDSCAPE IMPACT ASSESSMENT (CREATE LANDSCAPE, 2024)

A Landscape and Visual Impact Assessment (LVIA) was prepared by Create Landscape Architecture & Consulting. The field assessment was conducted on 1 November 2024. According to the Site Sensitivity Verification (SSV) Report, a Level 2 assessment was the required approach for this evaluation. This included a description of the receiving environment and the proposed project, the establishment of the view catchment area and receptors, a brief indication of potential visual impacts, and possible mitigation measures.

7.11.1 LANDSCAPE BASELINE

Table 7-50: Summary of the landscape baseline.

Landscape character[33]	
Climate	The climate of the study area can be described as semi-arid, lying in the rain shadow of the escarpment which have an annual rainfall of 400 mm and mean temperature of 22ºC.
Topography and Geology	The landform varies from the wide valley of the Moopetsi River flanked on either side by rolling hills to the undulating topography along the R37. This section forms part of the middle of the Olifants sub catchment and contains a variety of geological features. Soils vary from moderate to deep sandy loam to erodible duplex soils. The vertical scale of the landscape is defined by irregular undulation of flat valleys and mountain foothills. The horizontal scale is interrupted by the rising landform to the northeast of the R37. Rocky outcrops are common and widespread throughout the region. The site identified for the new BPR is currently used as a soccer field and the topography can be described as flat with a 5% slope. Mountain foothills, 500 m east of the proposed site and small isolated and dispersed hill formations located more than 1km to the west have the topographic ability to screen the proposed infrastructure.
Vegetation cover	The vegetation is largely modified natural vegetation. The riverine habitat is in a poor state. The vegetation falls within the Mixed Bushveld of the Savanna Biome (Low and Rebelo, 1996). The natural vegetation varies from a dense, short Bushveld to open Savanna. Much of the vegetation is overgrazed and mainly de-bushed and thus open and sparse with large scale erosion across the study area. The average vegetation height is not more than 5m and provides little screening ability. Taller trees are sparsely scattered and is mostly associated with private residences.
Land use	This study area is characterized by a mix of land uses. Industrial activities are mainly linked to several mines (Tubatse Alloy Smelter, Steelpoort Mine, ECM Winterveld, and Modikwa Platinum Mine) that edge the pipeline servitude, dry land and irrigated agriculture, farms, towns, villages, and settlements. Informal stock grazing occurs throughout this section. The R37 is a busy road, often with slow moving trucks, minibus taxis, pedestrians, and cattle and goats. Owing to the general attitude towards erosion, these natural dongas are used as illegal dumping sites by local industries in the region. Uncontrolled mining, agricultural and residential development of the area has resulted in the irreplaceable loss of Sekhukhuneland's unique landscape. The land use surrounding the proposed site for the BPR consists mainly of clumps of scattered free-standing brick and plaster residential houses with patches of small crops,

[33] These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.

	joined by informal gravel roads. Smaller local retail facilities are typically found next to main roads. The current land use for the BPR site is a local, informal soccer field also used as a grazing area for resident livestock.
Landcover	**Figure** 7-71 indicates the landcover for both the proposed pipeline servitude (solid black line) as well as the previously authorised pipeline servitude (hatched black line). Where the proposed changes occur the main landcover types consist out of: • Natural grassland • Fallow land and old fields • Subsistence/small scale agriculture • Residential • Mines It is clear that the landcover type for the southern and central deviations remain unchanged, the landcover types for the proposed new alignment includes fallow land and residential and for the old alignment it includes subsistence farming, mines and fallow land. Based on this information the proposed changes will not be significantly more, or less sensitive to the landscape and visual impacts associated with the infrastructure.

Visual absorption capacity and visual intrusion

Visual absorption capacity (VAC) is an indication of the ability of the landscape to visually conceal the development. Areas with high VAC have the ability to accommodate and absorb physical changes in the landscape without transforming its visual character and quality. The factors that contribute to the VAC factor includes slope, vegetation height and visual pattern. The VAC can be expressed as follows:

- High VAC - Built up areas and industrial/mining zones, where tall structures provide a high degree of visual screening;
- Moderate VAC – Areas of natural vegetation and moderately undulated topography; and
- Low – Agricultural areas (crops provide little screening) where the topography is fairly flat.

The degree of visual intrusion is related to the idea of context and maintaining the integrity of the landscape and essentially rates the degree of contrast. The higher the landscape's quality and the simpler the visual context, the more likely the impact will be intrusive.

Visual intrusion is rated as indicated in **Table 7-51** below:

Table 7-51: Visual intrusion**.**

Visual intrusion (How the project fits into the surrounding landscape)	Criteria
High	Results in a noticeable change or is discordant with the landscape
Moderate	Partially fits into the landscape, but clearly noticeable
Low	Minimal change or blends in well with the landscape
None	Negligible change to the landscape

Due to the close proximity of existing industrial and mining type infrastructure, it is not anticipated that the proposed BPR will cause a significant visual intrusion as it will be similar in appearance. Compared to the mine (Tubatse Alloy Smelter) and its associated infrastructure which are located 1 km away, the proposed reservoir is small in scale.

The low growing vegetation in the study area has little potential to conceal infrastructure of this size. In some areas, there is no natural vegetation cover as land has been left barren after ceasing agricultural activities. The visual pattern is moderate as there is a good combination of trees, grass and buildings. The natural slope is at an average angle of 4- 8% and therefore VAC of the study area is moderate. Overall visual intrusion will be low for the proposed infrastructure, due to:

- The relatively low infrastructure height of the BPR (less than 3 storeys/12 m)
- The presence of similar types of infrastructure, existing footpaths, gravel roads, and mining infrastructure; and
- The fact that the proposed access roads will have no height.

The proposed deviation in the alignment will not be visually more intrusive than the authorised alignment as the landscape types which traverses the area remain vastly similar.

Landscape Quality

Landscape quality is based on human perceptions and expectations in the context of the existing environment. The landscape quality rating is a combination of the landscape's, intrinsic physical properties consisting out of the landform, vegetation, water, colour, adjacent scenery, scarcity, cultural or man-made modifications. Landscape quality increases with the presence of water, topographic ruggedness and where diverse patterns of vegetation occur. Areas that contain more natural features or harmonious man-made compositions will have a more favourable landscape quality than areas with non- harmonious human activity.

Table 7-52: Landscape quality rating.

Landscape quality rating	Criteria
High	Unmodified landscape: The landscape is almost free from human encroachment, Visual integrity occurs and where human intervention is visible, no visual discontinuity occurs, and visual order is harmoniously maintained. Strongly defined landforms are noted, including mountains and large bodies of water. Distinct visual patterns are formed through patterns, colours and textures.
Moderate	Moderately transformed/disturbed landscape: There is average visual integrity between the natural and manmade landscape. Some visual encroachment is visible which lacks visual order. There is some disruption of the natural and man-made patterns. Moderately distinctive landscape patterns are visible, including rolling hills and smaller water bodies.
Low	Extensively transformed human intervention: There is low or no visual integrity between the natural and man – made natural features. The visual integrity of the landscape is disrupted, and visual order is entirely lost. Little visual patterns are formed, and vegetation patterns, colours and textures are not noticeable.

As a result of the landscape's modification, proximity of the existing mines and other medium scale, similar type of infrastructure, the small percentage of built-up areas, the overall rural feel, the absence of natural open bodies of water, the fairly rugged topography and the low visual absorption capacity, the landscape quality of the study area is considerate moderate - low. The visual setting is not vivid nor does it have elements that fully unify a view. Transformed areas such as mining and residential areas have a lower landscape quality than undisturbed areas, which typically lies east of the R37, closer to the foot of the Strydpoort Mountains.

Landscape Value

The Study Area is likely to be most valued by tourists who travel through the study area to visit nature and game reserves throughout the year which offer various eco-tourism activities. The proposed activities may therefore lower the landscape value to a small extent through the direct loss of rural and natural land, especially during the construction phase of the project.

Local residents attach a high cultural and economic value to their surrounding landscape in terms of cultural value, various landscape elements have cultural connections and regional significance. In essence, local communities live from the landscape, and it is seen as a communal asset. Considering the above local residents will therefore attach a moderate - high value, depending on their direct association with the landscape.

Construction workers, mine workers and stakeholders associated with various current and future industrial projects within the study area will have a different perception because of the employment opportunities, their more regular contact with the landscape and the ongoing infrastructural type changes within it. The proposed project will therefore affect the landscape value to a lesser extent for this specific receptor group.

Night-time lighting

To determine the potential visual impact of nighttime lighting, it is important to understand the existing lighting levels within the study area. The Institute for Lighting Professionals (ILP, 2011) identifies five zones of environmental zones for exterior lighting control, describing the existing lighting conditions within the landscape. These zones are supported by design guidelines to reduce lighting pollution, which can inform mitigation measures.

Table 7-53: Environmental zones for nighttime lighting (ILP, 2011)

Environmental Zones	Surrounding	Lighting Environment	Examples

E0	Protected	Dark	United Nations Educational, Scientific and Cultural Organization (UNESCO) starlight reserves, IDA dark sky parks.
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Beauty.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations.
E3	Suburban	Medium district brightness	Small town centers or suburban.
E4	Urban	High district brightness	Town/City centers with high levels of nighttime Activity.

Light pollution falls within the following categories, ILP (2011):

- Skyglow: Wasteful light from artificial sources emitted upward (at horizontal angles and higher) is scattered by aerosols such as clouds and fog or small particulates like pollutants in the atmosphere. These scattering forms a diffuse glow that can be seen from far away. Skyglow is the most known form of light pollution.
- Light trespass: Unwanted light at night can seep through the windows of houses and buildings, causing sleeping disorders due to overexposure to light.
- Glare: Excessive brightness at night creates high contrast and decreased visibility, causing discomfort or, in extreme cases, a blinding effect.
- Lighting from vehicles within rural areas will generally be more intrusive than in urban settings and could therefore potentially have a greater impact due to general lack of existing ambient light within areas further away from the study area.

The ILP recommends that to maintain the nighttime setting, lighting within the identified zone should have minimal illumination into the sky.

The largest part of the study area is rural and have limited sources of night time lighting and can therefore be categorised as low district brightness. Some natural areas such as valleys and ridgelines are intrinsically dark. Areas closer to mines will have more night time lighting. Levels of night time lighting will increase closer to the town of Steelpoort, mines, rural settlements and the R37. The rural residential and industrial infrastructure has already contributed to sky glow and artificial lighting within the study area.

Existing and new access roads, as well as the realignment of the pipeline servitude, will not contribute to additional sky glow and artificial lighting. It is expected that the BPR's ancillary infrastructure and security lighting will contribute to additional sky glow and night time lighting, affecting adjacent parcels of land, however, due to the relatively small scale of the reservoir and the presence of other lights within proximity, it is anticipated that the development of this parcel of land will not contribute to a significant increase in night time lighting within the study area.

Sense of place

Sense of place is the "extent to which a person can recognise or recall a place as being distinct from other places, as having a vivid or unique, or at least a particular character of its own". Sense of place is constituted by spatial form and character of the natural landscape together with human intervention and transformation mainly associated with habitation. Sense of place is determined through a site visit.

The overall remoteness of the area, the denuded landscape, and the typical rural one storey, scattered brick houses, juxtaposed with narrow dust roads, open overgrazed parcels of land and livestock, gives the area its particular character.

The most significant human made features include the various chrome and platinum mines with associated waste rock dumps, slimes dams and other infrastructure located west of the proposed pipeline servitude and in proximity to the proposed site for the BPR. Other main features include the Strydpoort mountain range, lying east of the alignment. Several nature reserves, such as Potlake and most game reserves (located within the Wolkberg Wilderness Area) are situated respectively 40 km north west and in excess of 60 km north east of phase 2D.

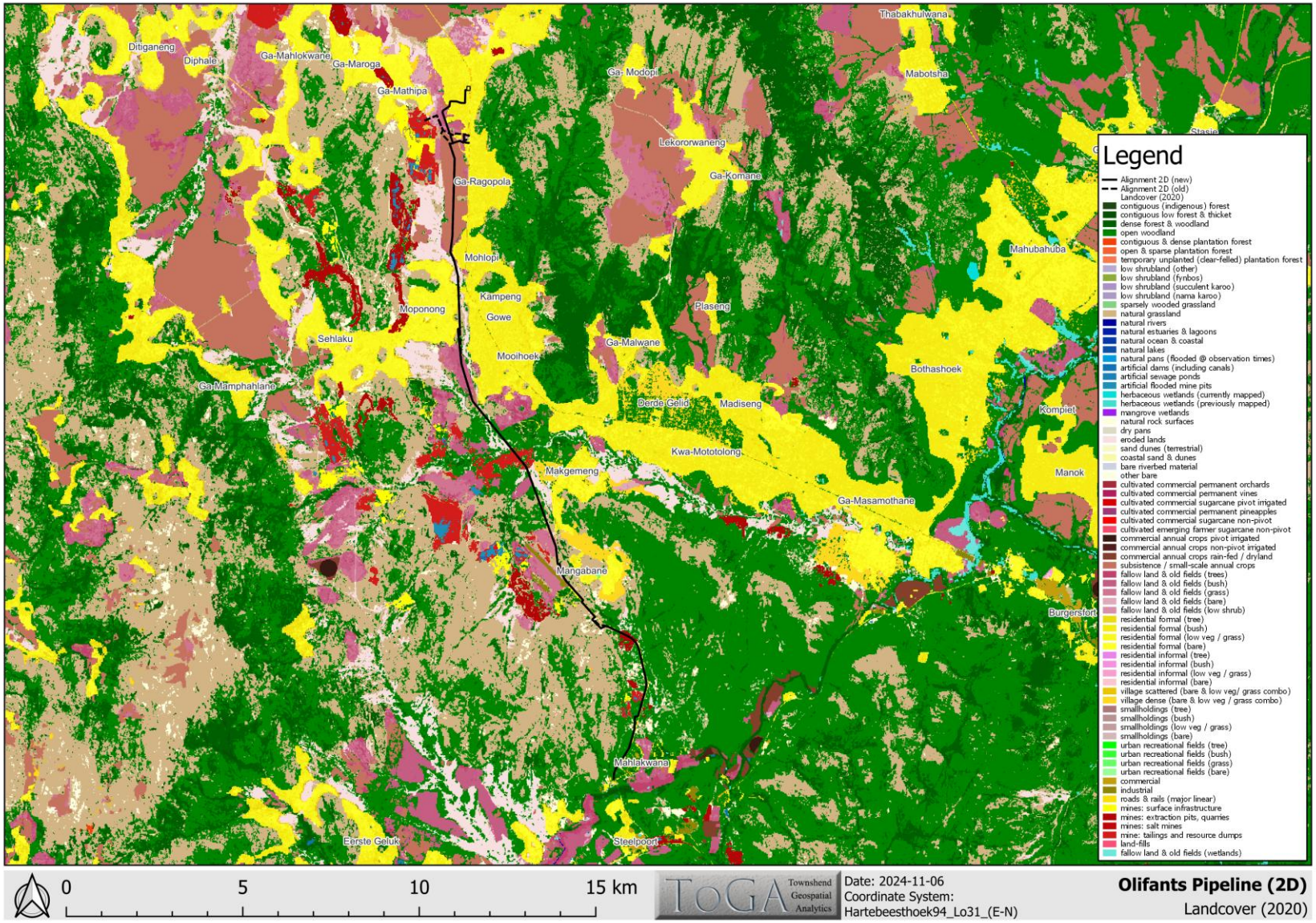


Figure 7-71: Landcover_Phase 2D.

Figure 7-72: Typical vegetation along the D1296, close to Steelpoort.

Figure 7-73: R37 close to the residential area of Seokodibeng.

Figure 7-74: Modikwa platinum tailings with Leolo mountain range in the background.

Figure 7-75: Tobatse Alloy Smelter infrastructure viewed from D4169, close to the Mooihoek WTW.

Figure 7-76: Existing Mooihoek WTW.

Figure 7-77: Typical formal residential house next to the R37.

7.11.2 VISUAL BASELINE

Table 7-54: Summary of the visual baseline.

Visual receptors
Receptors for visual impacts are potential viewers of the proposed development and receptor sensitivity refers to the degree that a development affects people. This depends on the number of people viewing the project and their perceptions of the study area. Perception of an object is linked to the purpose for which a viewer is present in the study area (i.e. the reason for their visit). The sensitivity of a particular individual to the visual impact of a proposed development may, therefore, also vary over time as they experience different features and land uses in the area. The sensitivity of viewers is determined by the number of viewers and by how likely they are to be impacted upon. It is also dependent on their perception of the area and their ability to adapt to changes in their environment and can include how frequently they are exposed to the view. A visual receptor's sensitivity is based upon the viewer's: • Familiarity with the actual scene; • Circumstances that bring them into contact with that view; and • Nature of the view (full or glimpsed, near or distant). Receptor sensitivity is therefore expressed as follows: • High sensitivity – e.g. nature reserves, coastal areas and scenic routes or trails; • Moderate sensitivity – e.g. residential areas, agricultural areas, sporting / recreational areas or places of work; and • Low sensitivity – e.g. industrial, mining or degraded areas. The criteria used to define receptor sensitivity are summarised in **Table 7-55** below.

Table 7-55: Receptor perception.

Receptor perception	Criteria
High	People attach a high value to aesthetics, such as in or around a game reserve, coastal areas, scenic routes or conservation areas, and the project is perceived to significantly impact on this value of the landscape.
Moderate	People attach a moderate value to aesthetics, such as neighbourhoods and smaller towns, where natural character is still plentiful and in close range of residency.
Low	People attach a low value to aesthetics, when compared to employment opportunities. Environment has already been transformed.

For the BPR, the main views to the proposed infrastructure will be from people traveling on the R37 and views from residential areas. Sensitive receptors typically include residential areas, tourist facilities and recreational facilities.

For access roads, the main views will be from people traveling along the R37, D1296 and local residents traveling on smaller roads crossing and joining these access roads.

Due to the visually minimal invasive proposed infrastructure, the possible positive perception for local job opportunities and the already transformed environment, the overall receptor sensitivity will be low.

Visibility
Visibility is determined by the distance between the proposed project and the visual receptor. The visibility or viewshed/ZTV of the project is the area from which the project will be visible and includes all the major observation sites. The viewshed is theoretical as it assumes a direct line of sight between any point within the viewshed and the object being viewed, (i.e., it does not consider screening elements such as buildings and vegetation). A GIS was used to generate the viewshed analyses for the proposed BPR. The system has 3D topographical modelling capabilities, including line-of-sight analysis. For this project, the viewshed analysis was generated by means of existing contours and pre-determined specific points in the landscape. The visibility of the proposed BPR and its influence on visual impact is rated using the criteria listed in **Table** 7-56 below.

Table 7-56: Visibility classes.

Class	Description
Highly visible	Clearly noticeable within the observer's view frame 0 - 0,5 km
Moderately visible	Recognisable feature within the observer's view frame 0,5 - 1,5 km
Marginally visible	Not particularly noticeable within the observer's view frame 1,5 - 3 km
Hardly visible	Practically not visible unless pointed out to observer beyond 3 - 5 km

View from the south
From the R37, views open after a clump of trees and an open parcel of land. Approximately 100 m from the proposed site.

View from the north
From the R37, views open up approximately 200 m from the proposed site, after passing a series of buildings.

View from the east
The Strydpoort mountains obscure views from the east, the receptors from the first row of residential houses next to the R37 will have a full view towards the BPR, however, views will be limited for stationary receptors located further east.

View from the west
The BPR will be highly visible from the gravel roads running parallel to the western site boundary. Visibility will drastically decrease for receptors located more than 200 m away.

Visual exposure

Visual exposure refers to the geographic area from which the proposed project will be visible and is defined by the degree of visibility of a proposed project from various receptor sites. According to Hull and Bishop (1998), the visual exposure of the proposed project is based on the distance from the proposed source of impact and usually (depending on the type of infrastructure) fades out beyond 7 km (in this case the estimated visual exposure will not be more than 5 km). The visibility of an object decreases exponentially over distance and accordingly visual impact will diminish as the viewer moves away from the object being viewed. It is also important to note that the actual zone of visual influence (ZVI) of the proposed project may be smaller than indicated because of screening by existing vegetation and infrastructure. The influence of diminishing visual exposure over distance is shown below in **Figure** 7-78.

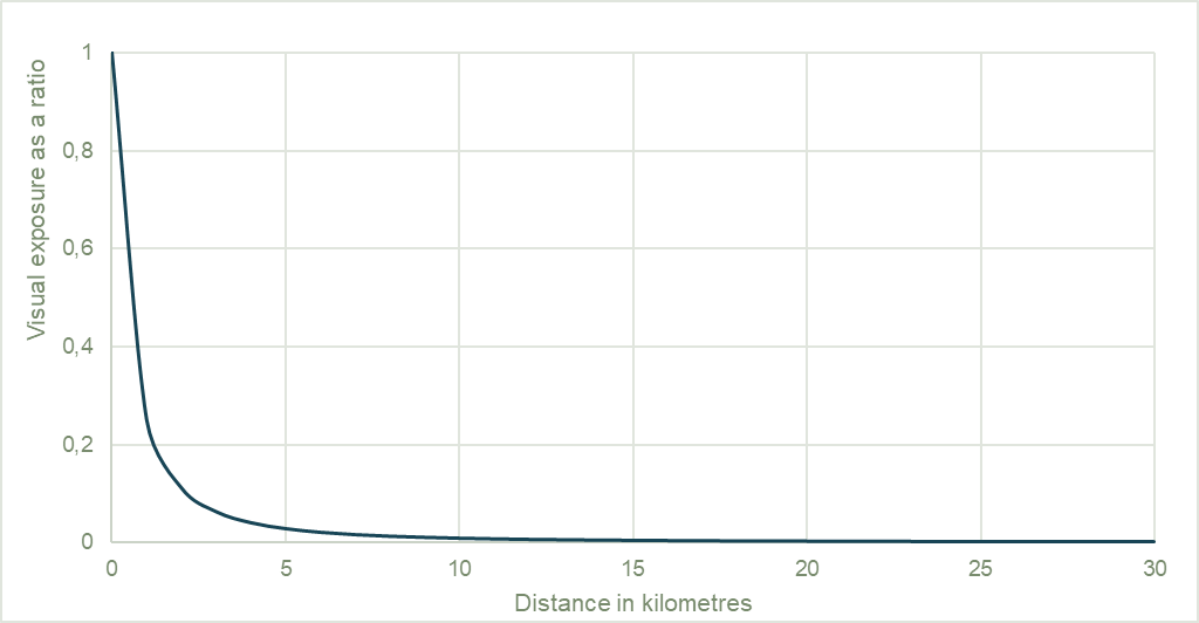


Figure 7-78: Visual exposure (Hull and Bishop, 1988).

For new access roads, it is highly likely that visual exposure (and therefore visibility) will be more intensely experienced during the construction phase of the project due to the larger concentration of activity and construction machinery/vehicles.

Viewshed analysis

The viewshed analysis calculates the geographical locations from where the proposed project might be visible (views towards the proposed infrastructure). This potential visual exposure of the project has been modelled by creating a digital terrain model (DTM) from contour data (20 m intervals, obtained from the Surveyor General) and applying a viewshed analysis using GIS software, whereby all areas with a line of sight towards the proposed project are indicated. It must be noted that the heights of existing infrastructure and vegetation are not included in the calculation of the viewshed as these factors have too much variability in terms of seasonal change and possible land use changes. It is therefore important to bear in mind that the proposed development will not be visible from all points within the viewshed, as views may be obstructed by visual elements, whereby such intervening objects will modify the viewshed at ground level. Based on this information and together with the site visit it has been confirmed that the visual envelope of the proposed development is smaller than the theoretical viewshed analysis

(especially in a northern, southern and western direction) as indicated in **Figure** 7-79 below. This is mostly as result of the rural typology providing sufficient screening towards the proposed infrastructure.

Table 7-57: Key observation points.

Key observation points					
This tale indicates the Key Observation Points (KOPs) identified during the site visit (**Figure** 7-80 **- Figure** 7-87). The viewpoints were not randomly selected but were chosen because they are likely to best represent the visibility (or the lack thereof) of the infrastructure to receptors. KOP7 and KOP8 is a representation of the typical type of access road.					
KOP	**Particular infrastructure**	**Location**	**Visibility**	**Receptor sensitivity**	**Transient or Stationary**
1	BPR	24°32'19.11"S 30° 9'38.82"E On the R37, opposite the proposed site	Full	Low	Transient
2	BPR	24°32'21.77"S 30° 9'40.03"E From Ga Raphola settlement, opposite the BPR	Partial	Low	Stationary
3	BPR	24°32'21.11"S 30° 9'32.13"E From a local road west of the proposed BPR.	Partial	Low	Stationary
4	BPR	24°32'6.96"S 30° 9'45.51"E From Ga Raphola settlement, opposite the BPR	Obscured	n/a	Stationary
5	Realignment of pipeline servitude	24°33'1.93"S 30° 9'16.57"E From the D1469 Photo number 799	Partial	Low	Transient
6	Realignment of pipeline servitude	24°32'51.72"S 30° 9'12.47"E Close to Maputle Secondary school	Full	Low	Transient
7	Access road (existing road)	24°34'11.46"S 30° 9'34.44"E From the R37	Full	Low	Transient
8	Access road (new road)	24°41'5.02"S 30°12'27.91"E Along the R37	Full	Low	Transient

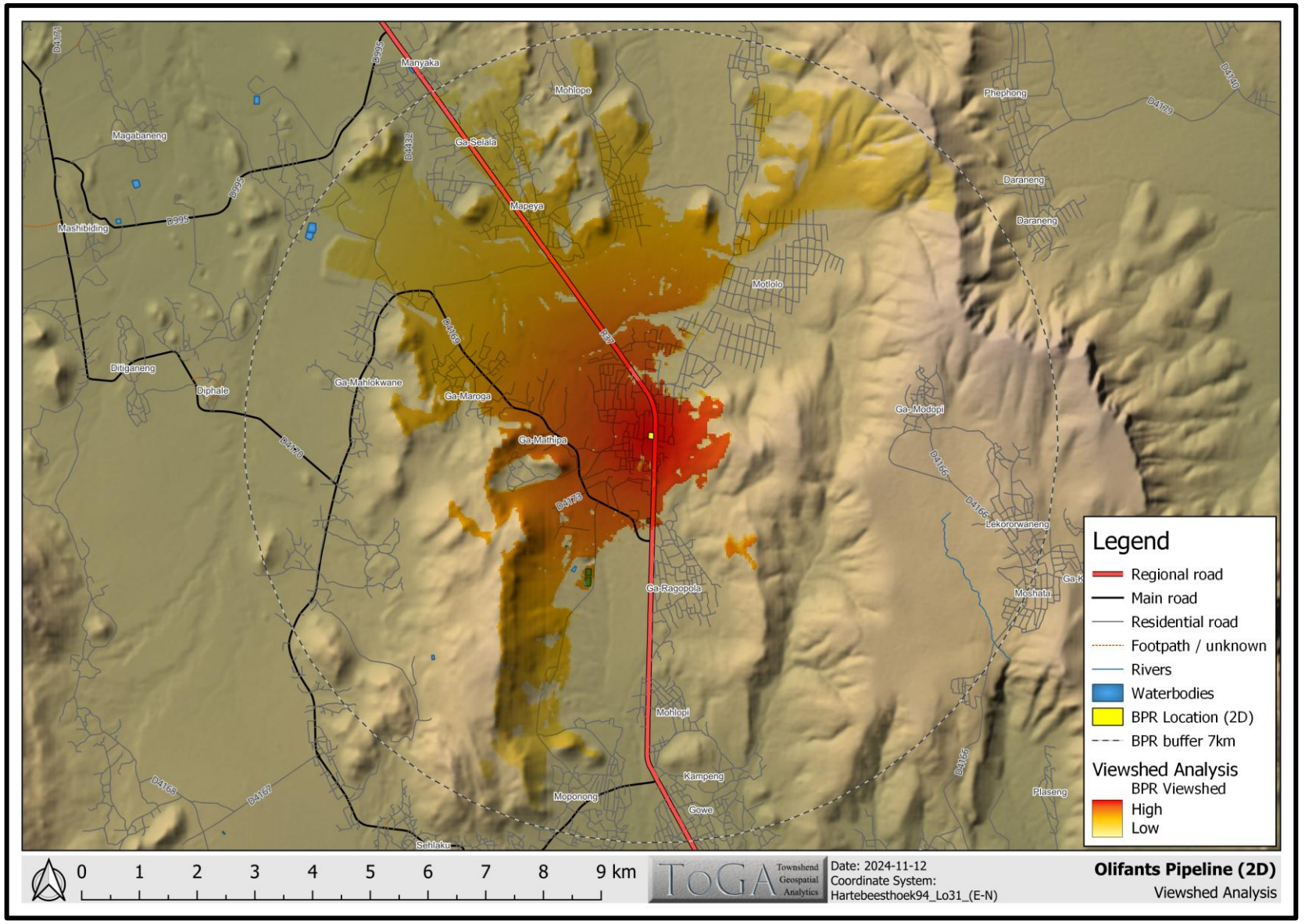


Figure 7-79: BPR Viewshed.

Figure 7-80: KOP 1

Figure 7-81: KOP 2

Figure 7-82: KOP 3

Figure 7-83: KOP 4

Figure 7-84: KOP 5

Figure 7-85: KOP 6

Figure 7-86: KOP 7

Figure 7-87: KOP 8

7.11.3 IMPACT ASSESSMENT

After conducting the site visit the specialist confirmed that, based on the wider study area, there will be no additional or an increase in landscape and visual impacts for:

- The proposed realignment of sections of the pipeline servitude; and
- The use of existing access roads for Phase 2D (best practice guidelines are, however, given under Section 11 of the LVIA report).

7.11.3.1 Landscape Impacts

Landscape impacts relate to physical changes to the landscape resulting from proposed development, that is changes to the landscape character and the landscape as a resource.

7.11.3.1.1 Impact on Landscape Character and Sense of Place

This impact is a change in the landscape character and sense of place of the study area through the addition of industrial-type infrastructure. The proposed development will add to the light industrial components in the landscape, resulting in negative changes to the landscape's character and sense of place.

Table 7-58: Summarised impacts: Landscape character and sense of place.

Infrastructure	Impact significance: Construction phase		Impact significance: Operational phase	
	Before mitigation	After mitigation	Before mitigation	After mitigation
BPR	Low negative	Very low negative	Low negative	Very low negative
Widening and construction of new access roads	Very low negative	Very low negative	N/A	N/A

7.11.3.1.2 Visual Intrusion and VAC

The level of compatibility and the ability of the landscape to visually absorb the proposed infrastructure, including contrasts in form, line, colour, and texture resulting from vegetation clearing.

Table 7-59: Summarised impacts: Visual intrusion and VAC.

Infrastructure	Impact significance: Construction phase		Impact significance: Operational phase	
	Before mitigation	After mitigation	Before mitigation	After mitigation
BPR	Low negative	Low negative	Low negative	Low negative
Widening and construction of new access roads	Very Low	Very Low	N/A	N/A
BPR (residents within proximity)	Moderate negative	Low negative	Moderate negative	Low negative

7.11.3.2 Visual Impacts

Visual impacts relate to the recording of existing views and the determination of potential impacts as perceived by those living, working, and visiting the area. Infrastructure within visually significant locations will detract from the existing cultural landscape and interfere with the viewsheds of receptors, including road users of main roads such as the R37 and local village settlements in proximity to the proposed infrastructure. The sections below present the results of the findings for each potential visual impact identified. Landscape scarring from exposed and cleared areas during the construction phase of the project may also contribute to visual impacts in localised areas.

7.11.3.2.1 Impact on Visual Exposure and Visibility

The visibility and presence of a cleared servitude and associated infrastructure.

Table 7-60: Summarised impacts: Visual exposure and visibility.

Infrastructure	Impact significance: Construction phase		Impact significance: Operational phase	
	Before mitigation	After mitigation	Before mitigation	After mitigation
BPR	Low negative	Low negative	Very low negative	Low negative
Widening and construction of new access roads	Very Low	Very Low	N/A	N/A
BPR (residents within proximity)	Moderate negative	Low negative	Moderate negative	Low negative

7.11.3.2.2 Night time lighting

The proposed infrastructure's contribution to sky glow and night time lighting in the area.

Table 7-61: Summarised impacts: Night time lighting.

Infrastructure	Impact significance: Construction phase		Impact significance: Operational phase	
	Before mitigation	After mitigation	Before mitigation	After mitigation
BPR	N/A	N/A	Low negative	Low negative
BPR (residents within proximity)	N/A	N/A	Low negative	Low negative

7.11.4 MITIGATION MEASURES AND RECOMMENDATIONS

Few landscape and visual mitigation measures are feasible with infrastructure with such a geographical spread. It is usually impossible to apply mitigation measures entirely satisfactorily to a point where the significance of the visual impact is greatly reduced. The following recommended mitigation measures are therefore primarily intended to minimise the intensity of the landscape and visual impacts but will not necessarily lower the overall significance.

7.11.4.1 Planning and Construction Phase

The most significant landscape and visual impacts will result during the construction phase and are likely to be from erosion and visual scarring of the landscape from clearing areas for access roads and work areas. Where access roads will not be used on a permanent basis, clean-up from site and rehabilitation monitoring is required to ensure that the mitigation measures are implemented to an acceptable level in order that long term rehabilitation is successful.

There is thus a need to carefully monitor the progress of the physical aspects of rehabilitation (soil stripping, overburden handling, landform development, and soil replacement) during the construction and defects liability phases, and the progress of re-establishment of the desired final land use (i.e. to a state where the land use is as close to the pre-construction environment as possible). Implementing rehabilitation in a phased manner simultaneously with the progression of construction for those works areas and applicable access roads that are no longer required will provide a longer lead time for monitoring of rehabilitation before the defects liability period is completed.

7.11.4.1.1 Break Pressure Reservoir

7.11.4.1.1.1 Design

- The top height of the BPR should be kept as low as technically feasible; and
- The current design suggests either a vegetated earth embankment dam or a raw concrete structure. Considering this, the following is suggested:
  - The successful establishment of vegetation on the slopes (especially during dry periods which are currently experienced on site as well as the possibility of flash floodings associated with long, dry periods) is questionable. The possibility of natural rock cladding/packing should be investigated as this will ensure immediate stability and it will blend in with the overall brown colour tones of the landscape; and
  - If a raw concrete finish structure is preferred for the embankment, a reddish-brown pigment must be mixed with the concrete to blend in with existing colours in the landscape.

7.11.4.1.2 New/Widening of Access Roads

7.11.4.1.2.1 Natural form and shape

- New access roads should avoid straight edges and corridors, and rather complement/reflect the physical shape of the landscape through which they pass; and
- Any spoil remaining from the construction of the access roads, as well as the fill areas below the constructed road should be shaped to reflect the natural terrain/contours and tie into/ blend with the surrounding landscape.

7.11.4.1.2.2 Minimising the risk of erosion

- Avoid cutting across and down steep slopes;
- Develop a method statement for post-construction rehabilitation that includes aspects such as:
  - Land restoration;
  - Topsoil storage and replacement;
  - Erosion control through feasible sediment and erosion control devices;
  - Alien plant control; and reseeding or revegetation (if applicable) as well as post-construction monitoring of erosion and rehabilitation; and
  - The use of indigenous species for restoration.
- The use of heavy machinery in areas that are outside of the access road area must be avoided to protect soils from erosion and compaction;
- Reduce slope gradients as far as possible along road cuts and disturbed areas to gradients at or below the angle of repose of those disturbed surfaces; and
- Use drainage control measures and culverts to manage the natural flow of surface runoff.

7.11.4.1.2.3 Routing

- Delineate routes prior to clearing tracks to minimise disturbance footprints and to ensure correct tracks followed by contractors; and
- Route access roads around larger vegetation patches, especially where it is located close to a village settlement.

7.11.4.1.3 All Work Areas

7.11.4.1.3.1 Protection of natural features

- The contractor shall not deface, paint, damage or mark any natural feature (e.g., rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand with the Engineer/ECO. Any features affected by the contractor in contravention to the above shall be rehabilitated/restored to the satisfaction of the Engineer /ECO.
- Develop a site layout and clearance plan that indicates the footprint of site clearance including topsoil stockpile zones, areas for vehicular access, parking and turning zones for construction equipment in order to minimise multiple tracks and areas of disturbance. Access to areas outside of the demarcated areas should be treated as no-go areas;
- Demarcate works areas by means of rocks and/or use of stakes and construction tape.

7.11.4.1.3.2 Protection of topsoil

- Retain and reuse soils for reinstatement and rehabilitation of disturbed areas, topsoil must be separated from subsoil during excavation and replaced as the topsoil layer upon backfilling or reused elsewhere for rehabilitation.
- Monitoring of the effectiveness of rehabilitation will be undertaken throughout construction as phased rehabilitation is implemented in accordance with the proposed Method Statement and/or Rehabilitation Plan developed by the contractor and approved by the ECO/ Engineer. Aspects that need to be monitored and corrective action taken include:
    - Erosion
    - Surface water drainage
    - Vegetation basal cover
    - Vegetation species diversity
    - Presence and abundance of invasive plant species.
- To minimise compaction associated with stockpile creation, it is recommended that the height of stockpiles be restricted to 2 m maximum; and
- Locate all topsoil stockpiles in areas where they will not have to be relocated prior to replacement for final rehabilitation. All stockpiles should be clearly demarcated and protected.

7.11.4.1.3.3 Housekeeping

- Active work areas should be well maintained and clean, they must be free of litter and other wastes; and
- Temporary construction signs and barricading must be removed as soon as the particular activity or set of activities are complete and in accordance with health and safety requirements.

7.11.4.2 Operational Phase

Mitigation for operational impacts is ensuring long-term erosion risks from construction areas, especially along steeper topographical areas. Additional measures such as low stone walls or gabions may need to be implemented in order to reduce these risks. Mitigation can be done by implementing measures to either reduce the visibility of larger structures such as the BPR by placing visually appealing, or visually less disruptive elements between the viewer and the proposed infrastructure.

7.11.4.2.1 BPR

7.11.4.2.1.1 Visibility and Visual Intrusion

- Fences must be of a robust permeable mesh type in a dark grey or green colour. Razor wire, palisade fencing, shiny galvanized or white coloured fencing must be avoided for permanent security fencing around the BPR and associated infrastructure. Electrification and isolators to be in matching colour;
- All necessary signage should be grouped together, be limited in size, and its colours and finishes should be chosen for their appropriateness to the colours of the site and its semi-rural nature. The use of corporate colours and logos is excluded from this;
- Where surfaces on buildings are painted it should be darker muted earthy colours which blends in with the landscape environment as represented throughout the largest part of the year such as shades of khaki brown, grey brown or olive green;
- Steel roof sheets or tiles must be a dark colour such as khaki brown, grey brown or olive green, bright and light colours like red, white, blue, yellow, and orange must be avoided;
- The use of highly reflective material should be avoided, and any metal surface should be painted to fit into the surrounding environment in a colour that blends in effectively with the background. White structures are to be avoided as these will form a significant contrast with the natural surroundings;
- It is recommended that the security fence be offset from all surrounding roads and that a green buffer be kept in place between the R37 and the BPR;
- Once the final position for the reservoir has been determined, proper pre-construction planning must be undertaken by a qualified landscape architect, this includes a master plan indicating the proposed layout and placement of infrastructure and green buffer zones in relation to existing residential houses;
- All existing large trees (stem diameter of 150 mm or more) that fall outside the earthworks area (on the perimeter of the site) must be retained as they will assist in softening the forms of built structures.

7.11.4.2.1.2 Lighting

- All lighting is to be kept to a minimum within the requirements of safety and efficiency;
- Low level lighting or limit mounting heights of lighting fixtures by utilising footlight or bollard level lights. The use of high light masts and high pole top security lighting should be avoided along the security fence of infrastructure areas. Any high-level masts should be covered to reduce glow and light spillage;
- Use minimum lumen or wattage in light fixtures, where possible and practical;
- Uplighting of structures must be avoided where possible, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass;
- No unshielded light source is to be directly visible on any exterior surface or facade -, except for reflected light;
- All buildings must have “full cut off” light fixtures that direct light only below the horizontal;
- Use low pressure sodium lamps, yellow Light Emitting Diode (LED_2) lighting, or equivalent to reduce sky glow (Bluish-white lighting is more likely to cause glare); and
- Make use of motion detectors on security lighting in offices and workshop areas.

7.11.4.2.2 Re-routing of Sections of the 2016 Pipeline

7.11.4.2.2.1 Ongoing Rehabilitation

- Additional long term mitigation measures of the pipeline servitude include the reinstatement of the of the backfilled pipeline trenched to its original soil condition, with revegetation of the topsoil;
- The pipeline servitude must be periodically monitored in order to determine if the reinstatement of the rehabilitated areas is effective. Problem areas must be addressed, and proper maintenance should be undertaken on an on-going basis; and
- All disturbed areas need to be rehabilitated as soon as possible after construction.

7.11.5 SPECIALIST CONCLUSION

The change in the landscape character of the study area is mostly a result of the removal of some of the sparsely located existing natural vegetation which remains within the study area. A variety of shapes, lines, textures, and patterns are visible in the landscape, this is mostly a result of the variety of land uses such as mining infrastructure, residential infrastructure, open degraded areas and other typical urban infrastructure (such as overhead transmission lines) which increases the overall VAC and reduces the proposed infrastructure's visual intrusion upon the landscape.

The most important views will be from the R37 and the immediate areas next to the proposed BPR. Visibility and visual exposure will be limited, mainly due to the urban built form. Longer range views could be possible where receptor quantities are lower i.e., from the west, however, the visual impact will be lowered due to the distance. Visibility will not extend significantly to the east as a result of the topography and residential houses and existing lights from the R37 and residential houses will lower the overall BPR's lighting impact on drivers.

The most affected receptors are those residing in the settlement of Ragapola, especially those residing directly next to the proposed BPR site. As a result of the rural character with a mix of juxtaposed built forms, the visual envelope will be smaller than indicated in the viewshed and overall visibility will be lower than theoretically indicated.

During construction the landscape and visual impacts remain very low - low as the overall duration is expected to be limited, however, the intensity of the anticipated landscape and visual impacts is expected to be highest during the peak construction phase of the project.

Landscape and visual impact are expected to be very low - low during the operational phase, this is mainly due to the low visual intrusion of proposed infrastructure as a result of existing mining and related industrial elements evident throughout the study area.

The vegetation cover of the region is the most important element in the construction and operation of the proposed BPR and associated infrastructure and should be regarded as an important component during the mitigation of the proposed infrastructure.

With reference to Oberholzer, B. (2005) minimal landscape and visual impact is expected, after the site visit and specialist assessment the overall combined anticipated landscape and visual impact is also expected to be minimal and from a visual perspective it is not fatally flawed, this is largely as a result of:

- Existing mining and industrial infrastructure within the study area. This includes the Mooihoek WTW, (located less than 2 km from the proposed BPR). Larger, visually more intrusive mining infrastructure located within 2 km from the proposed BPR which includes various chrome and platinum open pit mines, tailing dams and waste rock dumps. Earlier unsuccessful mining activities, without any attempt at rehabilitation, resulted in extensive damage to the immediate environment, which is visible as scars on many of the hills and mountains of the region;
- The relatively small visual envelope due to the nature of some of the proposed infrastructure (access roads and pipeline servitude with no significant height);
- The low receptor sensitivity;
- The majority of receptors are in transit;

- The majority of proposed access roads are existing roads;
- The dispersed nature of built infrastructure offers some screening from a variety of areas within the study area (except for residents residing directly next to the site). It is anticipated that no other sensitive stationary receptors will be directly affected;
- The proposed infrastructure is not a dominant and significant component in the landscape and blends in well with existing urban forms, colours and textures;
- The assumption that some access roads will be temporary and will after rehabilitation blend in with the existing landscape as natural vegetation is sparsely scattered; and
- No additional and increased landscape and visual impact for the realignment of the pipeline and impacts remain as per previous LVIA, (land use, landcover and receptor type remain largely homogenous as proposed deviations are close (maximum of 400 m) to the authorised alignment.

From a visual perspective, the proposed project does not heavily impact landscapes of significant symbolic, aesthetic, cultural and historical value, however, every possible effort should be made to make the BPR, new sections of access roads and pipeline servitude blend in with the existing environment. Considering this, the implementation of all other mitigation guidelines will lower the intensity of the landscape and visual impacts but will in most cases not lower the overall impact significance.

7.12 TRAFFIC IMAPCT ASSESSMENT (ZUTARI, 2024)

A TIA was conducted by Zutari. In 2010, Zutari was commissioned to conduct a Baseline Traffic Impact Study for Phase 2 of the project as part of the EIA process. In 2012, Zutari was reappointed to update the study for Phases 2C and 2I, followed by further updates in 2016 for Phases 2B, 2D, 2E, and 2F.

An updated traffic study was required to support this BA process for the pipeline realignment and associated infrastructure.

A site visit was conducted from the 28th of October to the 30th of October 2024, to assess the current conditions of the road network layout and intersection geometry.

7.12.1 KEY INTERSECTIONS

In addition to the proposed construction and operation accesses, the key road networks affected by Phase 2D transport activities include: R37, D1296, D1392, D1297, D4167 and D4169. The key intersections listed below were considered for the study area.

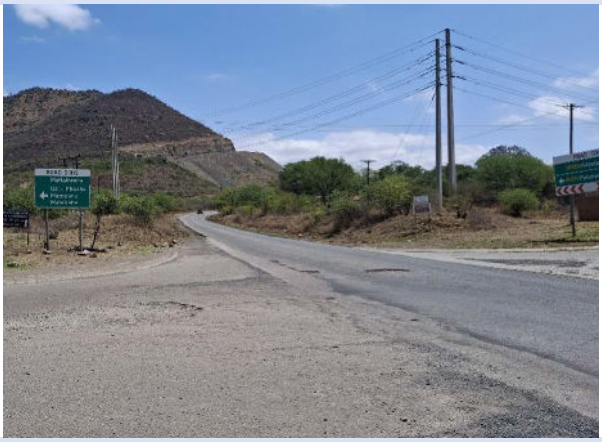
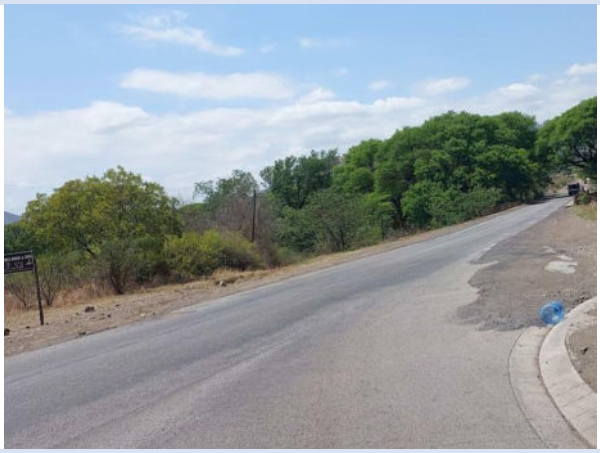
- Intersection 1: D1296 / D1392
- Intersection 2: D1296 / Samancor Access
- Intersection 3: R37 / D1297
- Intersection 4: R37/ Unnamed Road
- Intersection 5: R37 / D4167
- Intersection 6: R37 / D4169

7.12.2 EXISTING CONDITIONS

7.12.2.1 Affected Road Network

Table 7-62: Affected Road Network.

Existing Road Conditions
R37

	The R37 is a major Class 2 arterial road under SANRAL's jurisdiction, forming the backbone of the Dilokong Corridor between Polokwane and Nelspruit, via Burgersfort and Lydenburg. It supports significant economic and mining activity. In the study area, the R37 is mostly a single carriageway with bus stops near intersections. The speed limit is 100 km/h, reduced to 60–80 km/h in residential zones due to pedestrian and livestock presence. The road experiences high freight volumes from nearby mining operations and villages. While some sections are being expanded, upgrades are limited. Frequent use by minibus taxis and buses highlights its importance in public and commercial transport.
D1296	
	The D1296 is a Class 3 district distributor under the Tubatse Local Municipality, connecting the R555 to the R37. It is a single carriageway with one lane in each direction and no shoulders. The operating speed is between 70–80 km/h. While generally in fair condition, some sections have deteriorated to poor.
D1392	
	The D1392 is a Class 4 road that starts at its intersection with **D2219** and ends at D2219. It provides access to several developments, including the Steelpoort Pump Station. The road is in fair condition, with no visible speed limit signage.
Unnamed Road	
	The unnamed road is a Class 5 single carriageway providing access to Temothuo Farms and nearby residential properties. It intersects with the R37 and is in poor condition, including a bridge about 400 m from the intersection that is also in poor condition.

D4167	
	The D4167 is a Class 4 municipal district collector road, with a single carriageway and one lane in each direction. It has a speed limit of 60 km/h. The proposed pipeline alignment will cross the D4167 approximately 0.5 km from its intersection with the R37.
D4169	
	The D4169 is a Class 4 district collector road under the Tubatse Local Municipality. It is a single carriageway with an operating speed of 60 km/h, located near the existing Mooihoek reservoir and the proposed new reservoir. The proposed pipeline alignment intersects the D4169 approximately 1 km from its intersection with the R37.

7.12.3 PROPOSED ACCESS ROADS AND ROAD MAINTENANCE CONSIDERATION

7.12.3.1 Proposed Access Considerations

The table below details the proposed access roads and proposed alternatives as given in the TIA report.

Phase 2D Pipeline	
Access 01b	**Access Location** Access 1b is proposed to be obtained from the Steelpoort WTW. **Access Spacing** The proposed access is from the existing Steelpoort WTW development; therefore, access spacing considerations are not relevant. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions expected to hinder visibility.
Access 01a	**Access Location** Access 01a is an existing access along an informal road off the D1296, west of the road towards the pipeline alignment. **Access Spacing** The proposed access is along an existing informal road. The minimum spacing requirements along Class 3 roads are 600 m ± 20%. The access is approximately

	400 m from the existing intersection at a curve. It is proposed that this access be moved about 300 m north to form a fourth leg at an existing intersection, to meet the minimum spacing requirements and to address sight distance issues. **Sight Distance** The horizontal alignment could present obstructions to hinder visibility due to the current proposed access being on a curve.
Access 09	**Access Location** Access junction 3 is proposed along a gravel road off the D1296, west of the road towards the pipeline alignment. The access junction is approximately 100 m from the D1296. **Access Spacing** The proposed access is along an existing intersection, and therefore access spacing consideration is not relevant. **Sight Distance** The vertical and horizontal alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 03a	**Access Location** A new access is proposed at approximately 3.8 km north of access junction 1 along the D1296. **Access Spacing** The minimum spacing requirements along Class 3 roads is 600 m ± 20% in urban areas and 1.6 km in rural areas. The proposed access is approximately 1.9 km north of the closest existing access. **Sight Distance** The vertical and horizontal alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 04a	**Access Location** A new access is proposed is approximately 3.7 km south of the R37/ D1296 intersection. **Access Spacing** The minimum spacing requirements along Class 3 roads is 600 m ± 20% in urban areas and 1.6 km in rural areas. The proposed access is approximately 1.7 km north of proposed access road 4. **Sight Distance** The vertical and horizontal alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 10	**Access Location** A new access point is proposed approximately 400 m south of the D1296/Samancor intersection. While the ideal location for access would have been at the D1296/Samancor intersection, this is not feasible due to existing private access to the west of the intersection. To reduce congestion at the newly proposed location, it is recommended to permit partial access to the west, while access to the east can be provided through Access 6 (D1296/Samancor intersection) to help prevent congestion in this area. **Access Spacing**

	The access is approximately 400m from Intersection as opposed to the require 480m for the semi urban environment at this location. Given the access constraints, the recommended T-junction is a mitigation measure as T-junctions inherently involves simpler traffic flow compared to a four-legged intersection, reducing the potential for congestion. **Sight Distance** The vertical and horizontal alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 11	**Access Location** Access 11 is an existing access that is opposite the Samancor Eastern Chrome Mines entrance. **Access Spacing** The access is at an existing intersection, therefore access spacing is not relevant. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 12	**Access Location** Access 12 is a proposed access along the D1296. **Access Spacing** The minimum spacing requirements along Class 3 roads is 600 m ± 20% in urban areas. Access 12 is proposed approximately 400 m from an existing access, which is slightly less than the recommended minimum spacing. However, this reduced spacing can be justified due to the low traffic volumes and low traffic speeds in the area. The reduced volumes mean that the demand for access is minimal, which reduces the likelihood of congestion or operational issues at this point. Additionally, the low traffic speeds further mitigate any potential safety concerns, as drivers have more time to react to vehicles entering or exiting the access. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 01	**Access Location** The access is proposed along the D1296, west of the road towards the pipeline alignment. The access is approximately 1.8 km north of the junction between the D1296 and the Doornbosch village access road and the Samancor Eastern Chrome Mines access road, with no formal roads within a 1.6 km distance to the north. There are a lot of informal road accesses along the D3600, primarily used for pedestrian movement. **Access Spacing** The minimum spacing requirements along Class 3 roads are 1.6 km. The proposed access is approximately 1.8 km north of the closest existing access. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 03	**Access Location**

	Access Road 3 is along a Class 4 road situated approximately 1.8 km from the R37 and 1 km from the Area Village and 700 m from the Modikwa mine road. **Access Spacing** The minimum spacing requirement along Class 4 roads is between 600 – 800 m in rural areas. The proposed access is within the recommended distances from the two existing formal accesses. **Sight Distance** Neither the vertical nor horizontal alignment present any obstructions, nor are there any permanent obstructions that is expected to hinder visibility.
Access 11	**Access Location** Access Junction 4 is proposed along the Class 3 Modikwa mine road approximately 1.5 km from the intersection with the R37. **Access Spacing** The minimum spacing requirements along Class 3 roads are 600 m ± 20% in urban areas and 1.6 km. The access is 160 m from the closest access road. It is proposed that the access is moved 150 m further west to have equal spacing between the two adjacent accesses. **Sight Distance** There are no permanent obstructions that would presumably affect the intersection's sight distance at the new location.
Access 08	**Access Location** Access 8 is located along an Unnamed Road. **Access Spacing** The proposed access is approximately 400 m from the R37. However, this reduced spacing can be justified due to the low traffic volumes and low traffic speeds in the area. The reduced volumes mean that the demand for access is minimal, which reduces the likelihood of congestion or operational issues at this point. Additionally, the low traffic speeds further mitigate any potential safety concerns, as drivers have more time to react to vehicles entering or exiting the access. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 13	**Access Location** Access 13 is located along the R37 through a residential community. It is suggested to provide an alternative route to cause the least disruption to the existing community. **Access Spacing** The minimum spacing requirements along Class 2 roads are 800 m ± 15% in urban areas. However, there are currently various informal intersections that are spaced closely together on this portion of the road. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 05	**Access Location** The proposed access 05 is located on an existing gravel road along the R37.

	Access Spacing The access is along an existing intersection, therefore accessing spacing requirements does not apply. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 06	**Access Location** Access 06 is located along D4169 and provides access to the new reservoir. **Access Spacing** Access 06 is approximately 100 m from the existing access, therefore not meeting the minimum access spacing requirements. However, due to the reservoir access point, it is proposed that this access point be permitted, rand necessary traffic management measures be implemented to minimise impact. **Sight Distance** The vertical alignment presents obstructions that are expected to hinder visibility due to the access being on a curve.
Access 07	**Access Location** Access 7 is located along the D4169, with access points to either side of the road. **Access Spacing** Access 7 is proposed approximately 400 m from an existing access, which is slightly less than the recommended minimum spacing. However, this reduced spacing can be justified due to the low traffic volumes and low traffic speeds in the area. The reduced volumes mean that the demand for access is minimal, which reduces the likelihood of congestion or operational issues at this point. Additionally, the low traffic speeds further mitigate any potential safety concerns, as drivers have more time to react to vehicles entering or exiting the access. **Sight Distance** The vertical alignment does not present any obstructions, nor are there any permanent obstructions that are expected to hinder visibility.
Access 20 and 21	**Access Location** Accesses 20 and 21 are proposed along the R37 to provide direct access to the BPR. Access 20 was proposed as an entry point to the BPR and Access 21 as an exit from the BPR to the R37. **Access Spacing** Accesses 20 and 21 are approximately a 100 m distance from each other. The minimum spacing requirements along a Class 2 urban road is 800 m +-15%. Therefore, it recommended that the BPR gains access from the existing access which is located further along the R37.

7.12.4 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN

7.12.4.1 Construction Phase

The activities, during the construction phase, that may have potential impacts on road capacity, road safety, road conditions, public transport services and Non-Motorised Transport (NMT) facilities are illustrated below.

Interaction	Impact
Construction	Transportation of establishment material, equipment, and employees will have the following impacts: • Increase traffic volumes resulting in a reduction in road capacity; • Increased road safety risk due to increase in heavy vehicles; • Increase public transport; and • increase in NMT demand.

7.12.4.2 Increased Traffic Volumes Resulting in a Reduction of Road Capacity

It is expected that Phase 2D will result in additional traffic being added to the network. Phase 2D is expected to generate about 90 vehicles trips in the AM and PM peak respectively. These traffic volumes will have a low impact on the road network capacity.

7.12.4.2.1 Management Objectives

Implement necessary road upgrades to increase road capacity to ensure that the affected road network operates at better or the same level of service during the establishment phase.

7.12.4.2.2 Management Actions

No action has been recommended to increase the road capacity; however, site management actions should be implemented as per **Table** 7-63.

7.12.4.2.3 Impact Ratings

The impact is expected to be low as shown in **Table** 7-63**.**

Table 7-63: Environmental Impact Rating – Decrease in Road Capacity.

IMPACT DESCRIPTION: Decrease in Road Capacity				
Predicted for project phase:	Construction			
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Impact will last between 1 to 5 years.	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Local	Most of the impact will be on the local road network. Although the development traffic will make use of regional roads, the number of vehicles will not have a noticeable impact on the wider road network.		
Intensity	Low - negative	The expected additional traffic volumes during operation phase, are low in TIA terms, and expected to cause negligible delays.		
Probability	Certain	Increased delays are negative to both the environment and driver behaviour.		
MITIGATION:				
While the impact is classified as a negligible negative, no mitigation measures are deemed necessary, as the effect on road operations is anticipated to be negligible. Notwithstanding the extended timeline, any traffic increases during operation phase are expected to be manageable within the existing infrastructure as the network is operating well below capacity. The analysis suggests that, despite the potential for minor disruptions, the overall functionality of the road network will remain largely unaffected. Therefore, the decision not to implement mitigation strategies reflects the confidence in the road system's capacity to accommodate the projected traffic without significant issues. However, ongoing monitoring will be important to ensure that any unforeseen impacts can be addressed promptly if they arise.				

7.12.4.3 Increase Road Safety Risk

Phase 2D is projected to generate approximately 68 heavy vehicles per day during its construction phase. Heavy vehicles can increase the speed differential on the road network, as they typically travel more slowly and require larger gaps between vehicles for safe manoeuvring. This can lead to a heightened sense of frustration among drivers of lighter vehicles, who may exhibit aggressive behaviour, such as frequent lane changing and overtaking when trailing behind heavy vehicles.

Such dynamics can create significant road safety concerns, as the presence of additional heavy vehicles can lead to increased risks of accidents and collisions. Drivers may misjudge the space needed to pass or fail to anticipate the slower speeds of these vehicles, resulting in unsafe conditions on the road. Therefore, it is essential to consider these factors carefully to mitigate potential safety issues associated with the increased presence of heavy vehicles during the establishment phase of the project.

7.12.4.3.1 Management Objectives

To minimise the risk of injury to other road users on public roads due to heavy vehicles and abnormal load vehicles.

7.12.4.3.2 Management Actions

The following actions are recommended:

- Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, No 93 of 1996 and the National Road Traffic Regulations, 2000 for vehicle using a public road.
- Ensure the transportation of dangerous goods complies with standard specifications prescribed in SABS 1398 “Road tank Vehicles for petroleum-based flammable liquids” or SABS 1518 “Transportation of dangerous goods.
- Heavy vehicle traffic should be discouraged in areas with high pedestrian activity, such as near
- schools. However, if routing through these areas is unavoidable, vehicles must reduce speed and avoid travel during peak pedestrian periods.
- Avoid transporting abnormal load during peak periods.
- Heavy vehicle drivers should attend a specialised road safety and driving course that sensitizes them to the impact that they have on driving conditions for other road users.

7.12.4.3.3 Impact Ratings

The impact is expected to be minor without mitigation, however, with mitigation the impact is expected to be negligible as shown in **Table** 7-64**.**

Table 7-64: Environmental Impact Rating-Road Safety Risk.

<table>
<tr><th colspan="6">IMPACT DESCRIPTION: Road Safety Risk</th></tr>
<tr><td>Predicted for project phase:</td><td colspan="5">Construction</td></tr>
<tr><td colspan="6">PRE-MITIGATION</td></tr>
<tr><td>Dimension</td><td>Rating</td><td colspan="2">Motivation</td><td></td><td></td></tr>
<tr><td>Duration</td><td>Short-term</td><td colspan="2">Construction is anticipated to be completed in less than five years.</td><td rowspan="4">Consequence: Moderately detrimental</td><td rowspan="4">Significance: High - negative</td></tr>
<tr><td>Extent</td><td>Regional</td><td colspan="2">Construction materials are expected to be transport from the wider region to the site.</td></tr>
<tr><td>Intensity</td><td>High - negative</td><td colspan="2">Generally, heavy vehicles/ abnormal load vehicles are slower and require larger gaps and follow-up headways. There is a risk of drivers taking less than optimal gaps to overtake.</td></tr>
<tr><td>Probability</td><td>Certain</td><td colspan="2">It is probable that increased number of heavy vehicles on the network could trigger some deterioration in the road safety conditions on the regional road network.</td></tr>
<tr><td colspan="6">MITIGATION:</td></tr>
</table>

- Ensure heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations, 2000 for vehicle using a public road.
- Ensure the transportation of dangerous goods complies with standard specifications prescribed in SABS 1398 “Road tank Vehicles for petroleum-based flammable liquids” or SABS 1518 “Transportation of dangerous goods.
- Heavy vehicle traffic should be discouraged in areas with high pedestrian activity, such as near schools. However, if routing through these areas is unavoidable, vehicles must reduce speed and avoid travel during peak pedestrian periods.
- Avoid transporting abnormal load during peak periods.
- Heavy vehicle drivers should attend a specialised road safety and driving course that sensitises them to the impact that they have on driving conditions for other road users.

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Construction is anticipated to be completed in less than five years.	Consequence: Moderately detrimental	Significance: Very low
Extent	Regional	Site establishment materials are expected to be transport from the wider region to the site.		
Intensity	Moderate - negative	With mitigation measures, the severity of road safety impact by heavy vehicles is expected to decrease.		
Probability	Very unlikely	The probability of the road safety conditions deteriorating is likely to be reduced with implementation of the recommended mitigation measures.		

7.12.4.4 Increase in Public Transport and NMT Demand

NMT (walking and other) account for 140 person trips, therefore there is public transport and NMT infrastructure demand.

7.12.4.4.1 Management Objectives

Provide adequate public transport services, public transport facilities and NMT infrastructure that would meet public transport and NMT users’ needs.

7.12.4.4.2 Management Actions

During the pipeline construction, it is recommended to implement temporary pedestrian and public transport infrastructure to ensure safety and minimise disruptions. This includes creating well-marked pedestrian walkways, providing safe crossings, and establishing temporary public transport stops with clear signage. Additionally, monitoring the effectiveness of these measures is essential to address any safety concerns and ensure continued mobility for pedestrians and public transport users throughout the construction period.

7.12.4.5 Impact Ratings

The impact is expected to be negligible with and without mitigation measures as shown in **Table 7-65**.

Table 7-65: Environmental Impact Ratings - Public Transport and NMT Demand.

<table>
<tr><th colspan="5">IMPACT DESCRIPTION: Public Transport and NMT Demand</th></tr>
<tr><td>Predicted for project phase:</td><td colspan="4">Construction</td></tr>
<tr><td colspan="5">PRE-MITIGATION</td></tr>
<tr><td>Dimension</td><td>Rating</td><td colspan="3">Motivation</td></tr>
<tr><td>Duration</td><td>Short-term</td><td>Construction is anticipated to be completed in less than five years.</td><td rowspan="4">Consequence: Slightly detrimental</td><td rowspan="4">Significance: Very low</td></tr>
<tr><td>Extent</td><td>Site-specific</td><td>Most of the impact will be on site and the immediate local road network.</td></tr>
<tr><td>Intensity</td><td>Moderate - negative</td><td>There is currently pedestrian and cycling activity in the vicinity of the site. Phase 2D is expected to generate NMT trips (public transport users walking from and to public transport drop off).</td></tr>
<tr><td>Probability</td><td>Unlikely</td><td colspan="2">Additional NMT trips are generated by employee’s construction.</td></tr>
<tr><td colspan="5">MITIGATION:</td></tr>
<tr><td colspan="5">During the pipeline construction, it is recommended to implement temporary pedestrian and public transport infrastructure to ensure safety and minimise disruptions. This includes creating well-marked pedestrian walkways, providing safe crossings, and establishing temporary public transport stops with clear signage. Additionally, monitoring the effectiveness of these measures is essential to address any safety concerns and ensure continued mobility for pedestrians and public transport users throughout the construction period.</td></tr>
<tr><td colspan="5">POST-MITIGATION</td></tr>
<tr><td>Dimension</td><td>Rating</td><td colspan="3">Motivation</td></tr>
<tr><td>Duration</td><td>Short-term</td><td>Construction is anticipated to be completed in less than five years.</td><td rowspan="3">Consequence: Negligible</td><td rowspan="4">Significance: Very low</td></tr>
<tr><td>Extent</td><td>Site-specific</td><td>Most of the impact will be on site and the immediate local road network.</td></tr>
<tr><td>Intensity</td><td>Negligible</td><td>With mitigation, there impact of the additional development traffic will be minor.</td></tr>
<tr><td>Probability</td><td>Very unlikely</td><td colspan="2">The proposed staff bus services will accommodate additional public transport trip due to the proposed construction activity, no impact is expected.</td></tr>
</table>

7.12.4.6 Deterioration of Road Conditions

The study area’s road network experiences above average heavy vehicle volumes which cause damage to the municipal, provincial and national roads. The increase in traffic generated by the proposed Phase 2D activities will increase the percentage of heavy vehicles using this road network which is likely to accelerate the deterioration of these roads.

7.12.4.6.1 Management Objectives

Minimise the impact on road conditions.

7.12.4.6.2 Management Actions

Road authorities are responsible for the repair and rehabilitation of public roads. The R37 is classified as a regional road managed by SANRAL, and the rest of the impacted roads are managed by RAL.

To ensure effective road management in the context of the proposed development, the following recommendations are suggested:

- **Engagement with Road Authorities**: The developer should collaborate with road authorities regarding the maintenance of public roads in proximity to the construction sites. This engagement will facilitate coordination and ensure that any necessary maintenance work is addressed promptly.
- To mitigate the temporary impact on road pavement conditions during construction, it is recommended to regularly monitor and maintain the roads, promptly repairing any damage caused by construction traffic. Temporary reinforcement, such as using steel plates or gravel, can protect vulnerable sections of the road. Traffic management measures, including rerouting heavy vehicles and controlling traffic flow, should be implemented to reduce stress on the pavement. Additionally, weather-resistant measures can protect pavements from environmental damage, while clear signage will help guide drivers and prevent accidents. These steps will help preserve road conditions and ensure safe, efficient traffic flow during construction.

7.12.4.6.3 Impact Ratings

The impact is expected to be minor.

Table 7-66: Deterioration of Road Conditions.

<table>
<tr><th colspan="5">IMPACT DESCRIPTION: Deterioration of Road Conditions</th></tr>
<tr><td>Predicted for project phase:</td><td colspan="4">Construction</td></tr>
<tr><td colspan="5">PRE-MITIGATION</td></tr>
<tr><td>Dimension</td><td>Rating</td><td colspan="3">Motivation</td></tr>
<tr><td>Duration</td><td>Short-term</td><td>Construction is anticipated to be completed in less than five years.</td><td rowspan="3">Consequence: moderately detrimental</td><td rowspan="4">Significance: Moderate - negative</td></tr>
<tr><td>Extent</td><td>Local</td><td>The goods/heavy vehicles are expected to originate within the local road network.</td></tr>
<tr><td>Intensity</td><td>High - negative</td><td>Heavy vehicles increase the rate at which erosion of road surface occur resulting in defects / deformations / potholes or an uneven road surface.</td></tr>
<tr><td>Probability</td><td>Certain</td><td colspan="2">It is probable that increased numbers of heavy vehicles on the network could trigger some deterioration in the road conditions on the local road network.</td></tr>
<tr><td colspan="5">MITIGATION:</td></tr>
<tr><td colspan="5">• The developer should engage with the planning authorities concerning maintenance of public roads near the development sites; and
• The developer should ensure that the internal roads and access roads are maintained and to acceptable maintenance standards.</td></tr>
<tr><td colspan="5">POST-MITIGATION</td></tr>
</table>

Dimension	Rating	Motivation		
Duration	Short-term	Construction is anticipated to be completed in less than five years.	Consequence: Slightly detrimental	Significance: Very low
Extent	Local	Construction is anticipated to be completed in less than five years.		
Intensity	Moderate - negative	With mitigation measures, the deterioration will be minimised.		
Probability	Unlikely	The probability of road conditions deteriorating is likely to be reduced with implementation of the recommended mitigation measures.		

7.12.5 SPECIALIST RECOMMENDATIONS AND CONCLUSION

- The capacity analysis indicates that all key intersections in the study area are generally operating at acceptable Levels of Service (LOS) and remain well below capacity. Background traffic growth is expected to have a negligible impact, with intersections continuing to operate at acceptable LOS and minimal additional delays until 2029. The only exceptions are the R37/D4167 and R37/Unnamed Road intersections, which are currently performing unacceptably.
- Phase 2D is expected to have a negligible impact on the surrounding road network; therefore, no road upgrades are proposed to mitigate project impacts. However, it is recommended that a pointsman be deployed at the R37/D4167 and R37/Unnamed Road intersections during peak hours to manage traffic and minimise delays.
- The impact of heavy vehicles on road safety is addressed through the following recommended measures:
    - Ensure heavy and abnormal load vehicles comply with size, weight, and safety requirements set out in the Road Traffic Act, No. 93 of 1996 and the National Road Traffic Regulations, 2000.
    - Ensure the transport of dangerous goods complies with SABS 1398 (Road Tank Vehicles for Petroleum-Based Flammable Liquids) or SABS 1518 (Transportation of Dangerous Goods).
    - Discourage routing of heavy vehicle traffic through populated areas.
    - Avoid transporting abnormal loads during peak periods.
    - Require heavy vehicle drivers to attend a specialised road safety and awareness course, focusing on the impact their vehicles have on other road users.

- The impact of heavy vehicles on road deterioration is mitigated by the following:
    - The developer should engage with planning authorities regarding the maintenance of public roads near construction sites and along construction routes.
    - The developer should ensure that internal and access roads are maintained to acceptable standards.
- During pipeline construction, it is recommended to implement temporary pedestrian and public transport infrastructure to ensure safety and minimise disruption. This includes establishing well-marked pedestrian walkways, providing safe crossings, and creating temporary public transport stops with clear signage.
- All access points have been reviewed with regard to location, spacing, and sight distance. Recommendations have been made to move or remove certain access points based on these criteria.

7.13 NOISE IMPACT ASSESSMENT (ENVIRO ACOUSTIC RESEARCH, 2024)

A desktop noise impact assessment report was compiled by Enviro Acoustic Research (EARES) for the entire Phase 2D alignment (refer to **Figure** 7-88**)**.

The pipeline will be developed in an area with significant residential activity, meaning construction activities may affect several households along the alignment. While not specifically identified in this assessment, projected noise levels (as calculated) will be used to assess the potential noise impact on undefined receptors. This evaluation will consider varying distances of receptors from the pipeline alignment.

A zone sound level typical of a rural noise district (45 dBA) was used for other receptors in this assessment.

Four different scenarios were considered to assess the potential noise impacts and how operational changes might affect noise levels:

- **Scenario 1**: Various construction activities near Maputle, with most activities located 100 to 150 m from excavation activities. Equipment with average sound power levels (PWL) will be used.
- **Scenario 2**: Similar to scenario 1, with the excavation activities close to Maputle. The stockpile/laydown area was relocated, with the other construction activities approximately 200 to 250 m from excavation activities.
- **Scenario 3**: Similar to scenario 2, with the excavation activities remaining close to Maputle with other construction activities approximately 400 – 450 m from the excavation activities; and
- **Scenario 4**: Similar to scenario 3, considering the use of quieter equipment (the PWL of equipment must be considered).

These scenarios were used to assess the potential significance of the noise impact on:

- Learners at the Maputle Secondary School.
- Conceptual receptors along the pipeline alignment.

This assessment primarily focuses on the area surrounding the Maputle Secondary School, identified as a specific noise-sensitive receptor (NSR) during the day. The project focus area (PFA) includes the area approximately 500 m around the school, excluding potential access roads.

Figure 7-88: Aerial image indicating the regional location of the proposed pipeline alignment.

7.13.1 POTENTIAL NOISE-SENSITIVE RECEPTORS

ZNJV specifically identified the Maputle Secondary School (Maputle) and an agricultural venture (located just north of Maputle) as potential noise-sensitive locations, with the assessment primarily focusing on Maputle. The agricultural venture, due to its nature, is not considered a potential noise-sensitive location for the following reasons:

- Agricultural activities inherently generate noise.
- People at the agricultural venture would be engaged in activities, significantly reducing the likelihood of noise impact.

This assessment identified five locations to represent NSR, specifically potential learners at Maputle. These locations are situated just outside the school building, allowing for the estimation of potential noise levels inside the building, using an attenuation factor of 10 dBA. These potential NSRs are illustrated in **Figure** 7-89**.**

Also indicated on **Figure** 7-89 are the general 100 m, 200 m and 500 m buffer zones. Generally, noise from construction activities:

- Could be significant at times within 100m (in an unmanaged situation).
- Is typically limited to within 200 m from locations where noise-generating activities are taking place (in an unmanaged situation). Cumulative effects from various simultaneous noise-generating activities will increase the extend of this buffer zone.
- Is of low concern further than 500 m from such noise sources (in an unmanaged situation), though cumulative effects from various simultaneous noise-generating activities will increase the extend of this buffer zone.

The pipeline will be developed in an area with significant residential activity, which means construction activities may affect several households along the alignment. While not specifically identified in this assessment, projected noise levels (as calculated) are used to assess the potential noise impact on undefined NSRs. This evaluation was conducted generally, taking into account the varying distances of NSRs from the pipeline alignment.

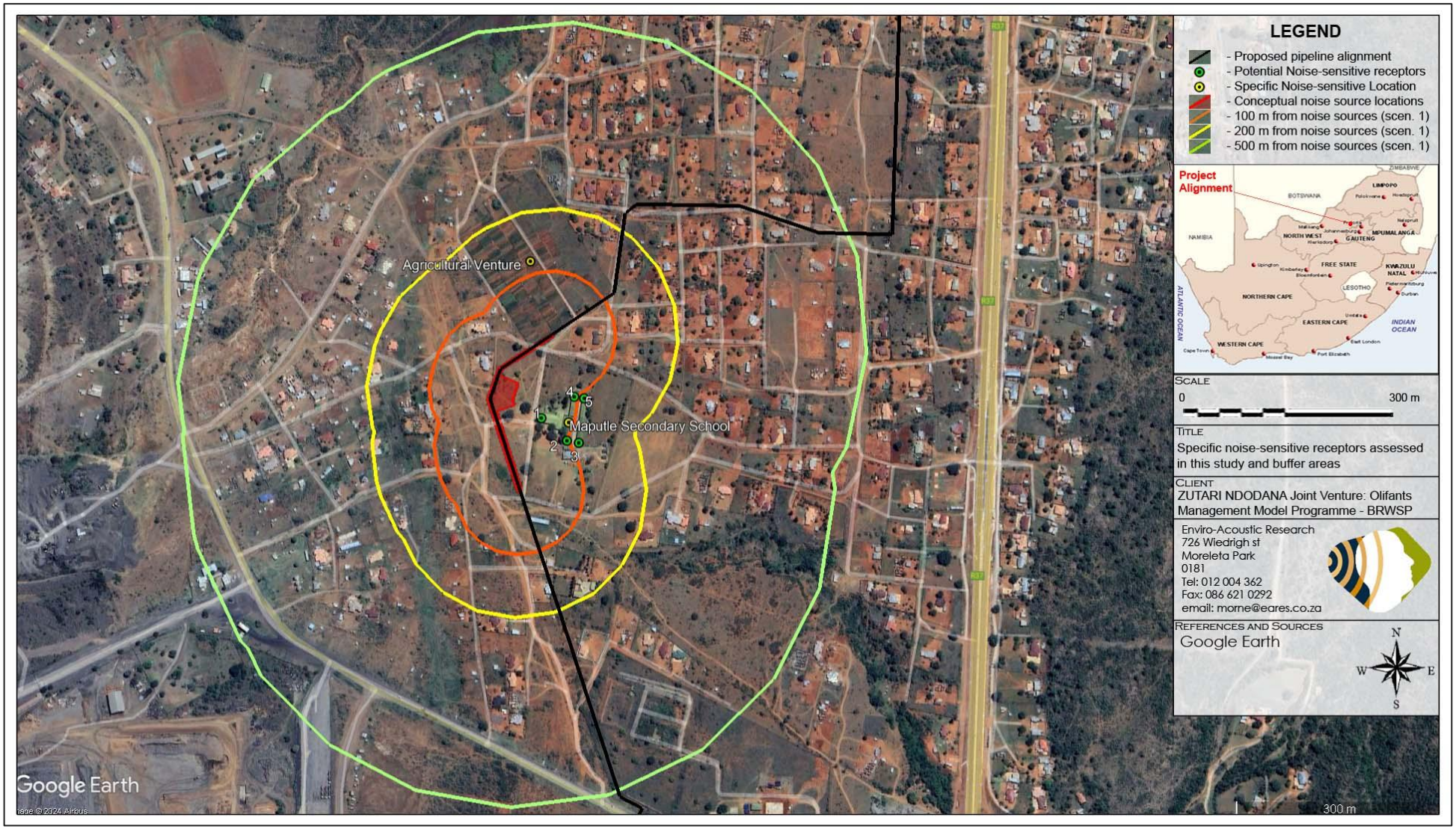


Figure 7-89: Aerial image indicating specific identified noise-sensitive locations and receptors and potential buffers.

7.13.2 POTENTIAL NOISE SOURCES

This noise impact assessment considers conceptual scenarios to estimate the potential impact of noise on the specified NSR.

7.13.2.1 Potential Construction Noise-Generating Activities

Pipeline development projects typically involve a range of activities that can generate noise throughout different phases of the project. The most common noise-generating activities include:

1. Site Preparation and Clearing
    - **Hauling of equipment**: The delivery of construction equipment to the project area using flatbed trucks or trailers.
    - **Construction of temporary access roads**: Bulldozers, graders, and other vehicles may be used to build access roads for construction equipment (or upgrade existing roads).
    - **Construction camps and laydown areas**: The use of bulldozers, graders and rollers to develop locations to develop the construction camps and material laydown areas.
    - **Clearing vegetation**: Use of chainsaws, bulldozers, and other heavy machinery at various locations.
    - **Grading**: Bulldozers and graders used for levelling the ground.
2. Trenching and Excavation
    - **Trenching operations**: Excavators, trenchers, and backhoes creating the trench for the pipeline.
    - **Rock breaking**: Depending on the underlying ground conditions, it may be required to break large boulders using rock breaking equipment.
    - **Rock blasting**: In areas where the pipeline route encounters hard rock, blasting may be required, which can produce significant noise levels.
3. Transportation and Delivery of Materials
    - **Hauling of construction materials**: Trucks, dump trucks, and other heavy vehicles transporting materials like pipe sections, gravel to the site, with trucks or tractor/trailers removing vegetation, rocks and excess material from the site.
    - **Loading and unloading**: Cranes and forklifts used to load and unload materials, such as large pipe segments.
4. Pipe Laying
    - **Pipe handling**: Moving and positioning large pipe segments using cranes or other lifting devices for joining/fitting.
    - **Pipe fitting and joining**: The process of welding pipe segments together and cutting pipes can generate substantial noise from machinery and the welding equipment itself.
    - **Hydrostatic testing**: High-pressure water testing of the pipeline to check for leaks, which may involve pumps and compressors.
5. Trenching and Backfilling
    - **Backfilling the trench**: After the pipeline is laid, earth-moving equipment such as bulldozers, backhoes and compactors are used to backfill the trench and compact the ground surface.
6. Testing and Commissioning
    - **Pipeline pressure testing**: High-pressure pumps used during testing of the pipeline.
    - **Flushing and purging**: If required, high-pressure air or other materials may be used for flushing or purging the pipeline.
7. Post-Construction Activities
    - **Rehabilitation of disturbed areas**: Use of vehicles, machinery, and equipment for post-construction inspections, repairs, and maintenance.
    - **Dismantling temporary facilities**: The removal of temporary construction equipment and facilities may involve activities such as dismantling structures and hauling away debris.

Potential maximum noise levels generated by various construction equipment, as well as the potential extent are presented in Table 7-68. Activities that generate a number of noise events, with the noise event being more than 10 dBA of the prevailing noise level could increase annoyance levels, as such maximum noise events are distracting and NSR could lose concentration. It is difficult to predict or model, and only discussed in general in this assessment.

The potential extent of a maximum noise depends on a number of factors, including the prevailing ambient sound levels during the instance the maximum noise event occurred, as well as the spectral characteristics of the noise and the ambient sound levels of the surrounding area.

Average or equivalent sound levels are another factor that impacts on the ambient sound levels and is the constant sound level that the receptor can experience. This can be predicted to a relative accurate level and used for noise assessments. Typical PWLs associated with various activities that may be found at a construction site is presented in **Table** 7-69**.**

A list of construction equipment and/or activities that was used for the modelling are defined in **Table** 7-67**.** Due to the various activities that may take place at different locations, this assessment will use the PWL of potential noise generating activities and equipment taking place at numerous locations, considering a number of scenarios.

Table 7-67: Sound power emission levels used for modelling.

Equipment	**Sound power level, dB re1 pW, in octave band, Hz**							**SPL**
Process	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**(dBA)**
Point noise sources (dBA re 1 pW)								
Bulldozer	118.3	115.2	111.0	109.1	107.5	103.0	97.0	113.3
Dumper/Haul truck/ADT	102.5	108.6	106.5	105.4	104.5	99.2	97.2	113.0
Excavator	113.8	114.2	110.3	108.3	106.3	103.9	103.7	113.0
General noise	95.0	100.0	103.0	105.0	105.0	100.0	100.0	108.8
Grader - Operational Hitachi	107.7	107.9	106.8	106.2	104.2	101.1	97.2	108.9
Area noise sources (dBA/m^2 re 1 pW)								
General Noise (High-intensity)	95.0	100.0	103.0	105.0	105.0	100.0	100.0	65.0

Table 7-68: Potential maximum noise levels generated by construction equipment.

Equipment Description[34]	Impact Device?	Maximum Sound Power Levels (dBA)	Operational Noise Level at given distance considering potential maximum noise levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
			5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Backhoe	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Chain Saw	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Compactor (ground)	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Dozer	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Drill Rig Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Dump Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Excavator	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Flat Bed Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Front End Loader	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Generator	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Grader	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Impact Pile Driver	Yes	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Mounted Impact Hammer	Yes	124.7	99.7	93.7	87.6	79.7	73.7	70.1	67.6	64.1	59.7	56.2	53.7	47.6
Pickup Truck	No	89.7	64.7	58.7	52.6	44.7	38.7	35.1	32.6	29.1	24.7	21.2	18.7	12.6
Pumps	No	111.7	86.7	80.7	74.6	66.7	60.7	57.1	54.6	51.1	46.7	43.2	40.7	34.6
Roller	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Slurry Plant	No	112.7	87.7	81.7	75.6	67.7	61.7	58.1	55.6	52.1	47.7	44.2	41.7	35.6
Soil Mix Drill Rig	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Tractor	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Vibratory Pile Driver	No	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Warning Horn	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Welder/Torch	No	107.7	82.7	76.7	70.6	62.7	56.7	53.1	50.6	47.1	42.7	39.2	36.7	30.6

[34]Equipment list and PWL source: **http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm**

Table 7-69: Potential equivalent noise levels generated by various equipment.

Equipment Description	Equivalent (average) Sound Levels (dBA)	Operational Noise Level at given distance considering equivalent (average) sound power emission levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
		5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Bulldozer CAT D10	111.9	86.9	80.9	74.9	66.9	60.9	57.4	54.9	51.3	46.9	43.4	40.9	34.9
Dumper/Haul truck - Bell 25 ton	108.4	83.5	77.5	71.4	63.5	57.5	53.9	51.4	47.9	43.5	40.0	37.5	31.4
Excavator	112.0	87.0	81.0	75.0	67.0	61.0	57.5	55.0	51.4	47.0	43.5	41.0	35.0
FEL - Bell L1806C	102.7	77.7	71.7	65.7	57.7	51.7	48.2	45.7	42.1	37.7	34.2	31.7	25.7
General noise	108.8	83.8	77.8	71.8	63.8	57.8	54.2	51.8	48.2	43.8	40.3	37.8	31.8
Grader - Operational Hitachi	108.9	83.9	77.9	71.9	63.9	57.9	54.4	51.9	48.4	43.9	40.4	37.9	31.9
JBL TLB	108.8	83.8	77.8	71.8	63.8	57.8	54.3	51.8	48.3	43.8	40.3	37.8	31.8
Road Transport truck (30t, FM)	109.6	84.7	78.7	72.6	64.7	58.7	55.1	52.6	49.1	44.7	41.1	38.7	32.6
Substation	80.9	55.9	49.9	43.9	35.9	29.9	26.4	23.9	20.4	15.9	12.4	9.9	3.9

7.13.2.1.1 Construction Activities Assessed in this Study

For the construction, the following activities and equipment were selected for modeling:

- A bulldozer (or grader) clearing the area along the pipeline alignment ahead of the other activities;
- An excavator operating near Maputle;
- Pipelaying activities following the excavation activities;
- General noises associated with a potential laydown area (material handling); and
- The backfilling of the pipe trench following the pipelaying activities.

This report will specifically focus on four potential scenarios, namely:
Scenario 1 – Various construction activities close to Maputle, with the most of the activities located 100 to 150 m from excavation activities. Equipment with average PWL will be used;
Scenario 2 – Similar to scenario 1, with the excavation activities close to Maputle. The stockpile/laydown area was relocated, with the other construction activities approximately 200 to 250 m from excavation activities;
Scenario 3 - Similar to scenario 2, with the excavation activities remaining close to Maputle with other construction activities approximately 400 – 450 m from the excavation activities; and
Scenario 4 - Similar to scenario 3, considering the use of quieter equipment (the PWL of equipment must be considered).

High-intensity area noise sources were also included for all activities to account for undefined activities. The PWLs, as defined in **Table** 7-67**,** were used in the noise modelling for the construction phase (scenarios 1, 2, 3 and 4).

7.13.2.1.2 Traffic

Construction traffic is expected to be generated throughout the entire construction period, however, the volume and type of traffic generated will be dependent upon the construction activities being conducted, which will vary during the construction period. Noise levels due to traffic were estimated using the methodology stipulated in RLS-90 (Calculating and predicting road traffic noise). Exact traffic volume assumptions are presented in the figures in section 7.13.3.

7.13.2.2 Potential Operational Noise-Generating Activities

Though generally quieter than construction activities, the operation of pipelines, particularly those with pump stations, can generate ongoing noise from compressors, pumps, and valves, depending on the pipeline's design and the location of pumpstations in relation to the closest NSR. Noise from the pump stations were however anticipated and addressed in the Design Criteria Memorandum (Report No: 01-1-05-05, Dated July 2010).

The noise design requirements and criteria are as follows:

- Pump stations should not be sited closer than 300 m to houses or within 200 m of schools.
- As the internal noise levels in the pump stations are high, the buildings housing the pumps should be adequately designed to limit the transmission of the pump generated noise and other internal equipment noise to the outside of the building. Insertion losses for the building of at least 30 dBA must be achieved.
- Where there are external sources of noise such as ventilation intake fans, appropriate measures will need to be taken. Typical measures such as the following should be taken:
    - Fan intakes to be low mounted (preferably ground mounted).
    - Fans to have a low sound power output.

- Fan intakes to be effectively screened off by an appropriately designed noise attenuation barrier (wall) with an insertion loss capability of at least 20 dBA.

Compliance with these criteria would minimise potential noise risks associated with such operational noises, and this assessment will not consider potential operational noises.

7.13.2.3 Potential Noise Sources: Future Noise Scenario – Decommissioning

The Decommissioning Phase is considered as the phase which begins when the pipeline system will no longer be used due to age, deterioration or if no longer needed. If the infrastructure can no longer be used (repurposed or retrofitted for a different use), buildings may be demolished, rubble and waste removed with the site rehabilitated.

However, while numerous activities can take place during the decommissioning stage, the potential noise impact will not be considered. This is because the noise impacts associated with the decommissioning phase are normally significantly less than the construction phase for the following reasons:

- Final decommissioning normally takes place only during the day, a time period when existing ambient sound levels are higher, generally masking most external noises for surrounding receptors; and
- There is a lower urgency of completing this phase and less equipment remains onsite (and is used simultaneously) to affect the noise levels during decommissioning.

7.13.3 PROJECTED NOISE RATING LEVELS

Noise contours are illustrated from 45 dBA upwards (in 5 dBA increments) and may represent the extent of the potential audibility of the project activities. Five different colours are used to illustrate the potential noise impact, namely:

- For the zone outside the green area: noises from the activities are unlikely to change the ambient sound levels even though the activities may be audible at times.
- Green:
    - Noise levels between 45 and 50 dBA. Introduced noises due to project activities may start to change ambient sound levels sufficiently for surrounding receptors to detect this change, but most people will accept this noise level;
- Yellow:
    - Noise levels between 50 and 55 dBA. Project activities may be clearly audible and potentially annoying during quieter periods. Considering the work of Zou (2020), less than 15% of the community could be highly annoyed due to noise from the construction activities;
- Red:
    - Noise levels between 55 and 60 dBA. Noise will exceed the IFC recommended noise limits for residential use (outside). Noises will be clearly audible, and the noise level can be considered disturbing in a rural noise district. Considering the work of Zou (2020), less than 26% of the community could be highly annoyed due to noise from the construction activities;
- Dark Red:
    - Noise levels between 60 and 65 dBA. Noise will significantly exceed the IFC recommended noise limits for residential use (outside) and the noises would likely be the dominant noise in the area. The noise level will be disturbing in a rural noise district. Considering the work of Zou (2020), less than 45% of the community could be highly annoyed due to noise from the construction activities;
- Blue:

- Noise levels higher than 65 dBA. Noise levels exceed 65 dBA and it is likely that receptors will significantly exceed the IFC recommended noise limits for residential use (outside) and the noises would likely be the dominant noise in the area. The noise level will be disturbing in a rural noise district. Considering the work of Zou (2020), more than 45% of the community could be highly annoyed due to noise from the construction activities.

7.13.3.1 Construction Phase Noise Impact

This section investigates the conceptual construction activities as discussed in section 7.13.2.1 and depicted in **Figure** 7-90 (scenario 1), **Figure** 7-91 (scenario 2), **Figure** 7-92 (scenario 3) and **Figure** 7-93 (scenario 4). All the scenarios include various equipment and activities taking place simultaneously. Noise rating level contours are illustrated for:

- future daytime construction activities are illustrated in **Figure** 7-94 for scenario 1, considering potential worst-case noise generating activities with most of the construction activities taking place relatively close to each other;
- future daytime construction activities are illustrated in **Figure** 7-95 for scenario 2, considering potential worst-case noise generating activities with most of the construction activities taking place further than 100 m from the excavation activities;
- future daytime construction activities are illustrated in **Figure** 7-96 for scenario 3, considering potential worst-case noise generating activities with most of the construction activities taking place further than 200 m from the excavation activities;
- future daytime construction activities are illustrated in **Figure** 7-97 for scenario 4, considering potential worst-case noise generating activities with most of the construction activities taking place further than 400 m from the excavation activities. The sound power emission levels of equipment are considered, with the quietest equipment selected for the construction activities.

As can be noted from in **Figure** 7-94, **Figure** 7-95, **Figure** 7-96 and **Figure** 7-97 construction activities could result in high to very high noise levels up to 200 m from active activities.

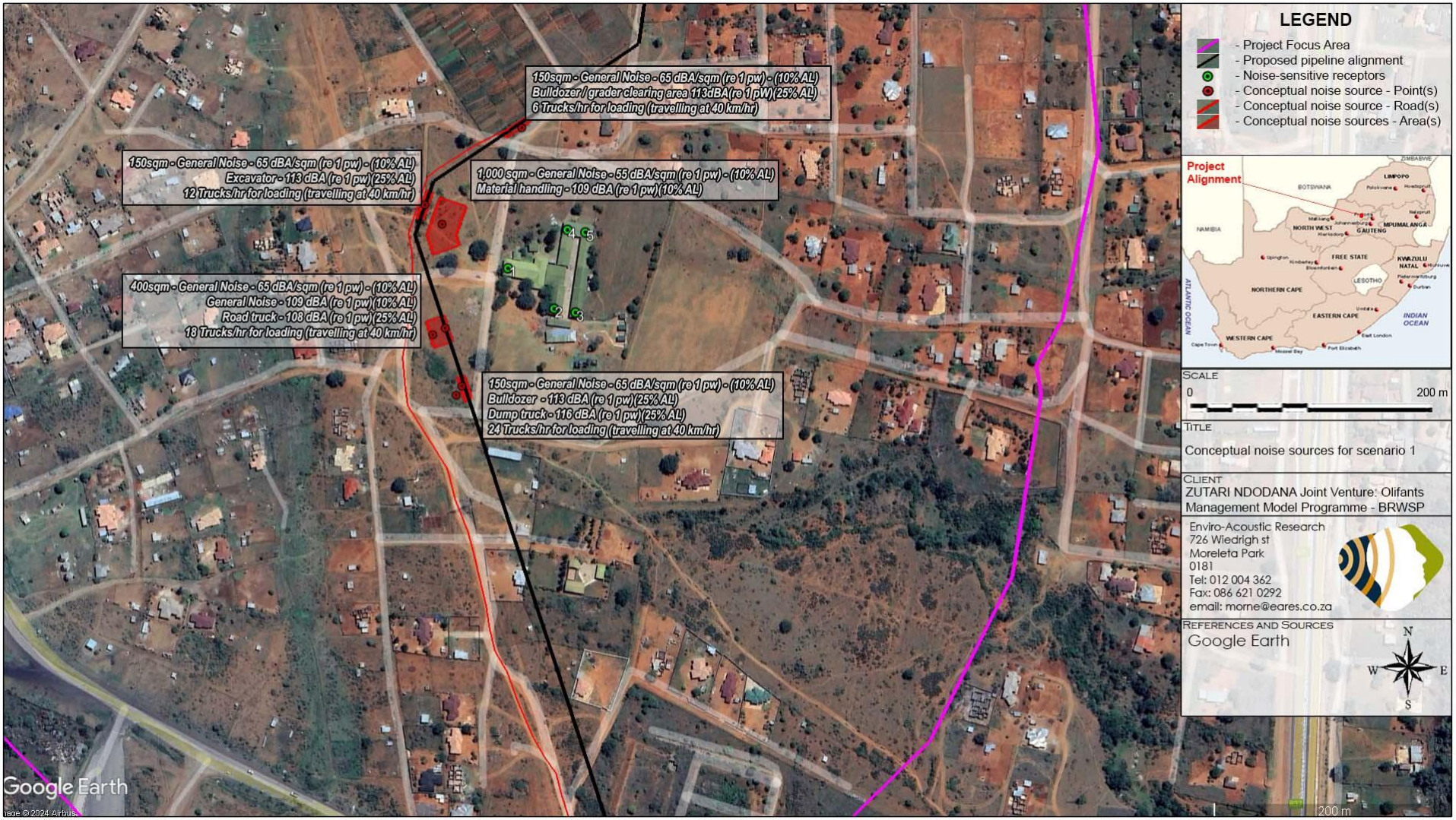


Figure 7-90: Conceptual noise generating activities used for noise modelling – Scenario 1.

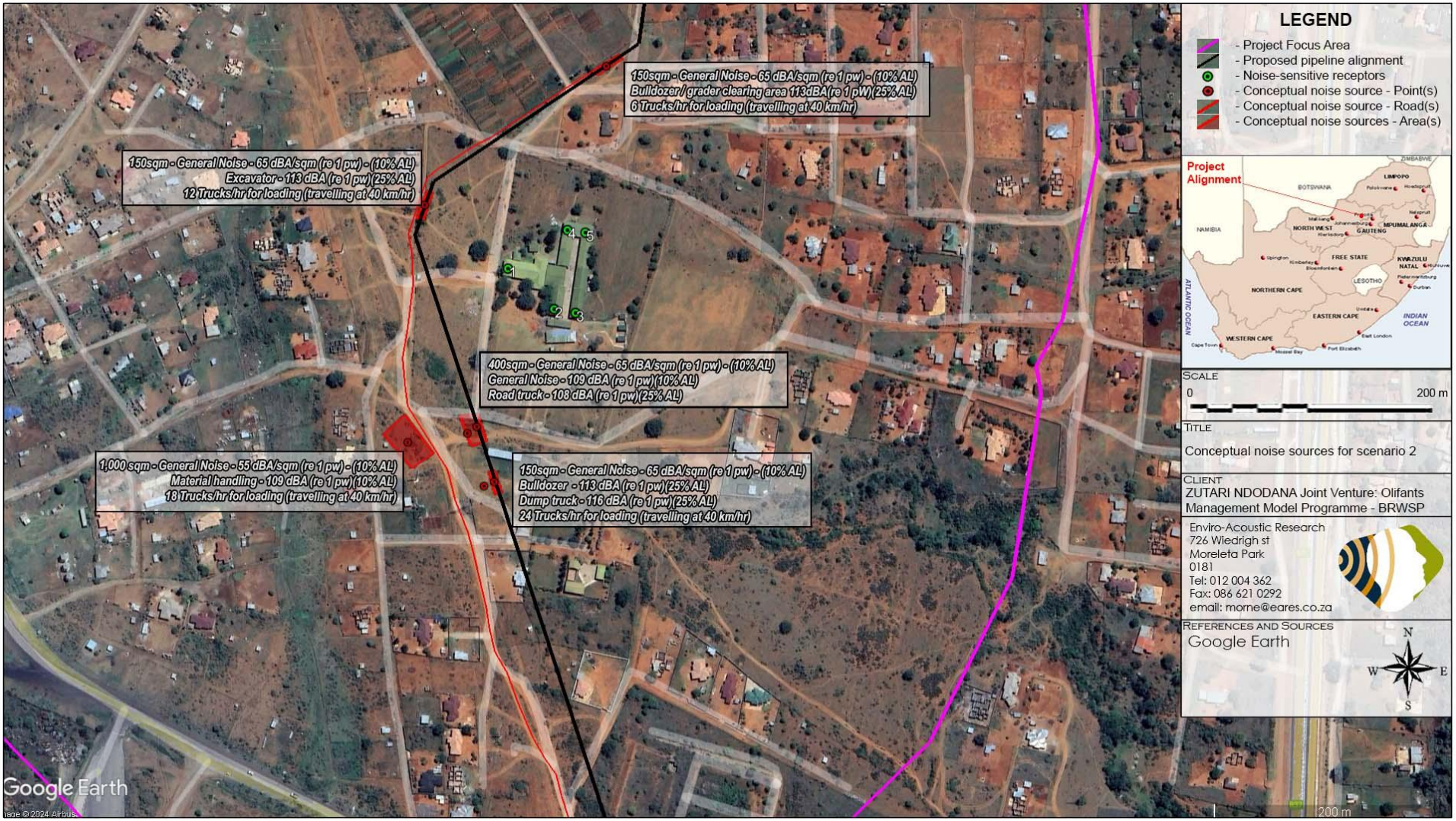


Figure 7-91: Conceptual noise generating activities used for noise modelling – Scenario 2.

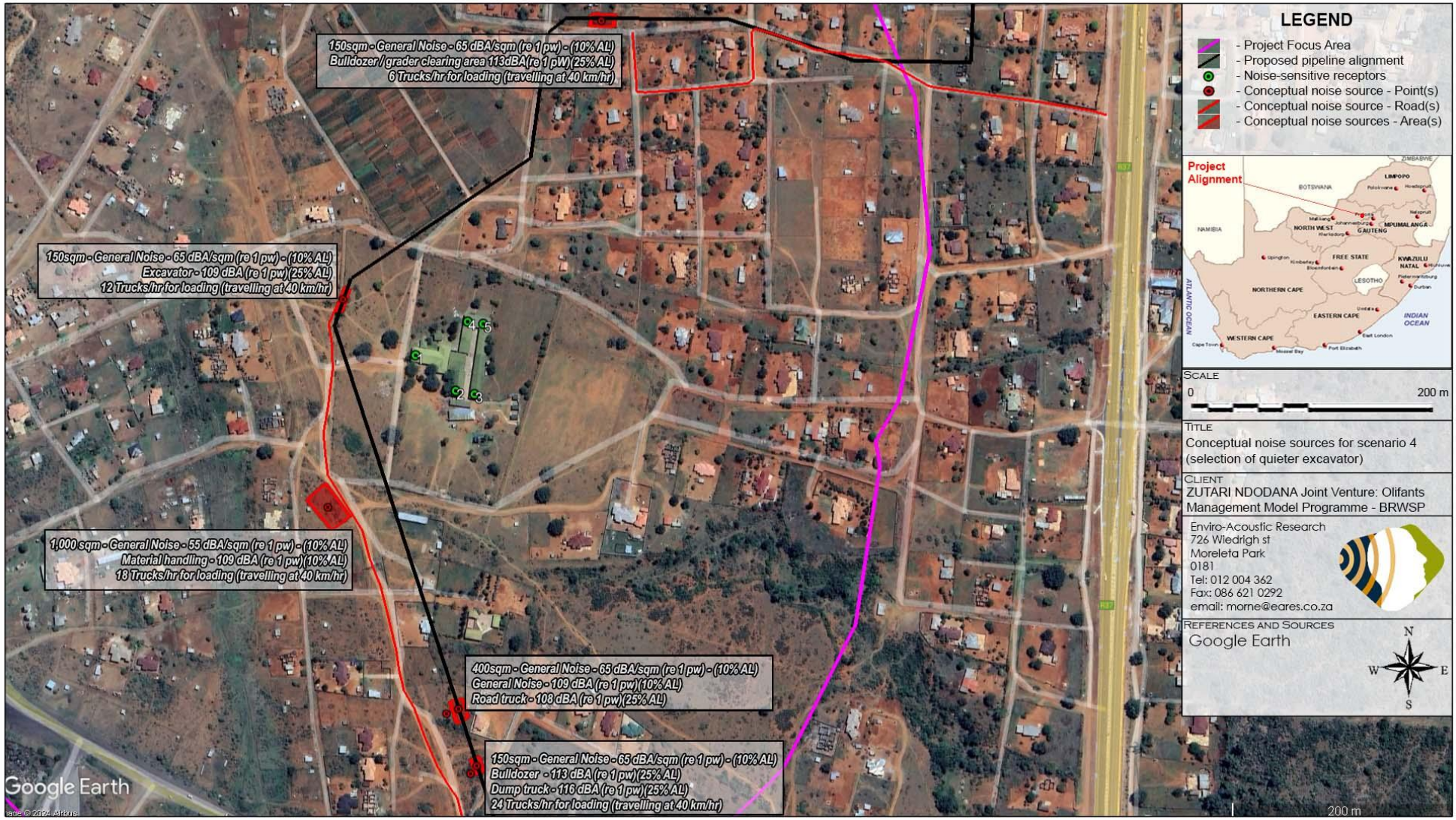


Figure 7-92: Conceptual noise generating activities used for noise modelling – Scenario 3.

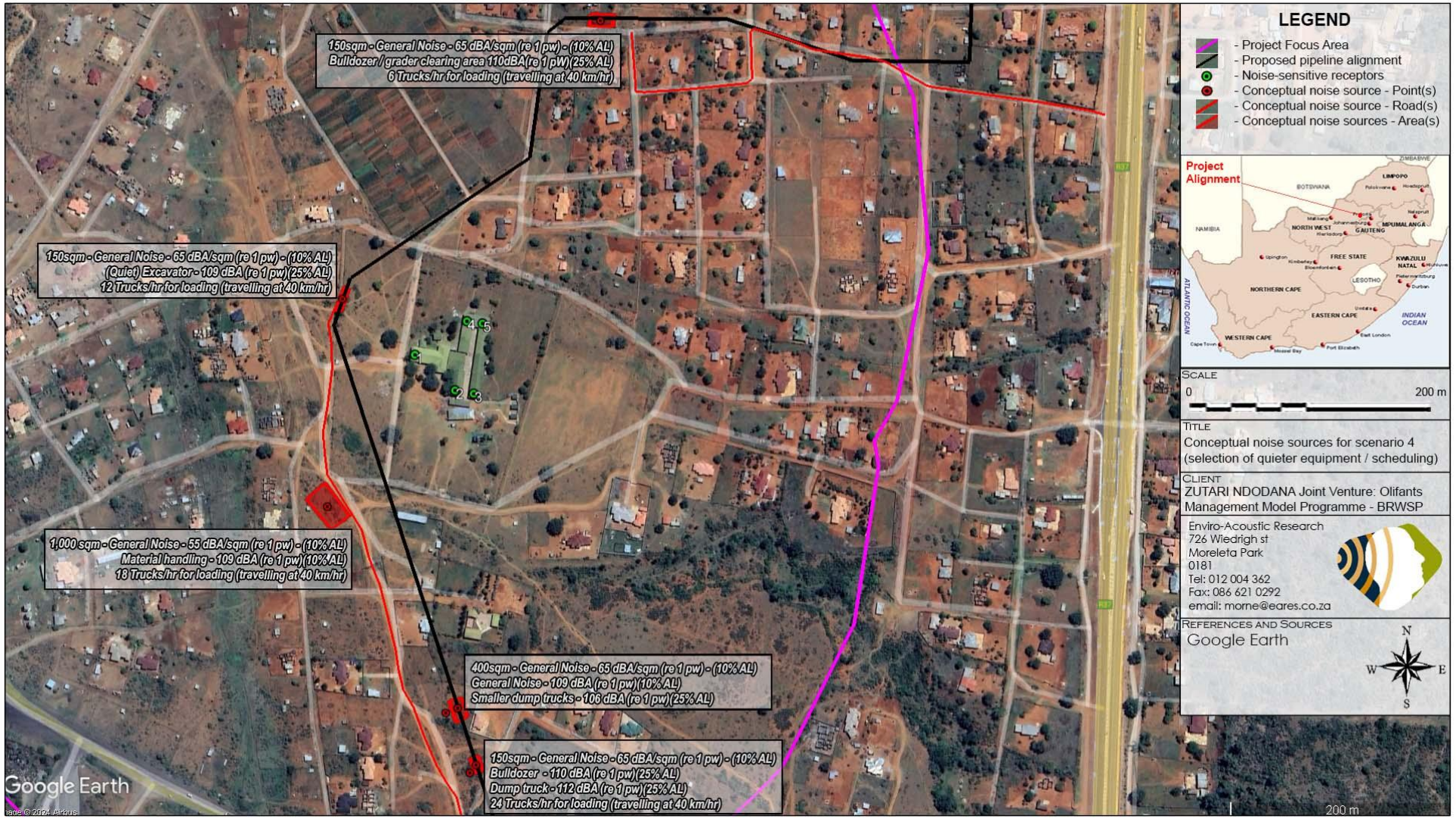


Figure 7-93: Conceptual noise generating activities used for noise modelling – Scenario 4.

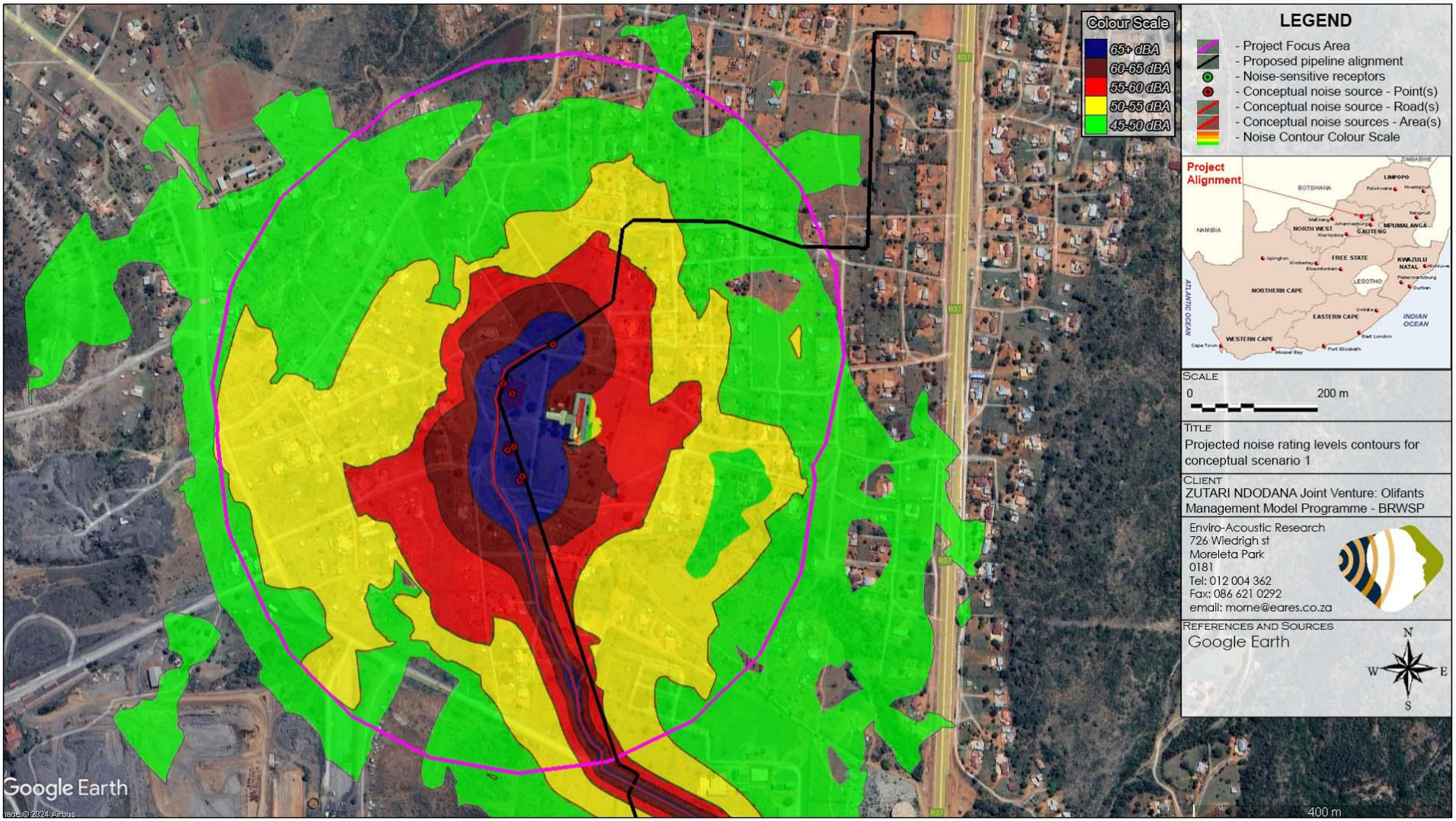


Figure 7-94: Daytime construction noise rating levels for Scenario 1.

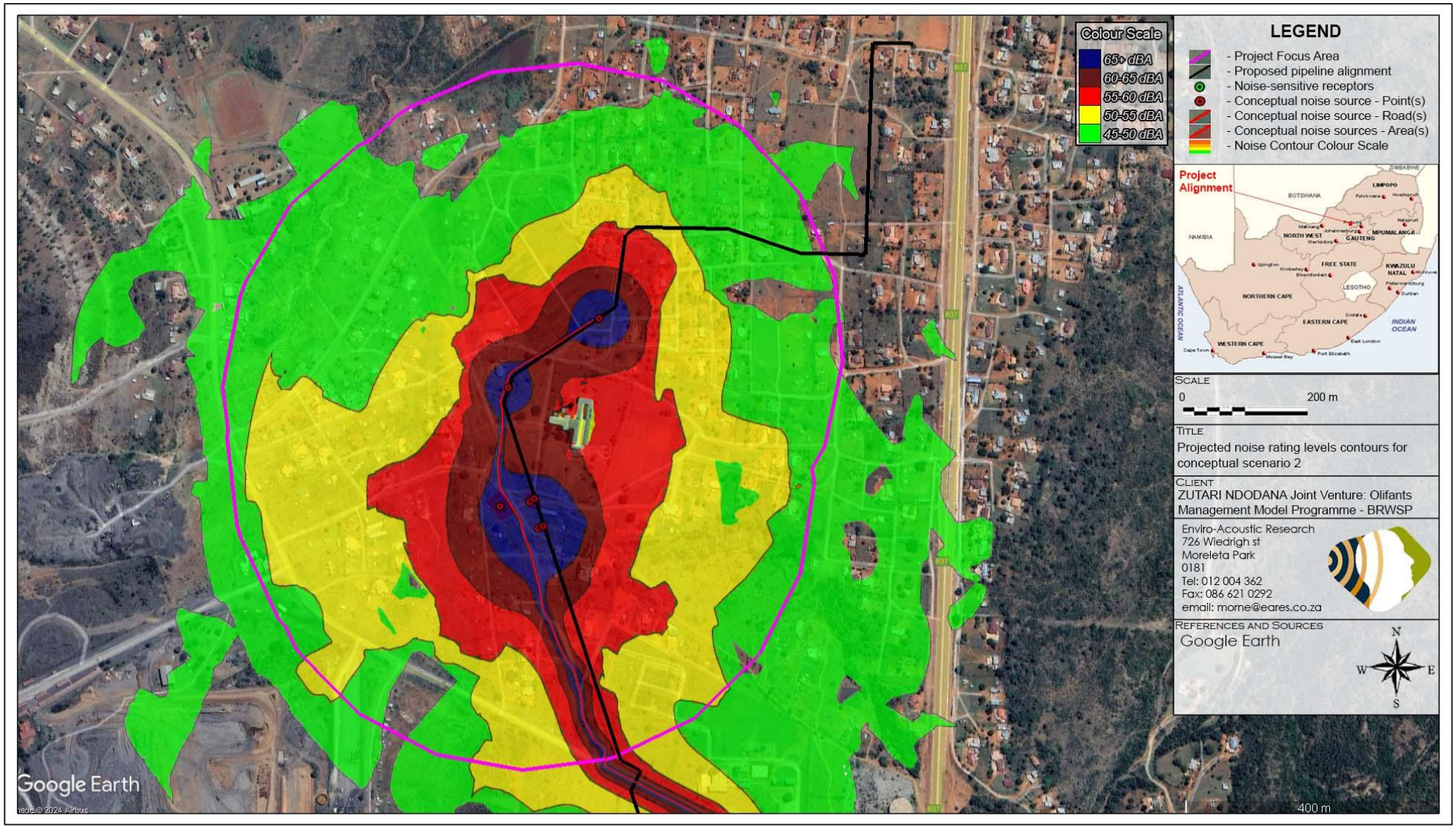


Figure 7-95: Daytime construction noise rating levels for Scenario 2.

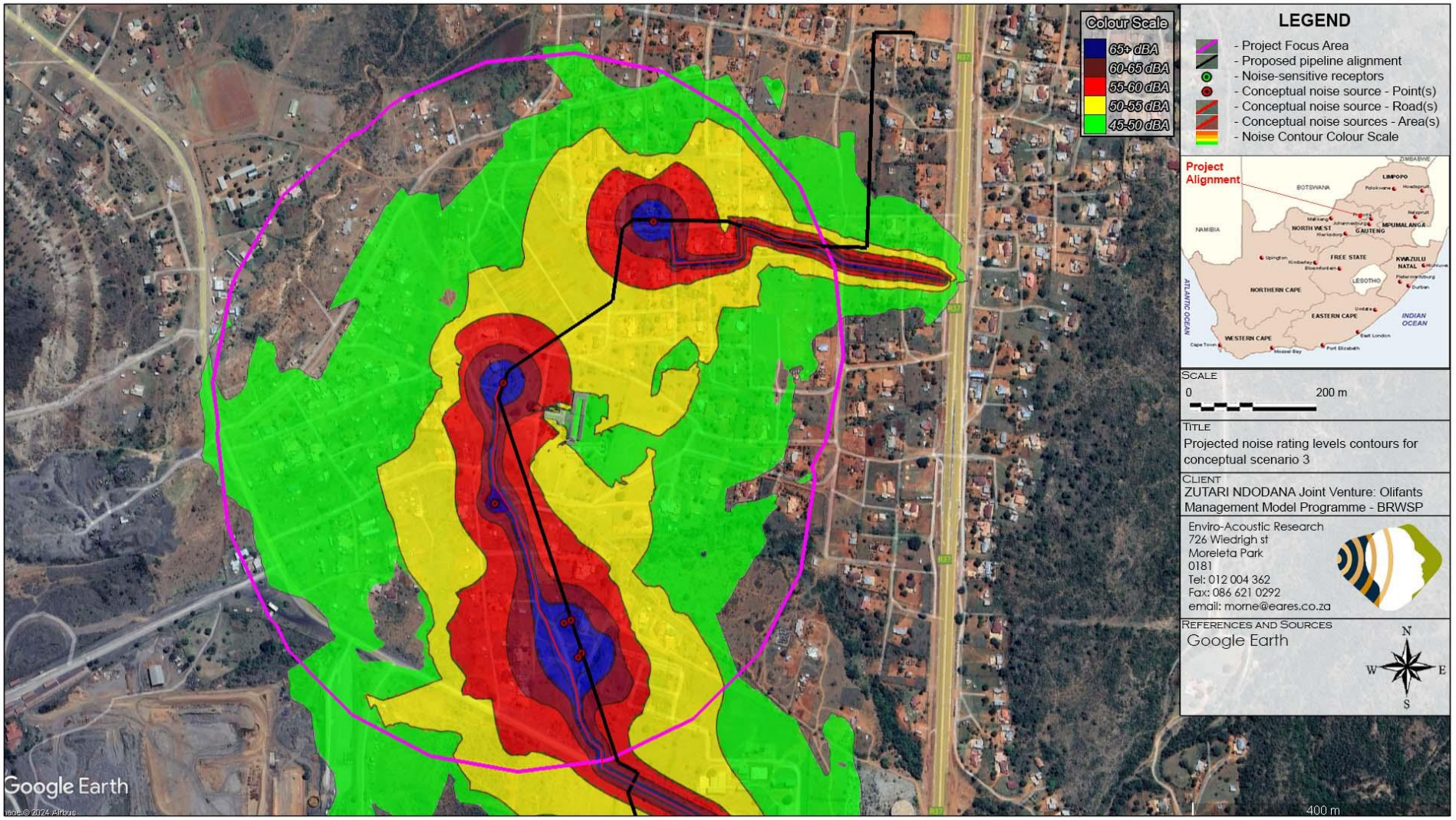


Figure 7-96: Daytime construction noise rating levels for Scenario 3.

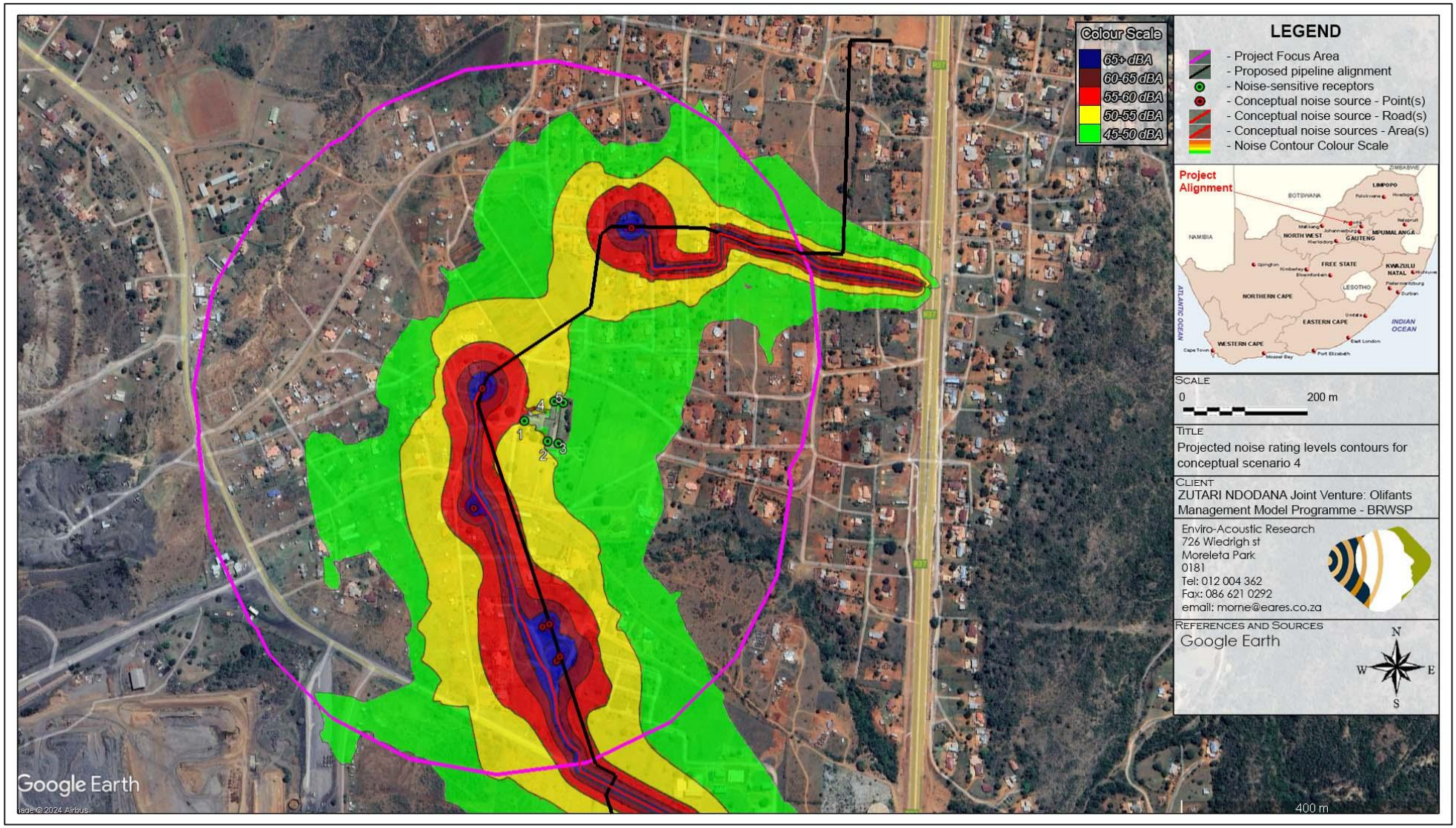


Figure 7-97: Daytime construction noise rating levels for Scenario 4.

7.13.4 SIGNIFICANCE OF THE NOISE IMPACT

7.13.4.1 Construction Phase Noise Impact

The potential noise levels for four scenarios were calculated in the section above with the significance of the noise impact assessment summarised in the tables below.

Table 7-70: Impact Assessment: Construction Activities near the Maputle School.

IMPACT DESCRIPTION: Noise levels disturbing learners (Maputle School)				
Predicted for project phase:	Pre-construction	**Construction**	Operation	Decommissioning
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	Very high - negative	Noise levels in classrooms could be as high as 54 dBA.		
Probability	Unlikely	Precautious rating. Construction noises will be audible in the classrooms and could annoy or distract 10 - 20% of learners.		
MITIGATION:				
• Construction activities closer than 200 m from the Maputle school can be scheduled to take place during the school holiday (*that will eliminate the potential noise impact on the leaners*); • Construction camps, laydown and stockpile areas should not be located within 200 m from Maputle Secondary School (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • When selecting the equipment to be used for this project, the project proponent should consider the sound power levels and select the quietest equipment for the purpose (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • If possible, main construction activities (site clearing, excavation, pipelaying and trench backfilling) should be separated in time (different day) and space (at least 200m from different activities) to minimise cumulative effects (*will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*).				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Slightly detrimental	Significance: Very low
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	Moderate - negative	Noise levels in classrooms could be as high as 54 dBA.		
Probability	Very unlikely	Precautious rating. Construction noises will be audible but could annoy or distract less than 10% of learners.		

Table 7-71: Impact Assessment: Construction Activities within 50 m from receptors.

IMPACT DESCRIPTION: Noise levels, people within 50 m from activities				
Predicted for project phase:	Pre-construction	**Construction**	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	Very high - negative	Noise levels could be higher than 65 dBA within 50 m from active construction activities.		
Probability	Very likely	Precautious rating. Construction noises will be dominant and could annoy 30 – 40% of the community.		
MITIGATION:				
• If possible, construction camps should not be located within 200 m from communities (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • When selecting the equipment to be used for this project, the project proponent should consider the PWL and select the quietest equipment for the purpose (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • If possible, main construction activities (site clearing, excavation, pipelaying and trench backfilling) should be separated in time (different day) and space (at least 200 m from different activities) to minimise cumulative effects (*will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • Receptors in the area should be notified when construction activities will take place, including details of the activities as well as the projected duration of the activities (*that will reduce the potential annoyance with the activities [the probability of a noise impact occurring]*); • No construction activities should be permitted closer on Sundays (*will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); and • No construction activities should take place during the night-time period in the communities.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	Very High - negative	Noise levels could be higher than 65 dBA within 50 m from active construction activities.		
Probability	Unlikely	Precautious rating. Construction noises will be dominant and may annoy 10 – 20% of the community.		

Table 7-72: Impact Assessment: Construction Activities 50 – 100 m from receptors.

IMPACT DESCRIPTION: Noise levels, people within 50 – 100 m from activities				
Predicted for project phase:	Pre-construction	**<u>Construction</u>**	Operation	Decommissioning
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400m from activities.		

Intensity	Very high - negative	Noise levels could range between 55 – 65 dBA due to active construction activities.		
Probability	Fairly likely	Precautious rating. Construction noises will be significant and could annoy 20 - 30% of receptors.		
MITIGATION:				
• If possible, construction camps should not be located within 200 m from communities (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • When selecting the equipment to be used for this project, the project proponent should consider the PWL and select the quietest equipment for the purpose (*that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • If possible, main construction activities (site clearing, excavation, pipelaying and trench backfilling) should be separated in time (different day) and space (at least 200 m from different activities) to minimise cumulative effects (*will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); • Receptors in the area should be notified when construction activities will take place, including details of the activities as well as the projected duration of the activities (*that will reduce the potential annoyance with the activities [the probability of a noise impact occurring]*); • No construction activities should be permitted closer on Sundays (*will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]*); and • No construction activities should take place during the night-time period in the communities.				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Very low
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400m from activities.		
Intensity	High - negative	Noise levels could range between 55 – 65 dBA due to active construction activities.		
Probability	Very unlikely	Precautious rating. Construction noises will be significant but may annoy less than 10% of the community.		

Table 7-73: Impact Assessment: Construction Activities 100 – 200 m from receptors.

IMPACT DESCRIPTION: Noise levels, people within 100 – 200 m from activities				
Predicted for project phase:	Pre-construction	**Construction**	Operation	Decommissioning
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	High - negative	Noise levels could range between 50 – 60 dBA due to active construction activities.		
Probability	Unlikely	Precautious rating. Construction noises will be significant and could annoy 10 - 20% of the community.		
MITIGATION:				

• If possible, construction camps should not be located within 200 m from communities (that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]); • When selecting the equipment to be used for this project, the project proponent should consider the PWL and select the quietest equipment for the purpose (that will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]); • If possible, main construction activities (site clearing, excavation, pipelaying and trench backfilling) should be separated in time (different day) and space (at least 200 m from different activities) to minimise cumulative effects (will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]); • Receptors in the area should be notified when construction activities will take place, including details of the activities as well as the projected duration of the activities (that will reduce the potential annoyance with the activities [the probability of a noise impact occurring]); • No construction activities should be permitted closer on Sundays (will reduce noise levels and reduce potential annoyance with the activities [the probability of a noise impact occurring]); and • No construction activities should take place during the night-time period in the communities.

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Moderately detrimental	Significance: Very low
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	High - negative	Noise levels could range between 50 – 60 dBA due to active construction activities.		
Probability	Very unlikely	Precautious rating. Construction noises will be significant and it might annoy less than 10% of the community.		

Table 7-74: Impact Assessment: Construction Activities further than 200 m from receptors.

IMPACT DESCRIPTION: Noise levels, people further than 200m from activities				
Predicted for project phase:	Pre-construction	**Construction**	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Slightly detrimental	Significance: Very low
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400 m from activities.		
Intensity	Low - negative	Noise levels could range between 45 – 55 dBA due to active construction activities.		
Probability	Very unlikely	Precautious rating. Construction noises will be significant, and it might annoy less than 10% of the community.		

MITIGATION:
No specific mitigation measures required, as receptors staying further than 200 m from construction activities will likely hear the noises, but mitigation implemented to benefit receptors staying closer to the activities will also benefit receptors staying further from the activities.

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	Activities will only take place for a portion of the construction period.	Consequence: Slightly detrimental	Significance: Very low
Extent	Local	The construction noises could change ambient sound levels with more than 7 dBA up to 400m from activities.		

Intensity	Low - negative	Noise levels could range between 45 – 55 dBA due to active construction activities.		
Probability	Very unlikely	Precautious rating. Construction noises will be significant, and it might annoy less than 10% of the community.		

7.13.5 MITIGATION OPTIONS

This assessment determined that noise levels will be high to very high at all receptors staying closer than 200 m from construction activities, considering ambient sound levels typical of a rural noise district. An unknown would be the probability that people and learners will be annoyed with the construction activities, as factors that could influence annoyance with a project are complex. Considering the relative temporary nature of typical construction activities as well as the general positive that communities have with an infrastructure development project, the probability of people and learners being highly annoyed with the project is considered mostly unlikely once they are notified that the project would benefit the larger community.

The project developer must however know that community involvement needs to continue throughout the project. Annoyance is a complicated psychological phenomenon, as with many projects, expressed annoyance with noises can reflect an overall annoyance with the project, rather than a rational reaction to the sound itself. At all stages, surrounding receptors should be informed about the project, providing them with factual information without setting unrealistic expectations. It is counterproductive to suggest that the activities that noise levels will not impact on them, as the magnitude of the noise levels will depend on a multitude of variables and will vary from day to day and from place to place with environmental and operational conditions. Audibility is also distinct from the noise level, because it depends on the relationship between the noise level from the activities, the spectral and impulsive character of the noise source as well as the sound level of the surrounding soundscape (both level and spectral character).

The developer must implement a line of communication (i.e. a help line where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers. The proposed project should maintain a commitment to the surrounding NSRs (people staying within 200 m from the project site) and respond to noise concerns in an expedient fashion. Sporadic and legitimate noise complaints could be raised. For example, sudden and sharp increases in sound levels could result from mechanical malfunctions or maintenance issues. Problems of this nature can be corrected quickly, and it is in the interest of the project proponent’s to do so.

7.13.5.1 Mitigation and Management Conditions to be Included in the EMPr and Environmental Authorisation

It is recommended that the following measures are included into the EMPr and EA:

1. All employees and contractors should receive Health and Safety induction that includes an environmental awareness component about noise. This is to allow employees and contractors to the potential noise risks that activities pose to the surrounding environment;
2. The applicant must implement a line of communication (i.e., a helpline where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers, or alternative means to communicate issues. The project proponent should maintain a commitment to the local community and respond to concerns in an expedient fashion. Sporadic and legitimate noise complaints could develop and if valid, should be investigated. Feedback must be provided to the affected stakeholder(s) with details of any steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again;
3. The project proponent must investigate any reasonable and valid noise complaint if registered by a receptor staying within 200 m from location where construction activities are taking place.

If noise complaints are registered, the project proponent should investigate the complaint and could implement routine noise monitoring;

4. The project proponent must ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures if available. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.
5. The project proponent should investigate the use of white-noise alarms instead of tonal reverse alarms on heavy vehicles operating on roads and on the project. The advantages of white noise alarms above tonal alarms are;
    a. It is as safe as a tonal alarm.
    b. Highly audible close to the alarm (or reversing truck).
    c. It generates a more uniform sound field behind a reversing vehicle.
    d. Greater directional information, workers can locate the source faster.
    e. Significantly less environmental noise and it creates significantly less annoyance far away.
    f. When properly installed, white noise alarms of a similar sound power emission level are more likely to comply with the ISO 9533 standard.

7.13.6 SPECIALIST RECOMMENDATIONS AND CONCLUSION

While the construction of the pipeline will increase ambient sound levels in the near vicinity of the construction activities, the increases will be temporary, and, if the community know that this is a project that could improve infrastructure, public sentiment will be more positive than a different project but with no future benefit to the community. This assessment concludes that the increases in noise levels do not constitute a fatal flaw, especially if the project proponent consider and adopt the mitigation measures as included in the Noise Impact Assessment report.

This assessment is considered sufficient, and no additional acoustic studies are required. No routine noise monitoring is required or recommended, though noise measurements might be considered if regular noise complaints are registered.

This assessment is not subject to any other conditions.

7.14 HYDROLOGY IMPACT ASSESSMENT (ZUTARI, 2024)

The hydrology Impact Assessment was compiled by Zutari. A site visit was conducted in January 2025 to assist with building an understanding of the prevailing hydrological conditions in the area.

7.14.1 FLOODLINES AND PIPELINE CROSSINGS

All three of the identified deviations interact with the delineated floodlines.

7.14.2 SCOUR RISK

7.14.2.1 Assessment of Scour Risk

Along the pipeline realignment, there are five locations where scour valves will be installed in order to drain the pipe. Two are located south of the Road D4169 and will discharge to open fields, allowing the water to infiltrate without causing any risk to property or people. The remaining three are located within residential areas, and these structures are listed below:

Scour Valve SV-2H1-02
Scour Valve SV-2H1-03
Mooihoek BPR

The location of these structures can be seen in **Figure** 7-98 below:

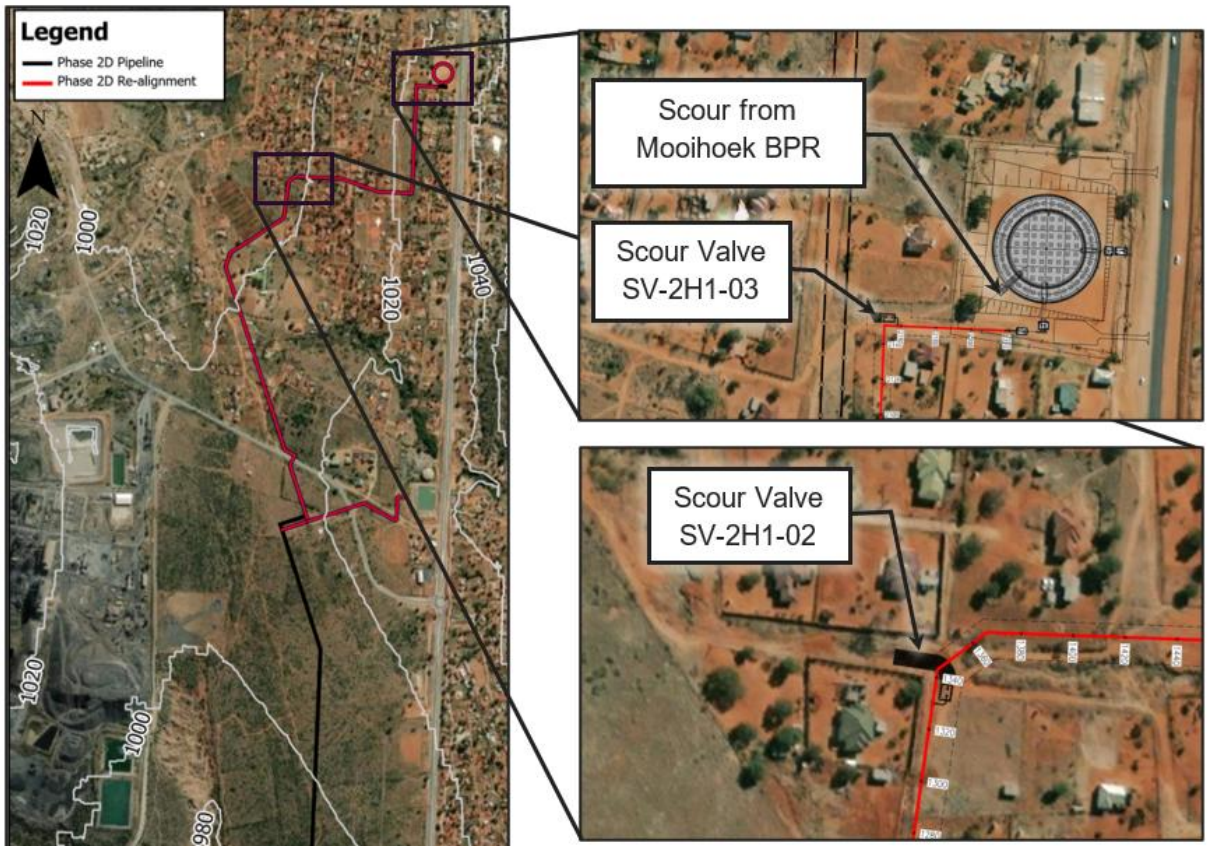


Figure 7-98: Scour valve locations.

The Scour valves are designed as part of the reference design. A summary of the design parameters is shown in Table 7-75:

Table 7-75: Scour valve design parameters.

Scour Valve	SV-2H1-02	SV-2H1-03
Scour Volume (m^3)	368	49
Scour Time (hours)	3.57	1.47
Peak Flow rate (l/s)	372.1	92.7

Two scenarios were modelled. Scenario 1 involves both the scour valves being opened to drain the pipe, and Scenario 2 involves the BPR scour valve being opened to drain the BPR.

For Scenario 1, SV-2H1-02 reported a maximum velocity of approximately 1.45 m/s and the maximum flow depth is 0.34 m and for SV-2H1-03 the maximum velocity and flow depth of approximately 0.69 m/s and 0.17 m. The hazard map for both scour valves indicated a low hazard rating and for SV-2H1-03 the discharge from the scour valve is conveyed by the roads and the primary stream is dissipated approximately 100 m downstream of the valve. Discharge from SV-2H1-02 is conveyed by an informal dirt road to what seems to be an attenuation dam located Northwest of the scour valve. Due to the low velocities and short duration of the flood event, no detailed mitigation measures are required for scour valve SV-2H1-02 and SV-2H1-03. Additionally, no flood risk to any properties were identified.

For Scenario 2, a maximum velocity of 2.36 m/s and flow depth of 0.25 m was observed. The area downstream of the scour valve outlet has a hazard rating ranging from medium to high. These conditions

are only experienced for a short section immediately downstream of the scour outlet and has a very short duration.

It should be noted that the results were derived from the model assuming no infiltration and hence can be considered as conservative. For a detailed risk assessment of the scours, refer to Section 3.2 of the Hydrology Impact Assessment Report.

7.14.2.2 Detailed Mitigation

In general, it can be seen from the results that the inundation boundaries are limited for Scenario 1, and the risk mapping generally indicates a low level of risk to inhabitants in this area. The mapping is based on available survey information that does not include levees like walls that will impede flow. Therefore, it is likely that the flow will be contained within road reserve where a continuous levee is present.

However, the results for Scenario 2 indicate that several residential properties located directly downstream of the Mooihoek BPR scour valve are at risk of localized inundation. Analysis of the results shows that flow exits the gravel road at a local low point just downstream of the scour valve. This flow path is illustrated in **Figure** 7-99, with the general direction of flow shown by the blue arrows:

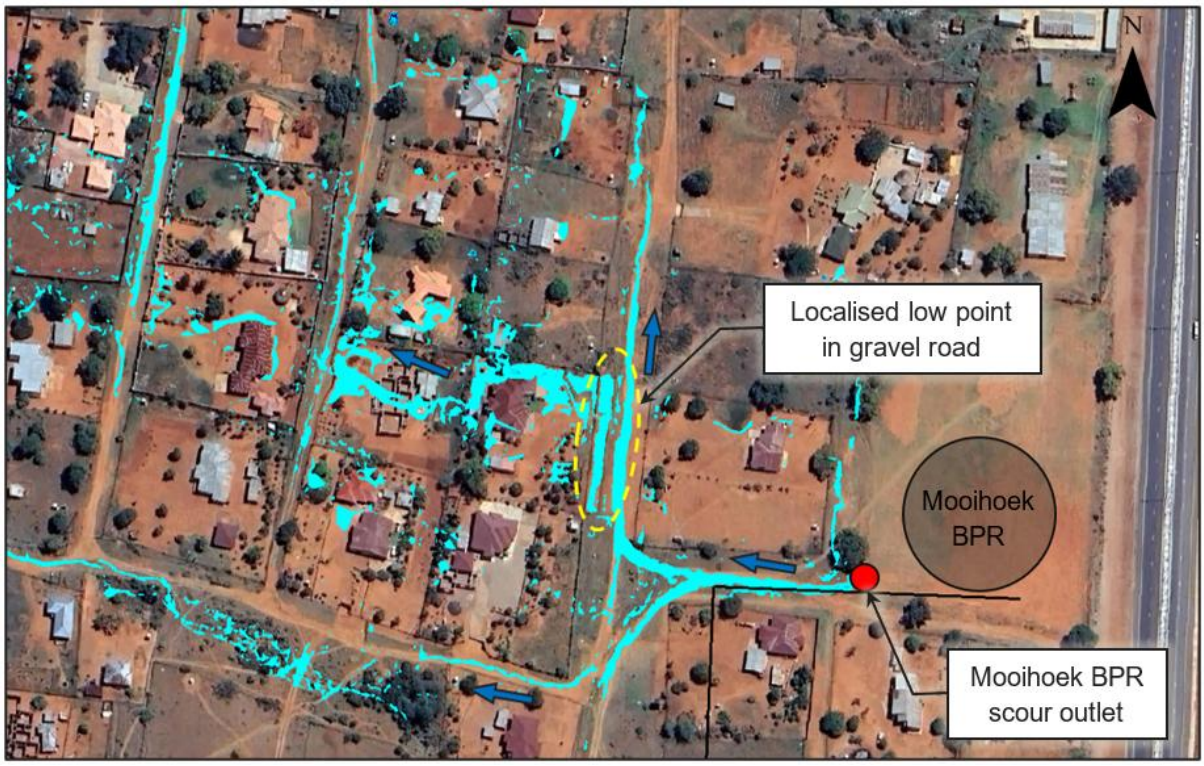


Figure 7-99: Scenario 2 – Identified problem areas.

Two primary risks were identified for Scenario 2:

1. Elevated flow velocities immediately downstream of the scour valve outlet, increasing the potential for erosion.
2. Localised inundation of residential properties situated downstream.

To mitigate these risks, the following measures were investigated:
Erosion Risk:

- Measure 1: Protect approximately 50 m of the gravel road downstream of the scour valve outlet with Reno mattresses or grouted stone pitching to reduce erosion caused by high-velocity flow.

Inundation Risk:

- Measure 2: Construct a 0.5 m high earth berm to prevent flow from encroaching onto nearby residential properties.
- Measure 3: Excavate the section of road directly downstream of the scour valve to form a defined channel capable of conveying the flow. A channel width of 5 m and depth of 0.3 m is recommended.

Only the areas in the immediate vicinity of the scour valves were deemed as high-risk areas requiring mitigation measures. The proposed mitigations discussed above will aim to reduce this risk and will not negatively impact the downstream areas. It is anticipated that downstream areas would experience similar conditions as those during typical rainfall events.

An overview of the general locations of the proposed measures is shown in **Figure** 7-100:

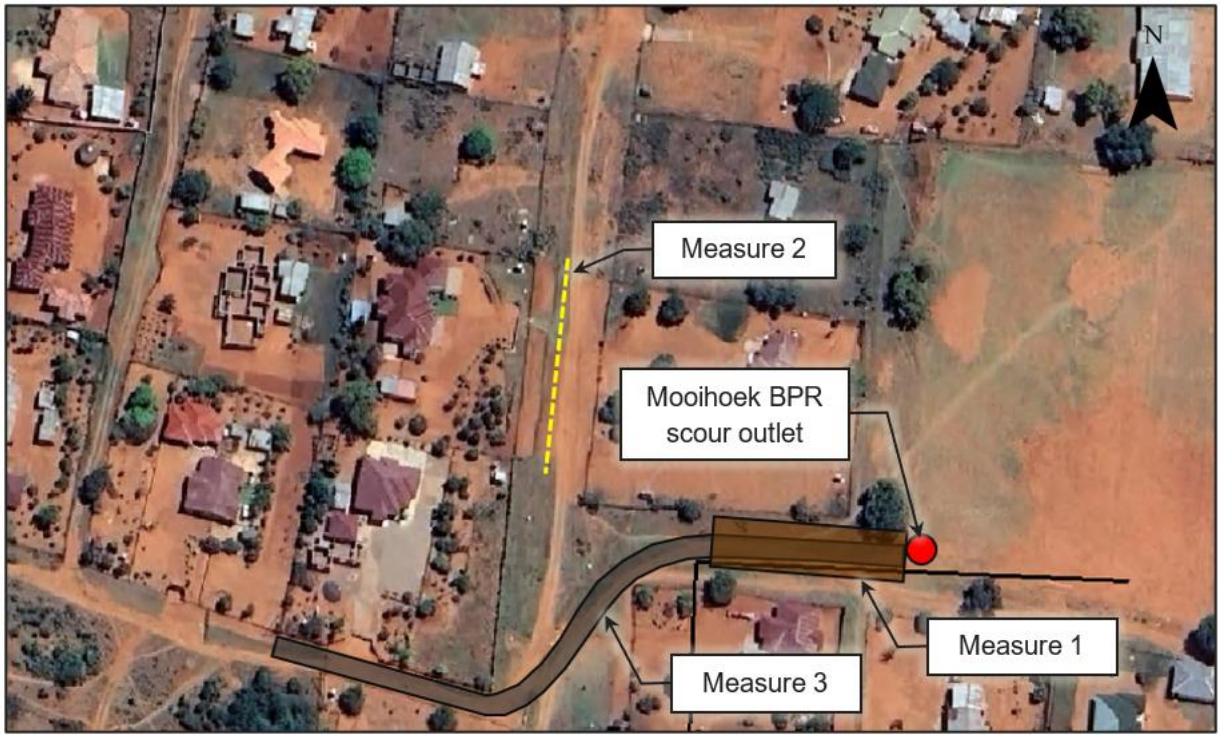


Figure 7-100: Scenario 2 - Overview of proposed mitigation measures.

Measure 2 and 3 were assessed individually within the hydraulic model. The results for measure 2 are shown in **Figure** 7-101:

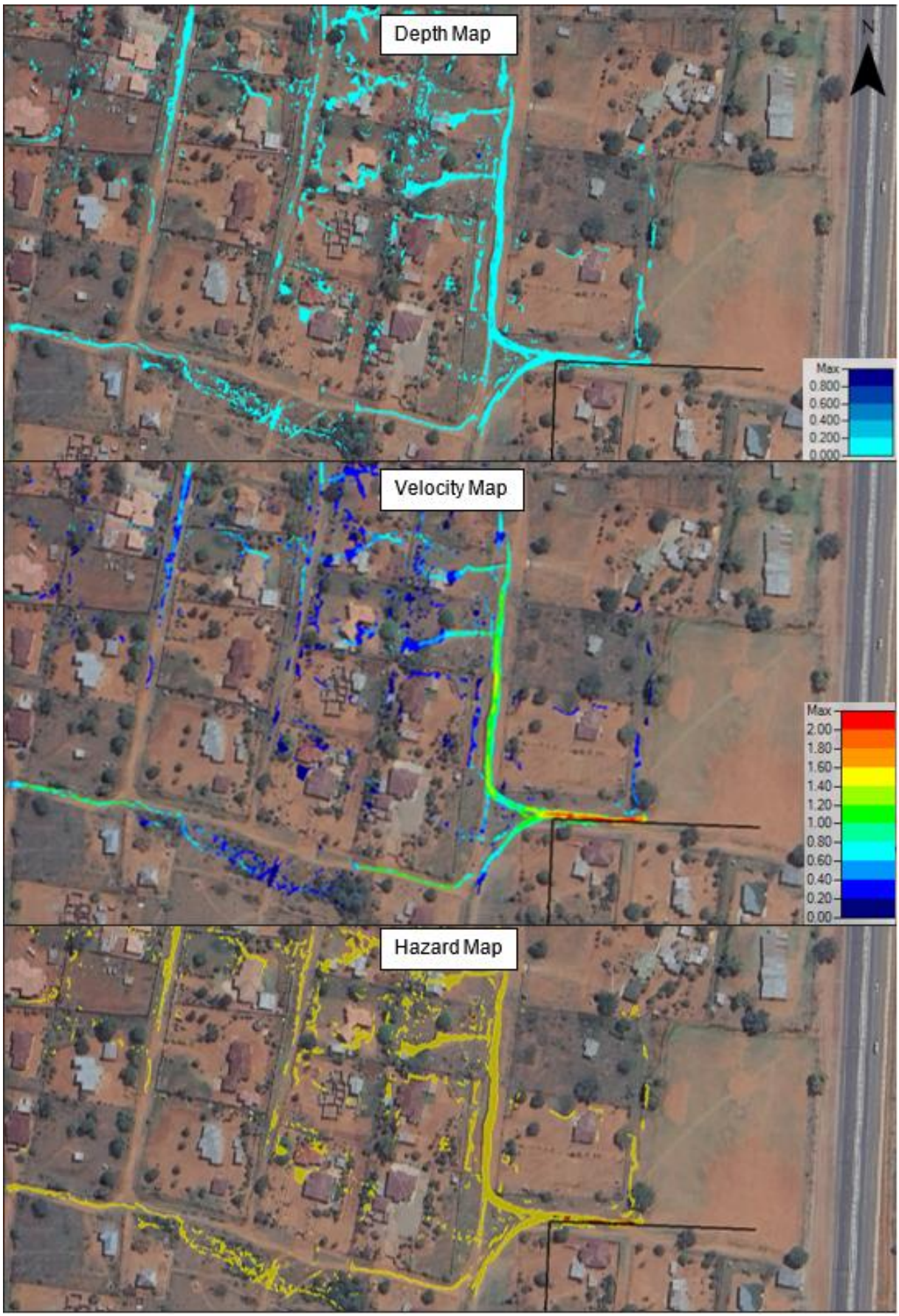


Figure 7-101: Scenario 2 - Mitigation measure 2 results.

The results for mitigation measure 2 indicate that the berm effectively reduces flood risk in the area identified in **Figure** 7-99. However, this also led to localized flooding at residential properties further

downstream. To address this, extending the berm further north may be necessary. It should be noted, however, that such an extension could introduce additional flood risks further downstream, as it may divert flow away from the natural, shortest drainage path to the nearest river or stream.

The results for mitigation measure 3 are shown in **Figure** 7-102 below:

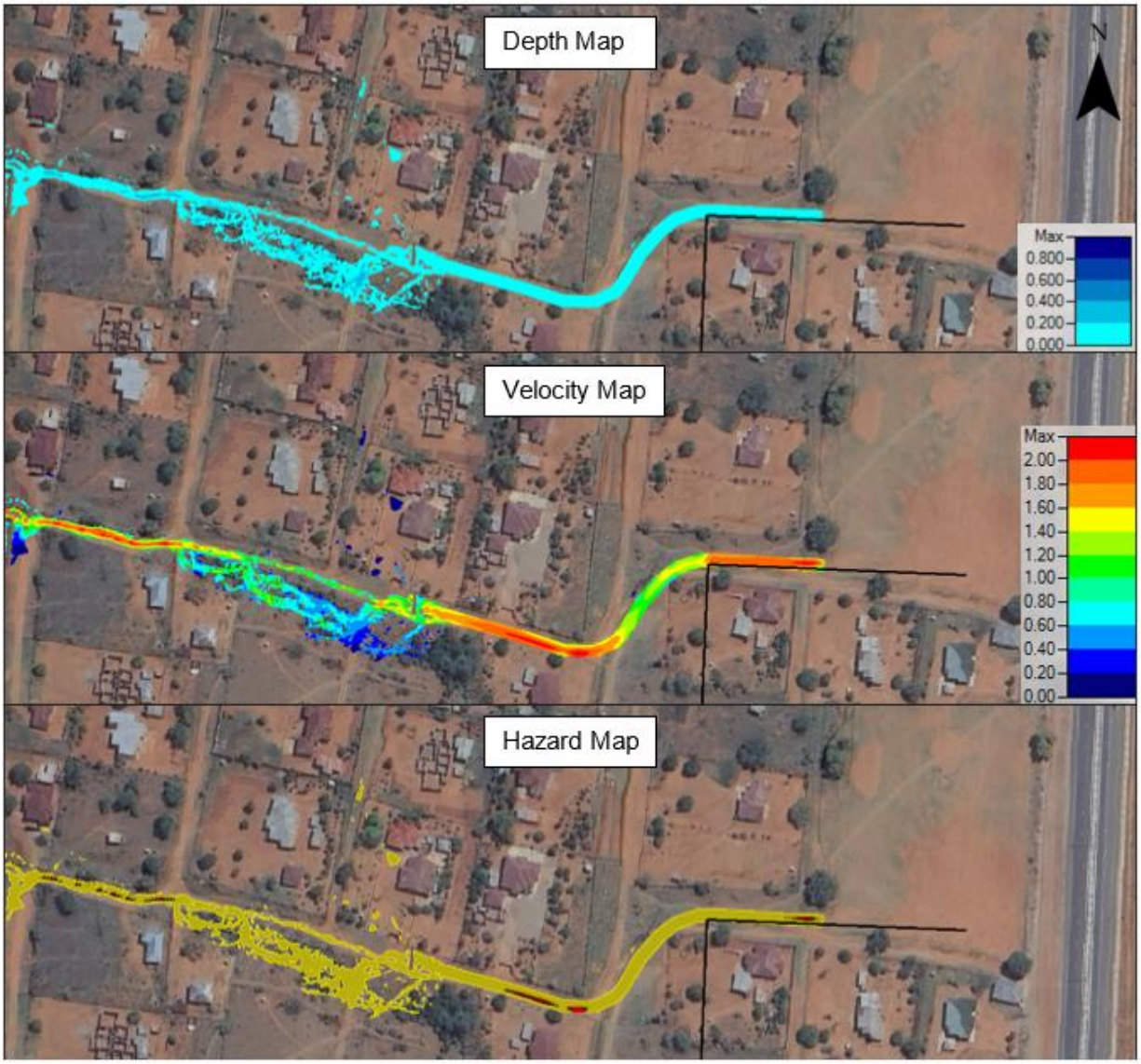


Figure 7-102: Scenario 2 - Mitigation measure 3 results.

Mitigation measure 3 offers the most effective solution for reducing flood risk in the vicinity of the scour valve. The proposed channel directs flow toward the nearest road, which follows the shortest path to the closest river or stream. As shown in **Figure** 7-102, elevated flow velocities are still present within the channel, and it is therefore recommended that these sections be lined with Reno mattresses or Armorflex to mitigate erosion risks. Additionally, an energy dissipation structure should be installed at the interface between lined and unlined channels.

Additionally, it should be noted that the channel may cut off access to some of the residential properties, but due to the short duration where the hazard is classified as high, it would not restrict residents from entering or leaving the property.

Based on the overall assessment, it is recommended that mitigation measures 1 and 3 be implemented in combination to effectively reduce the hydrological impacts associated with the Mooihoek BPR scour valve.

7.14.2.3 General Mitigations

In general, the receiving environment's susceptibility to erosion is influenced by both soil type and land cover. The erodibility of the soil encountered at the site can be evaluated using **Figure** 7-103, which presents the permissible flow velocities for various soil types.

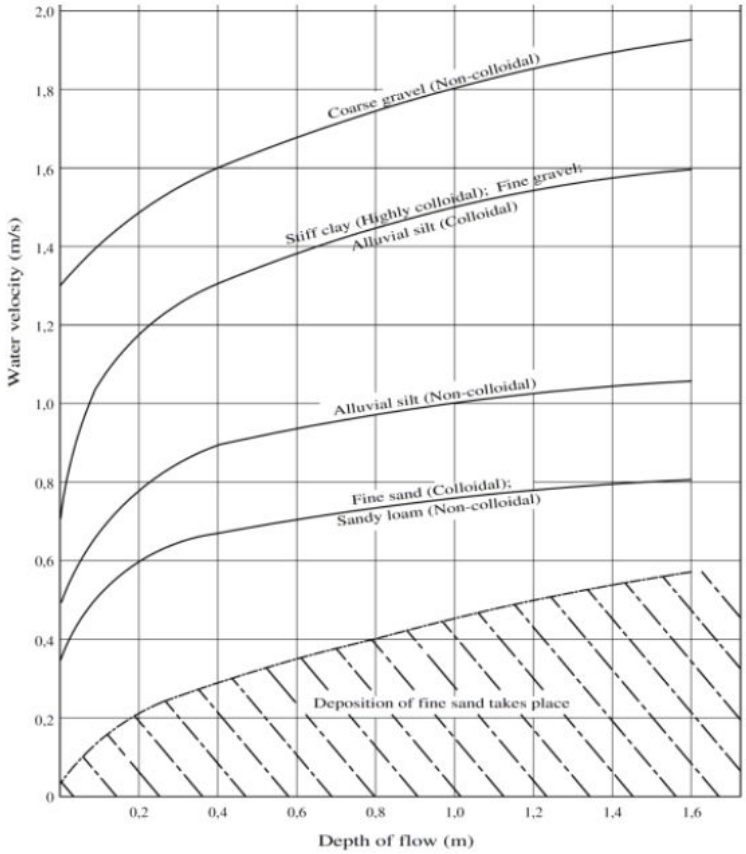


Figure 7-103: Permissible velocity per soil type (SANRAL, 2013).

If additional erosion mitigation measures are deemed necessary based on the actual soil classifications encountered on site, the following interventions may be considered:
Protection of areas experiencing high velocities with more resistant linings such as grouted stone pitching or armorflex.
Implementation of energy dissipation structures, such as elevation drops lined with gabions or Reno mattresses, to promote hydraulic jumps that transition flow from supercritical to subcritical conditions.
Construct berms around the affected areas to prevent water ingress.
Construction of lined or unlined channels and incorporating vegetation using appropriate grass or vegetation linings, as guided by **Table** 7-76, to improve surface stability and reduce erosion potential.

Table 7-76: Permissible maximum velocities (m/s) for grass covers (SANRAL, 2013).

Mean annual rainfall (mm)	**<600**			**600-700**			**>700**		
Type of grass	**% Clay content in the soil**								
	>15	**6-15**	**<6**	**>15**	**6-15**	**<6**	**>15**	**6-15**	**<6**
Kikuyu	No data			1.8	1.5	0.8	2.5	2.0	1.2
NK 37				2.0	1.5	0.8	2.0	1.5	1.0
K11				1.5	0.8	0.6	2.0	1.5	1.0
Rhodes				1.2	0.8	0.6	1.5	1.0	0.8
***E Curvula**	1.0	0.8	0.8	1.2	0.8	0.6	1.5	1.0	0.8
Blue Buffalo	1.0	0.8	0.8	1.2	0.8	0.6	No data		
Paspalum didatum	No data			1.2	0.8	0.6	2.0	1.5	1.0

7.14.3 ACCESS ROADS

7.14.3.1 Classification and Mitigation

A summary of all the planned access roads for Phase 2D, as well as their classification, are provided in **Table** 7-77**.** The table also states whether specific mitigation measures would be necessary. Section 7.14.3.2 provides additional information on access roads for which additional context was deemed necessary, and Section 7.14.3.3 provides general mitigation measures which could be taken into account for the other access roads.

Table 7-77: Detailed classification of access roads.

Access Number	Status	Road Type	Proposed Mitigation Measures
Access 01b	New	Informal Tyre Tracks	See Section 7.14.3.2.1**Error! Reference s ource not found.**
Access 01a	Existing	Gravel Road	—
Access 09	Existing	Gravel Road	—
Access 03a	Existing	Paved Road	—
Access 04a	Existing	Gravel Road	—
Access 10	Existing	Paved Road	—
Access 11	Existing	Paved Road	—
Access 12	Existing	Paved Road	—
Access 01	New	Informal Tyre Tracks	See Section 7.14.3.2.2
Access 03	New	Informal Tyre Tracks	See Section 7.14.3.2.3
Access 04	Existing	Paved Road	—
Access 08	Existing	Paved Road	—
Access 13	Existing	Gravel Road	—
Access 05	Existing	Gravel Road	—
Access 06	Existing	Paved Road	—
Access 07	Existing	Paved Road	—

7.14.3.2 Detailed Mitigations

This section provides a more detailed description of the proposed mitigation measures for the access roads identified in **Table** 7-77**.** General mitigation measures outlined in Section 7.14.3.3 may also be considered for implementation where applicable.

7.14.3.2.1 Access 01b

Access road 01b is situated at the Steelpoort WTW. The access road will entail widening 20 m of an existing informal tyre track. The layout of the proposed access road is shown in **Figure** 7-104.

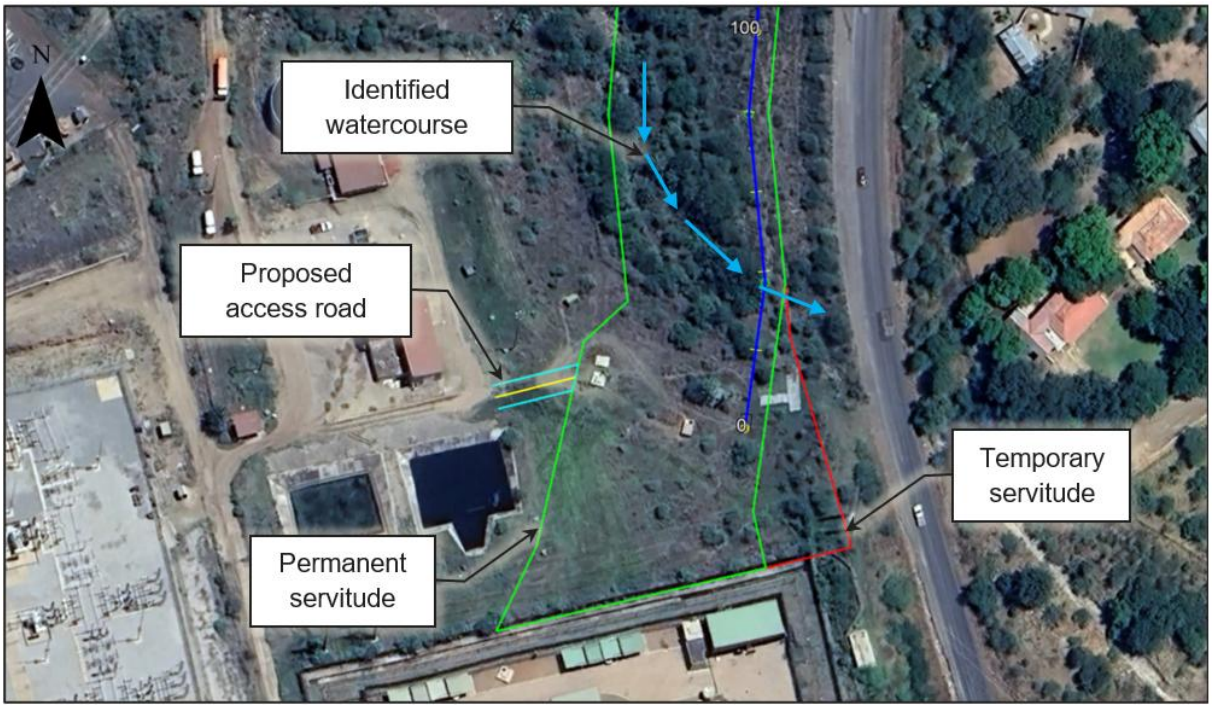


Figure 7-104: Access Road 01b.

A qualitative assessment of aerial imagery indicates that the associated access road lies approximately 50 m from an identified watercourse. To prevent significant erosion in the event that the floodline reaches the road boundary, erosion protection measures should be implemented along the side of the road facing the watercourse which may include riprap, stone pitching or Armorflex. Additionally, it is recommended that floodlines for the 1 in 100-year return period be delineated for this area to confirm that the access road is located outside the flood-affected zone.

7.14.3.2.2 Access 01

Access road 01 comprises of a bellmouth access from an existing road and entails widening of 136 m of an informal tyre track. A layout of the proposed access road is provided in **Figure** 7-105.

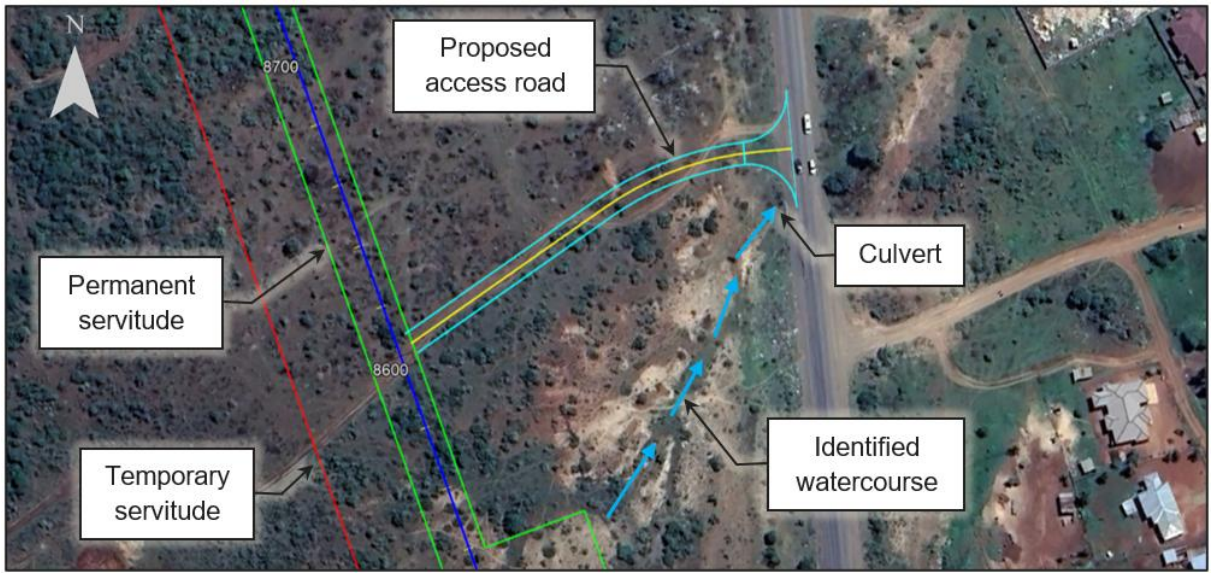


Figure 7-105: Access Road 01.

A qualitative assessment of the available aerial imagery indicates that the access road is situated in close proximity to a watercourse, which drains the area through a stormwater culvert. To ensure proper drainage functionality, the new access point must not obstruct any existing stormwater infrastructure at the junction with the existing road. It is therefore recommended that the access road be constructed with a drift or culvert at the tie-in location to maintain uninterrupted flow. In addition, erosion protection measures, such as stone pitching, riprap or reno mattresses, should be considered along the road edge facing the watercourse to reduce the risk of erosion. General mitigation measures as provided in Section 7.14.3.3 may also be incorporated.

7.14.3.2.3 Access 03

Access Road 03 is situated near an identified watercourse. This reconstructed access road is designed to include a bell mouth entrance, widening 560 m of the existing gravel road and the construction of 110 m of new gravel road that branches off towards the pipeline servitude. The access road layout is shown in **Figure** 7-106.

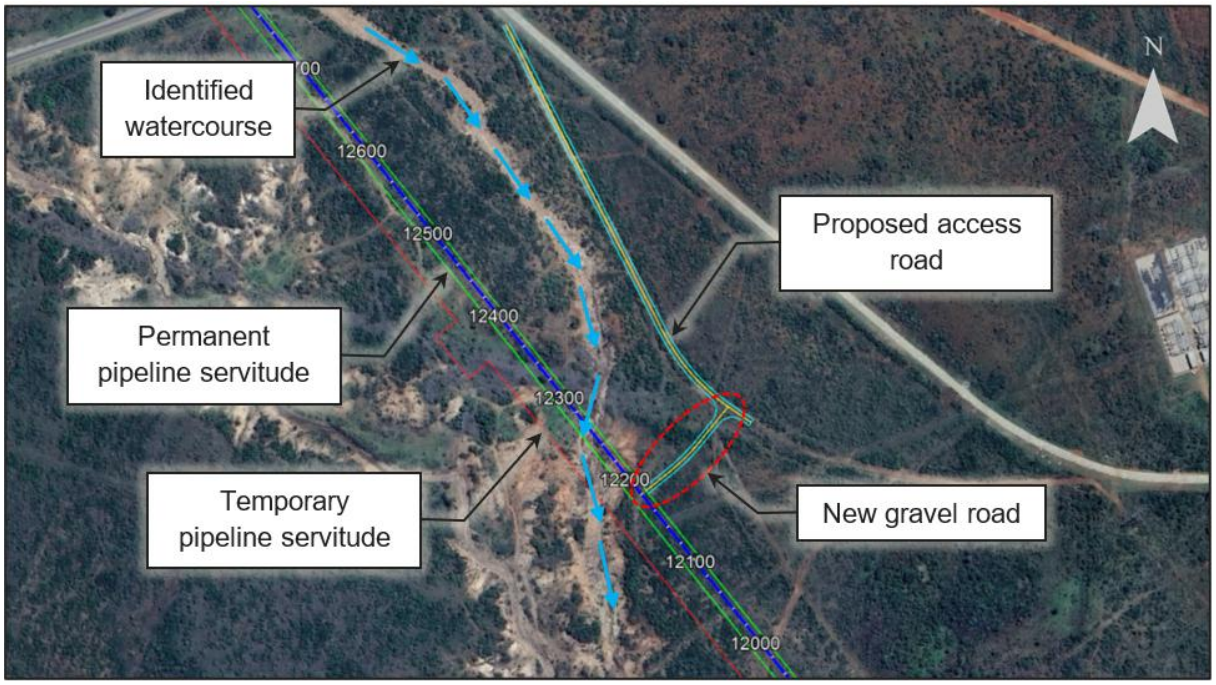


Figure 7-106: Access Road 03.

As shown in **Figure** 7-106, the majority of the access road runs parallel to a nearby watercourse. To reduce the risk of erosion should the 1:100-year floodline extend to the road boundary, suitable erosion protection, such as riprap, reno mattresses or stone pitching, should be implemented along the side of the road facing the watercourse.

It is therefore also recommended that floodlines corresponding to the 1:100-year return period be delineated for this area to confirm that the road is situated outside the flood-prone zone. Furthermore, to ensure that the new gravel section of the road does not negatively affect local hydrological conditions, the general mitigation measures provided in Section 7.14.3.3 should be applied where necessary.

7.14.3.3 General Mitigations

To minimise erosion and ensure long-term functionality of access roads, particularly where they interact with natural or man-made drainage paths, the following general mitigation measures are recommended:
Install drifts or culverts at locations where access roads intersect with natural watercourses to facilitate uninterrupted flow and reduce the risk of overtopping.

Construct side drains along the upstream side of access roads to collect and safely convey stormwater along the road alignment, preventing water accumulation and surface erosion.

Protect road embankments against erosion by lining the toe with semi-flexible materials such as Reno mattresses or stone pitching.

Erosion protection should also be provided at culvert inlets and outlets using durable materials such as stone pitching, reno mattresses, or Armorflex to prevent scour and undermining.
At junctions where access roads meet paved roads with existing drainage infrastructure, ensure that surface drainage patterns are preserved, if possible, and that flow continuity is maintained.

7.14.4 SPECIALIST CONCLUSION AND RECOMMENDATIONS

7.14.4.1 Flood Risk for Pipe Re-alignment

The aim of the mitigation measures was to address the hydrological impacts where the pipelines are affected by a watercourse. For this reason, the proposed mitigation measures can be divided into two main options:

a. Placing the pipeline below ground at these areas
b. Provide a pipe bridge to span the watercourse where feasible.

These options are discussed in further detail below:

Mitigation measures (a):

It is understood that the current design intent is to place the pipeline underground which significantly mitigates the overall hydrological impacts of the pipeline when compared to an above-ground pipeline. It is therefore anticipated that only structures protruding from the natural ground level may cause adverse hydrological impacts. If these structures are located within the 1 in 100-year floodline boundaries, they may locally alter the natural flow regime which may induce erosion. These structures will mainly include scour valve chambers, which are generally located at low points along the alignment of the pipeline.

To mitigate the hydrological impacts of these structures, the following measures can be applied:

- Ensure that structures near watercourses and within floodlines do not impede/obstruct flow.
- Ensure that erosion control measures are implemented so that the protrusions do not excacerbate localised erosion in the area.
- Should the structure be situated in an area which is already subject to significant erosion, soil conservation measures (gabion baskets, silt fences, etc.) should be implemented in an attempt to stabilise the area.
- The hydrological impact during construction should be managed and must consider both downstream and upstream effects.

Additionally, due to the high erosion potential observed during the site visit conducted in January 2025, it is essential that additional precautions be taken at pipeline crossings over watercourses. Over time, ground cover above the pipeline may erode, potentially exposing the pipeline and increasing the risk of hydrological impacts. These may need to be managed in future, similar to the retrofitted erosion protection measures observed in the area. This natural variability should be accounted for during the detailed design phase, and it is therefore recommended that the following considerations be incorporated into the detailed design:

- Cover and backfill requirements:

- This may be informed by sediment transport and erodibility assessments coupled with flow velocity determinations.

- Maximum undermined pipeline span (should excessive erosion be experienced):
  - An undermined pipeline will be subject to gravitational forces, as well as significant drag forces imparted by the flow of water. These forces have the potential to damage the pipeline, which may in turn cause significant downstream damage in the event of sudden pipeline failure. The potential for, and consequences of, such a sudden failure should be assessed.
- Erosion protection and soil conservation structures:
  - Construct erosion protection measures at all pipeline-watercourse crossings. These structures should be designed based on local flow velocities, flow depths, and soil erosivity conditions.
  - Construct soil conservation structures in erosion prone areas, such as dongas and gullies near the pipeline, to mitigate the progression of head-cuts in these areas.
  - Both structures should aim to reduce the flow velocity upstream of the structure, effectively promoting sedimentation.
  - Allowance should also be made for a key wall on the downstream side to intercept any potential head-cuts from progressing upstream which will allow the downstream reach to reach equilibrium in terms of sediment transport.

It is anticipated that by implementing the recommendations mentioned above, an overall improvement to risk of erosion in the area can be achieved. The mitigation measures will improve the stability of the watercourses and promote sedimentation in the upstream of the control structures essentially improving the overall hydrological impacts in the area. Ongoing maintenance and the surveying of donga growth should be monitored annually post construction.

Mitigation measures (b):

Alternatively, another approach that may be considered is to place the pipeline above the 1 in 100-year floodline by means of a pipe bridge in areas where excessive velocities and erosion is anticipated. The following may be considered:

- Ensure that portions of the pipeline that spans across the floodline boundary are above the water surface elevation of the 1 in 100-year flood.
- Locate the pipe supports outside the regulated boundaries where possible.
- Should pipe supports be required within the 1 in 100-year floodline boundary, appropriate erosion protection measures should be incorporated to reduce the risk of erosion compromising the supports.

Although this may reduce the immediate need of large erosion control measures and soil conservation structures at crossings, this does not prevent the propagation of head-cuts and there may be an increased risk for a local point failure at bridge supports. Consequently, erosion protection measures at the footing locations must be managed accordingly. In areas where long spans and multiple footings within the floodline are required, pipe bridges are not suggested due to the risk of failure.

As this assessment was prepared to reference design level as per the New Engineering Contract (NEC), revised post-construction floodlines should be delineated as part of the final design and the detail design must ensure that the impact of these post-construction floodlines is fully mitigated, including the risk of inundation of property and infrastructure, and the risk of the exacerbation of erosion and sedimentation.

7.14.4.2 Scour Risk

The scour risk associated with scour valve SC-2H-02 and SV-2H1-03 poses a minor risk to the community. While the temporary presence of water in pathways might be noted as a minor nuisance, the infrequent occurrence of scour events is unlikely to significantly disrupt the community's daily

activities. Scour valve SV-2H1-02 and SV-2H1-03 are classified as low risk. General mitigation measures may be implemented for areas of concern based on site observations.

The hazard classification associated with scouring for the Mooihoek BPR is categorised as medium to high risk in certain areas. This classification reflects the potential risk to community members of being swept away by the flow from the scour outlets. The status quo assessment indicated that the scour event would cause localised flooding of properties in the vicinity of the BPR. Additionally, due to the relatively high velocities downstream of the scour outlet, protection measures would be required to mitigate risks associated with erosion as well as sediment transport.

For this reason, it is proposed that some mitigation measures be implemented as described in Section 7.14.3.2. The final proposed mitigation measures that may be implemented are listed below:

- Measure 1: Line approximately 50 m of the gravel road downstream of the scour valve outlet with Reno mattresses, grouted stone pitching or riprap to reduce erosion caused by high-velocity flow.
- Measure 3: Excavate the section of road directly downstream of the scour valve to form a defined channel capable of conveying the flow. A channel width of 5 m and depth of 0.3 m is recommended.

Should areas be identified where localised flooding may still occur, it is recommended that some general mitigation measures be implemented based on site-specific conditions. The proposed general mitigation measures are listed below (refer to Section 7.14.3.3):

- Protection of areas experiencing high velocities with more resistant linings such as grouted stone pitching or armorflex.
- Implementation of energy dissipation structures, such as elevation drops lined with gabions or Reno mattresses, to promote hydraulic jumps that transition flow from supercritical to subcritical conditions.
- Construct berms around the affected areas to prevent water ingress.
- Construction of lined or unlined channels and incorporate vegetation using appropriate grass or vegetation linings to improve surface stability and reduce erosion potential.

7.14.4.3 Access Roads

The access roads were assessed based on the criteria set out in section **Error! Reference source not found.** of the hydrology impact assessment report and stormwater management interventions are proposed to mitigate the impact of the new access roads on the current hydrological conditions. The primary objective of these interventions is to preserve natural or man-made flow paths and to minimise erosion resulting from the construction of the new access roads. The proposed mitigations measures are listed below:

- Drift or culverts should be installed where access roads cross natural flow paths to allow for uninterrupted water movement.
- Side drains should be constructed along the upstream side of the road to collect and convey stormwater along the road alignment.
- Erosion protection should be implemented by lining the toe of the road embankments with semi-flexible materials such as reno mattresses or stone pitching.
- Culvert inlets and outlets should be protected against erosion using durable materials like stone pitching, reno mattresses or Armorflex.
- Where access roads connect to paved roads where side drainage is present, the relevant surface drainage should be maintained by the access road.

7.15 SITE SENSITIVITY MAPS

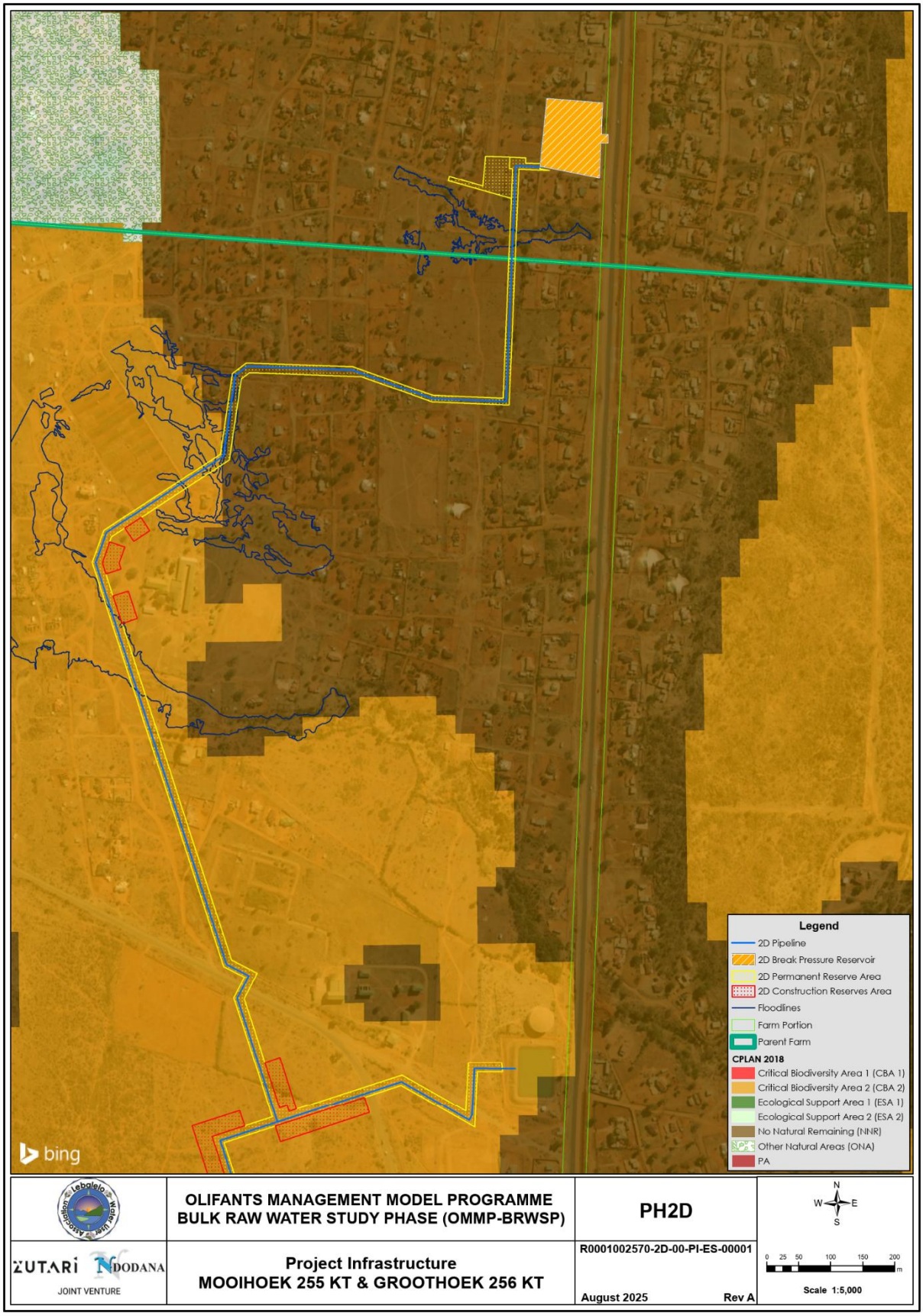


Figure 7-107: Environmental Sensitivities - Raw water pipeline segment from the Mooihoek reservoir to the proposed Mooihoek BPR.

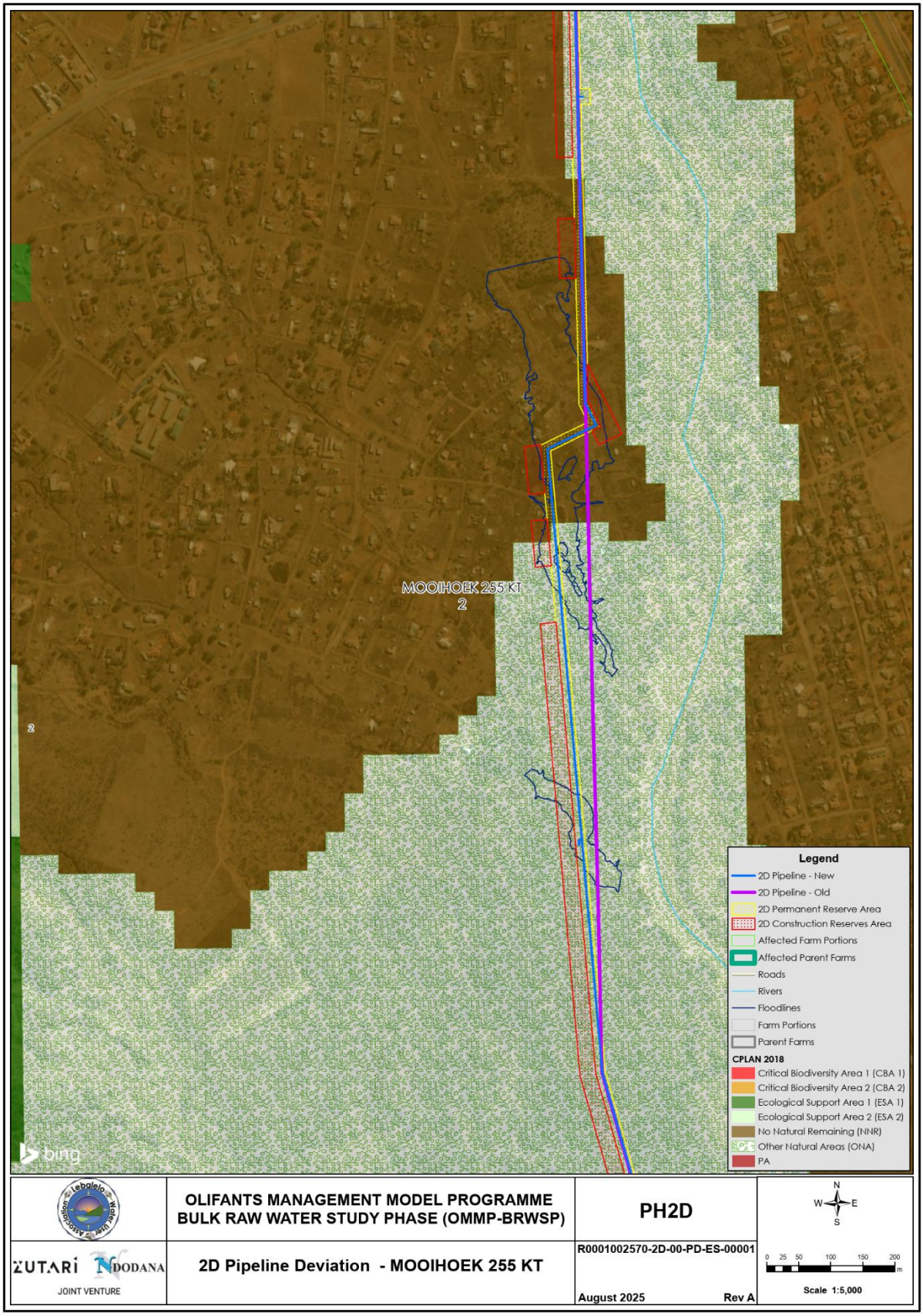


Figure 7-108: Environmental Sensitivities - Raw water pipeline segment deviation in the central section of the alignment.

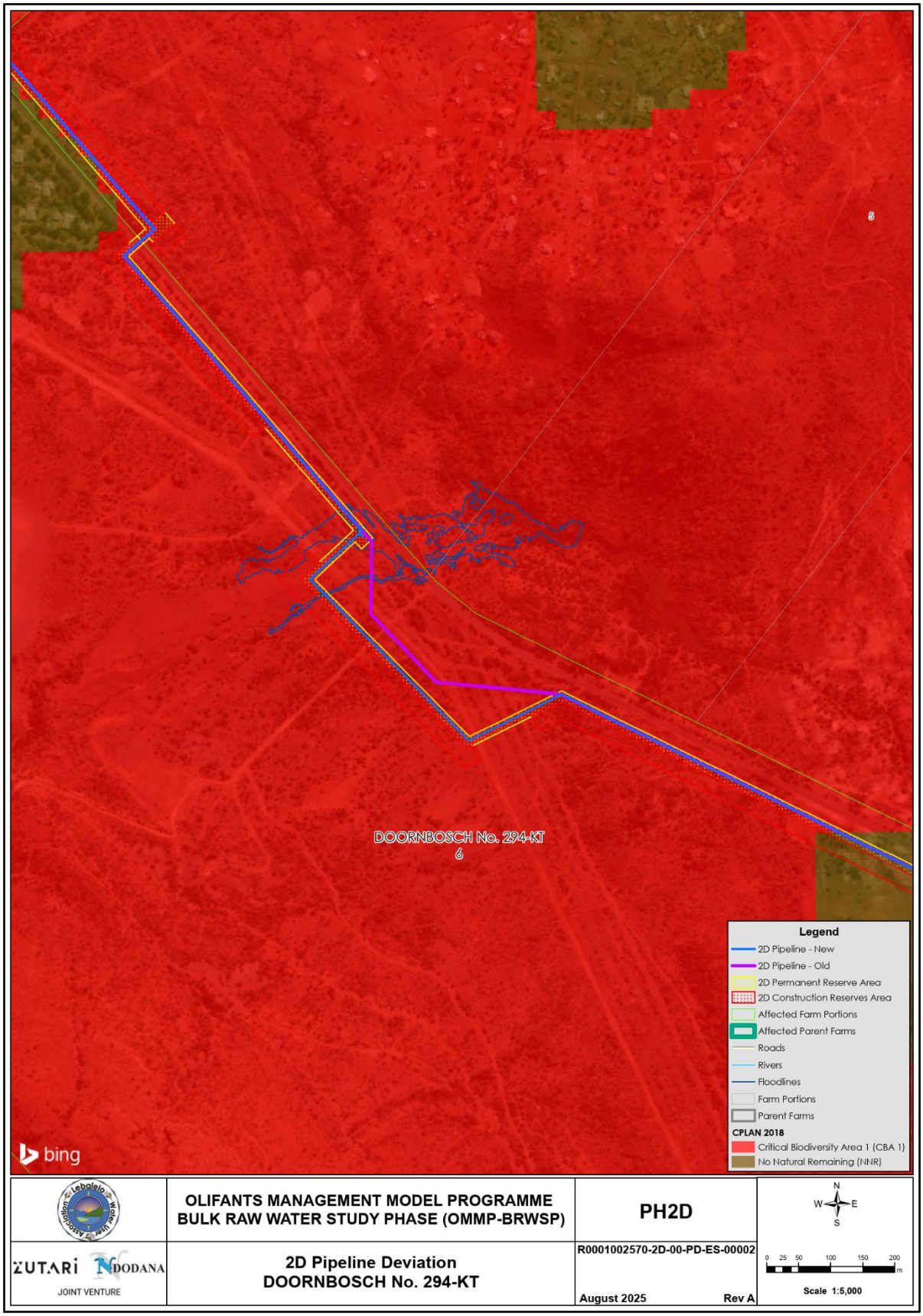


Figure 7-109: Environmental Sensitivities - Raw water pipeline segment deviation in the southern section of the alignment.

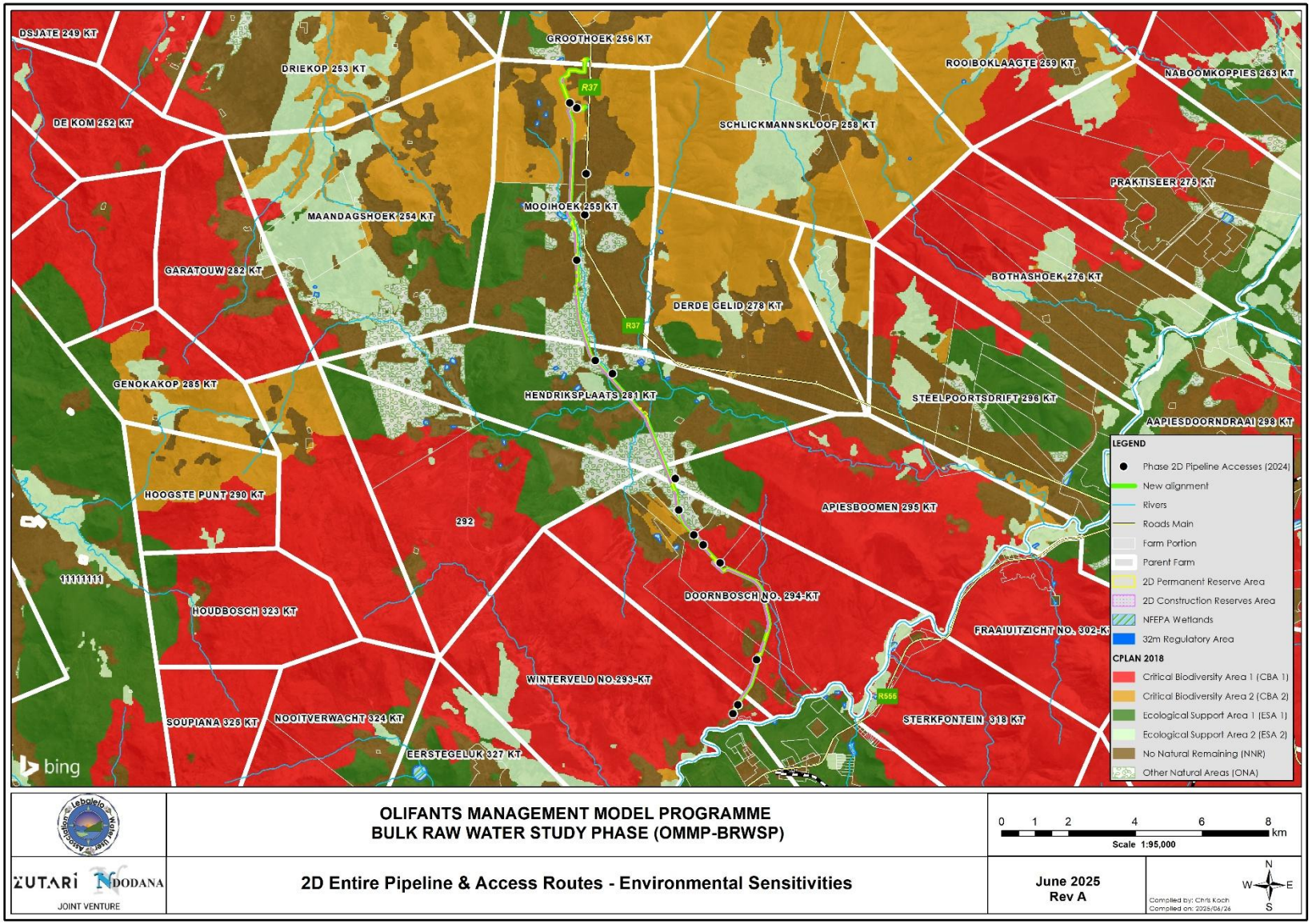


Figure 7-110: Environmental Sensitivities - Overall Phase 2D pipeline alignment

8 CONCLUSIONS AND WAY FORWARD

8.1 SPECIALIST-PROPOSED MITIGATION MEASURES NOT ENDORSED BY THE EAP

Outlined below is a summary of the mitigation measures recommended by the specialists, which have not been endorsed by the EAP.

8.1.1 HERITAGE PROPOSED MITIGATION MEASURES

The heritage specialist has recommended a 30 m no-go buffer zone around all four sites to avoid potential direct impacts to these heritage resources. However, the EAP does not endorse this recommendation and has instead proposed that the buffer be reduced to 5 m. This is to ensure that the already narrow proposed servitudes are not further constrained, and to maintain consistency with the 2016 Heritage Impact Assessment, which previously recommended a 5 m buffer around identified gravesites along the alignment.

Furthermore, realigning the pipeline to avoid the 30 m buffer around the cemetery is not feasible, as such a realignment would result in impacts on surrounding houses, which have been deliberately avoided to minimise the number of households requiring resettlement. The alternative recommendation of relocating graves in instances where the temporary and/or permanent servitude encroaches into the 30 m buffer is not considered practical. Relocating at least 250 graves would not be justifiable from an environmental, social, or cost perspective.

In light of the above, a **5 m buffer** around these heritage sites is recommended as a more practical solution, given the spatial constraints. This will also accommodate the required **15 m permanent servitude** along the pipeline.

8.1.2 FRESHWATER AQUATICS PROPOSED MITIGATION MEASURES

- Stockpiles may not exceed a 2 m height and must be covered with a suitable geotextile (e.g. Geotextile or hessian sheeting) to prevent contamination by hydrocarbons/fuel and to prevent alien invasive encroachment until the excavation trench can be backfilled. While this is a valid recommendation regarding stockpile management, the EAP does not consider it directly relevant in the context of surface water impacts.
- The topsoil layer of the soil stockpile must be separated from the lower layers and protected from moisture loss and alien vegetation encroachment, using a geotextile such as hessian sheeting, for use during the rehabilitation phase of the river banks. Although this is a valid specialist recommendation, it should be noted that the proposed pipeline does not cross any riverbanks.
- It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present. However, the EAP notes that this is not a practical recommendation, as construction will proceed continuously from commencement until completion.
- It is strongly recommended that the reinstated areas be fenced off for a period (at least 6 months) following reinstatement to prevent livestock from accessing the rehabilitated areas thereby allowing vegetation to become established. The EAP notes that this fencing requirement is not practical, and the contractor should instead refer to the conditions outlined in the Terrestrial Biodiversity Impact Assessment (see section 7.9) for guidance on rehabilitation and the reinstatement of disturbed areas, as far as is practically possible.

8.2 PROPOSED SPECIFIC CONDITIONS OF AUTHORISATION

Outlined below are the specific conditions of authorisation proposed by the EAP, informed by the environmental sensitivities identified by the appointed specialists:

- A walkthrough of the final layout must be undertaken by a botanist and if populations of SCC will be impacted, infrastructure should be moved to avoid these areas. Where this is not feasible, a search and rescue plan will be required.
- If any SCC are to be impacted, these must be relocated to nearest appropriate habitat. Extreme caution should be applied during the relocation of the plants to ensure they are not damaged.
- A permit must be ontained from the relevant department for the removal or destruction of indigenous vegeation, protected, or endangered plant or animal species (if any).
- Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.
- The temporary construction camps must be located outside of the water courses (including the aquatic buffers) during the construction mobilisation process. None are presently located within any aquatic systems, but should additional laydown areas be required during the construction process, this recommendation will be applicable.
- Rehabilitation must be planned as a staged approach to ensure an area is immediately rehabilitated once construction is completed. No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised.
- If any changes to the assessed layouts are made, the input of the relevant specialist must be considered or obtained and incorporated into any changes.
- If any evidence of archaeological sites or remains, unmarked human burials, fossils or other categories of heritage resources are uncovered during construction, work in the immediate area must be halted, and SAHRA or LIHRA must be alerted immediately, and a professional archaeologist or palaeontologist (depending on the nature of the finds) must be contacted as soon as possible to inspect the findings.
- Topsoil must be stockpiled separately from subsoil and should be placed within the designated areas.
- Where topsoil is stored for more than three months, a protective vegetation layer must be established to cover the stockpiles. Furthermore, soil stockpiles must be kept relatively moist during dry seasons to maintain the vitality of the soil.

8.3 VALIDITY OF THE ENVIRONMENTAL AUTHORISATION

It is proposed that the EA be valid for a period of 10 years from the date of the decision. This is to allow sufficient time for the Applicant and developers to gain the necessary approvals required before construction can commence.

8.4 EAP STATEMENT

It is the EAPs opinion that the recommended mitigation measures proposed by the specialists and contained in the EMPr, together with the Applicant's consideration of the sensitivities and no-go areas in the current design, will sufficiently reduce the negative impacts to an acceptable level.

Provided the mitigation measures included in the EMPr are implemented, the EAP recommends that the proposed Phase 2D components be authorised. The final layout within the footprint must take the identified sensitivities into account during the detailed design phase.

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10 ANNEXURES

ANNEXURE A: DETAILS OF THE EAP

ANNEXURE B: CORRESPONDENCE WITH DFFE

ANNEXURE C: PUBLIC PARTICIPATION

ANNEXURE C1: I&AP REGISTER

ANNEXURE C2: PUBLIC PARTICIPATION DOCUMENTS

ANNEXURE D: SPECIALIST REPORTS

ANNEXURE D1: AGRICULTURAL COMPLIANCE STATEMENT

ANNEXURE D2: AIR QUALITY IMPACT ASSESSMENT

ANNEXURE D3: CIVIL AVIATION COMPLIANCE STATEMENT

ANNEXURE D4: DEFENCE COMPLIANCE STATEMENT

ANNEXURE D5: HERITAGE IMPACT ASSESSMENT

ANNEXURE D6: PALAEONTOLOGY IMPACT ASSESSMENT

ANNEXURE D7: FRESHWATER AQUATIC IMPACT ASSESSMENT

ANNEXURE D8: TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

ANNEXURE D9: SOCIAL IMPACT ASSESSMENT

ANNEXURE D10: VISUAL AND LANDSCAPE ASSESSMENT

ANNEXURE D11: TRAFFIC IMPACT ASSESSMENT

ANNEXURE D12: NOISE IMPACT ASSESSMENT

ANNEXURE D13: HYDROLOGY ASSESSMENT

ANNEXURE E: DFFE SCREENING TOOL REPORT

ANNEXURE F: ENVIRONMENTAL MANAGEMENT PROGAMME (EMPR)

ANNEXURE G: SITE PHOTOGRAPHS

ANNEXURE H: MAPS AND DRAWINGS

ANNEXURE I: EAP DECLARATION

ANNEXURE J: REVISED RECORD OF DECISION (REF: **03/2/4**) AND 2016 ENVIRONMENTAL MANAGEMENT APPROVAL (REF: **14/12/16/3/1/9/21**)

In diversity there is beauty and there is strength.

MAYA ANGELOU

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