



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

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

ENVIRONMENTAL MANAGEMENT PROGRAMME PHASE 2D



JOINT VENTURE

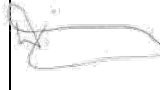
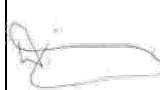
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ABBREVIATIONS

ACC	Authorities Coordinating Committee
AEL	Atmospheric Emissions License
AIP	Alien Invasive Plant
AMSL	Above Mean Sea Level
ASTM	American Society for Testing and Materials
ATS	Air Traffic Service
BA	Basic Assessment
BAR	Basic Assessment Report
BIC	Bushveld Igneous Complex
BOQ	Bill of Quantities
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act, No. 43 of 1983
CBA	Critical Biodiversity Area
CB	Critical Biodiversity
CDM	Capricorn District Municipality
CoGHSTA	Cooperative Governance, Human Settlements and Traditional Affairs
COLTO	Committee of Land Transportation Officials
CR	Critically Endangered
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
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/Control Officer
EE	Engineers Environmental
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Monitor
EMC	Environmental Monitoring Committee
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
ESA	Ecological Support Area
ES	Engineers Social
ESO	Environmental Safety Officer
FTLM	Fetakgomo Tubatse Local Municipality
FPO	Fire Protection Officers
FPA	Fire Protection Association
GA	General Authorisation
GDP	Gross Domestic Product
GG	Government Gazette
GN	Government Notice / General Notice
(H)	Horizontal Distance
HSA	Hazardous Substances Act, No. 15 of 1973
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
ISO	International Organisation for Standardisation
LED	Local Economic Development
LEDET	Limpopo Department of Economic Development, Environment and Tourism

LEMA	Limpopo Environmental Management Act, No. 7 of 2003
LIHRA	Limpopo Provincial Heritage Resources Authority
LNLM	Lepelle Nkumpi Local Municipality
LWUA	Lebalelo Water User Association
MPRDA	Mineral and Petroleum Resources Development Act, No. 28 of 2002
MSDS	Material Safety Data Sheet
NCR₁	Noise Control Regulations
NCR₂	Non-conformance Record
NCW	Not Conservation Worthy
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
NHRA	National Heritage Resources Act, No. 25 of 1999
NPAES	National Protected Areas Expansion Strategy (2008)
NRTA	National Road Traffic Act, No. 93 of 1996
NWA	National Water Act, No. 36 of 1998
OSH	Occupational Safety and Health
OHSA	Occupational Health and Safety Act 85 of 1993
OMM	Olifants Management Model
OMMP - BRWSP	Olifants Management Model Programme Bulk Raw Water Study Phase
ORWRDP-2	Olifants River Water Resources Development Project
PDCA	Plan, Do, Check and Act
PM	Particulate Matter
PPE	Personal protective equipment
PPP	Public Participation Process
PS	Performance Standard
PSDF	Provincial Spatial Development Framework
PTO	Permissions to Occupy
RAL	Roads Agency Limpopo
RAP	Resettlement Action Plan
RoD	Record of Decision
RRoD	Revised Record of Decision
RLS	Rustenburg Layered Suite
SACAA	South African Civil Aviation Authority
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANRAL	South African National Roads Agency
SAPS	South African Police Service
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SDM	Sekhukhune District Municipality
SEIR	Scoping and Environmental Impact Reporting
SHE	Safety, Health, and Environmental
SIP	Strategic integrated Project
SM	Social Monitor
SMME	Small, Medium and Micro Enterprise
SMP	Social Monitoring Plan
SO	Social Officer
SOP	Standard Operating Procedure
SSV	Site Sensitivity Verification
SUDS	Sustainable Urban Drainage Systems
SWMP	Stormwater Management Plan
TCTA	Trans-Caledon Tunnel Authority
VAC	Visual absorption capacity

VU	Vulnerable
WCMR	Waste Classification and Management Regulations
WML	Waste Management License
WMP	Waste Management Plan
WSA	Water Service Authority
WTW	Water Treatment Works
WWTW	Wastewater Treatment Works
WUL	Water Use Licence
WULA	Water Use License Application
ZNJV	Zutari Ndodana Joint Venture

REQUIREMENTS OF ENVIRONMENTAL MANAGEMENT PROGRAMMES

Appendix 4 of the National Environmental Management Act, No. 107 of 1998 (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014 [General Notice (GN) R982 of 2014] specifies the requirements of an Environmental Management Programme (EMPr). The table below serves as a map of how the requirements detailed in Appendix 4 have been adhered to.

Table 1-1: Requirements of an EMPr as detailed in Appendix 4 of the NEMA EIA Regulations 2014.

Requirement		Reference
1(a)	(i) details of the EAP who prepared the EMPr; and	Sections 1.1 and Appendix A
	(ii) details of the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Sections 1.1 and Appendix A
1(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Sections 1.2, 1.3, 1.5, 1.6 and Section 4
1(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Appendix E
1(d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including -	Sections 6, 7, 8, 14 and 15
	(i) planning and design;	Section 4
	(ii) pre-construction activities;	Section 4
	(iii) construction activities;	Sections 4, 6 and Section 7
	(iv) rehabilitation of the environment after construction and where applicable post closure;	Sections 6, 7 and 8
	(v) where relevant, operation activities;	Sections 6, 7 and 12
1(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d)	Sections 6, 7, 14 and 15
1(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Sections 6, 7, 14 and 15
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Sections 6, 7, 14 and 15
	(ii) comply with any prescribed environmental management standards or practices;	Sections 6, 7, 14 and 15
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	Sections 6, 7, 14 and 15
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	N/A
1(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Sections 6, 7, 14 and 15
1(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f)	Sections 6, 7, 14 and 15
1(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5, 6, 7 and Section 9
1(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Sections 6, 7, 14 and 15
1(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Sections 6, 7, 14 and 15
1(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 6, 7, 14, 11 and 15
1(m)	an environmental awareness plan describing the manner in which -	
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 11
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Sections 6, 7, 14 and 15
1(n)	any specific information that may be required by the Competent Authority.	None to date.

TERMS AND DEFINITIONS

Acceptable Cover: Not less than 80% of the planted area sown, hydro-seeded or planted shall be covered with live plants of the specified species measured as basal cover, and that there shall not be any bare patches larger than 500 mm maximum in diameter. The Contractor, in agreement with the Engineer, shall determine the areas or portions of land that shall be assessed for acceptable cover, and these shall then remain fixed for the purposes of maintenance and final hand over. Acceptable shall be measured using a procedure agreed with the Engineer, and would generally include randomly selecting 1 metre square plots covering the entire site to be assessed, assessing if the cover meets the criteria above, and then statistically determining acceptability or not, over the entire area assessed. In areas where the pipeline traverses surface rocky outcrops and naturally degraded areas because of inappropriate land-use practices, and the duplex soils requiring a perennial grass cover for maintenance have been subject to annual cropping or over grazing, or because of faulty road alignment, design and drainage that concentrated runoff resulting in canyon sized gullies (dongas) that grow ever deeper, wider and longer, this requirement will not be applicable. In these cases, the area shall be acceptable if all the requirements of this Section have been executed and a stable surface area, not prone to erosion, is left.

Continual Improvement: This is a recurring process resulting from Management Reviews used to enhance the requirements of the Environmental Management Programme (EMPr) in order to improve the overall environmental compliance and performance of an organisation.

Engineer: The Engineer in the context of this document and Project shall be the appointed engineering team which includes the Chief Resident Engineer, resident engineers, the Environmental Monitor etc. This team is to manage and oversee the construction of the Project against the requirements of the contract specifications, the RRoD and this EMPr and others.

Environmental Aspect: Any element of an organisation's activities that can interact with the environment ultimately resulting in effects to the environment – whether positive or negative.

Environmental Impact: Any change to the environment, whether positive or negative, resulting from the organisation's environmental aspects.

Environmental Management System: This system forms part of the organisation's overarching management system and is used to develop and implement the environmental policy and manage its identified environmental aspects.

Environmental Objective: An overall environmentally related goal or statement of achievement, consistent with the environmental policy, that the organisation sets itself to achieve.

Environmental Policy: Sets the overall intention and direction of the organisation with regard to its environmental compliance and performance as agreed upon by top management. The Policy provides a framework for action and for the setting of environmental objectives and targets.

Grey Water: Wastewater generated from activities such as washing of vehicles and plant as well as dishwashing.

Non-conformity: Failure of the organisation to adhere to the requirements of the relevant legislation governing its activities, conditions of the Record of Decision and EMPr.

PM₁₀: Particle matter equal to and less than 10microns in aerodynamic diameter which can be deposited in the lungs. PM includes dust, smoke, soot, pollen and soil particles.

Ripping: Loosening the in-situ and backfilled soil in areas to be rehabilitated to a depth of at least 300mm where feasible throughout the servitude. In areas identified as agricultural or having a high agricultural potential ripping shall be done to a depth of at least 600mm. Ripping is done to mitigate compaction resulting from construction activities, and is done prior to placing topsoil.

Scarifying: Loosening the soil in areas which have become hard and compacted and which need to be loosened in order to facilitate re-vegetation to a depth of at least 150 mm.

Sensitive Receptors: A person or place where involuntary exposure to pollutants released by the proposed project could take place.

OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP)

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR PHASE 2D

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1. INTRODUCTION

The Lebalelo Water User Association (LWUA) appointed the Zutari Ndodana Joint Venture (ZNJV)¹ for the provision of professional services for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP).

Note: This is a continuation of the existing, approved 2016 Environmental Management Programme (EMPr) to incorporate the proposed scope changes for the Phase 2D component. All changes are highlighted in blue. This is the valid EMPr that must be used during the construction of the entire Phase 2D alignment.

1.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The compilation of this EMPr was prepared by Ms. Zinzi Portia Xakayi and reviewed by Mr. Deon Esterhuizen and Mrs. Natanya Whitehorn of ZNJV. For a detailed description of the expertise and previous project experience of the author and reviewers, please refer to **Annexure A** for the curriculum vitae of the environmental assessment practitioners (EAPs).

1.2 PROJECT BACKGROUND

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)² 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 EMPrs are developed and submitted for approval to the Competent Authority (CA).

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

¹ Previously referred to as the Aurecon-Ndodana Joint Venture.

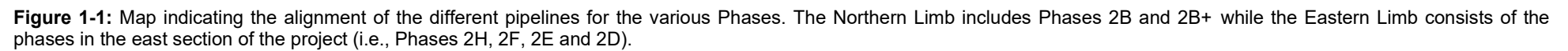
² Now referred to as the Department of Forestry, Fisheries and the Environment (DFFE).

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 EMPr being on Phase 2D:

- ▶ Phase 2B
- ▶ Phase 2B+
- ▶ Phase 2D³ ; and
- ▶ 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.

³ Changes in this phase will be administratively implemented as Phase 2H.



1.3 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 B**) 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 new application, LWUA, on behalf of the DWS, seeks authorisation for the raw water pipeline segment from the Mooihoek Reservoir to the proposed Mooihoek⁴ 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 Environmental Authorisation (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**⁵ below.

Note: This is the current EMPr that must be used during the construction and operation of the entire Phase 2D alignment.

⁴ Referenced as the *Groothoek BPR* in the specialist reports compiled to support this assessment.

⁵ This deviation, by itself, does not trigger any listed activities.

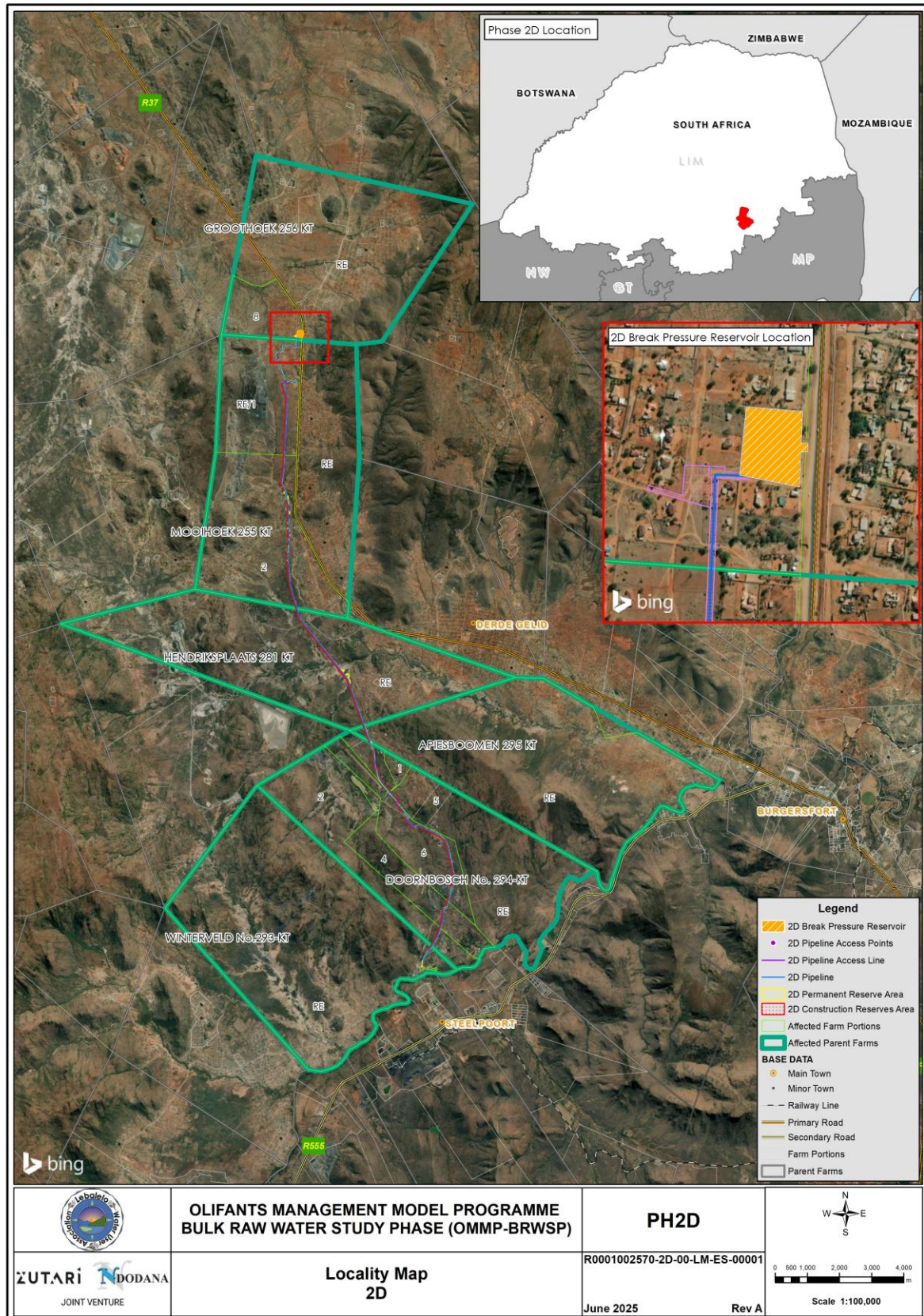


Figure 1-2: Locality Map of the current Phase 2D pipeline alignment.

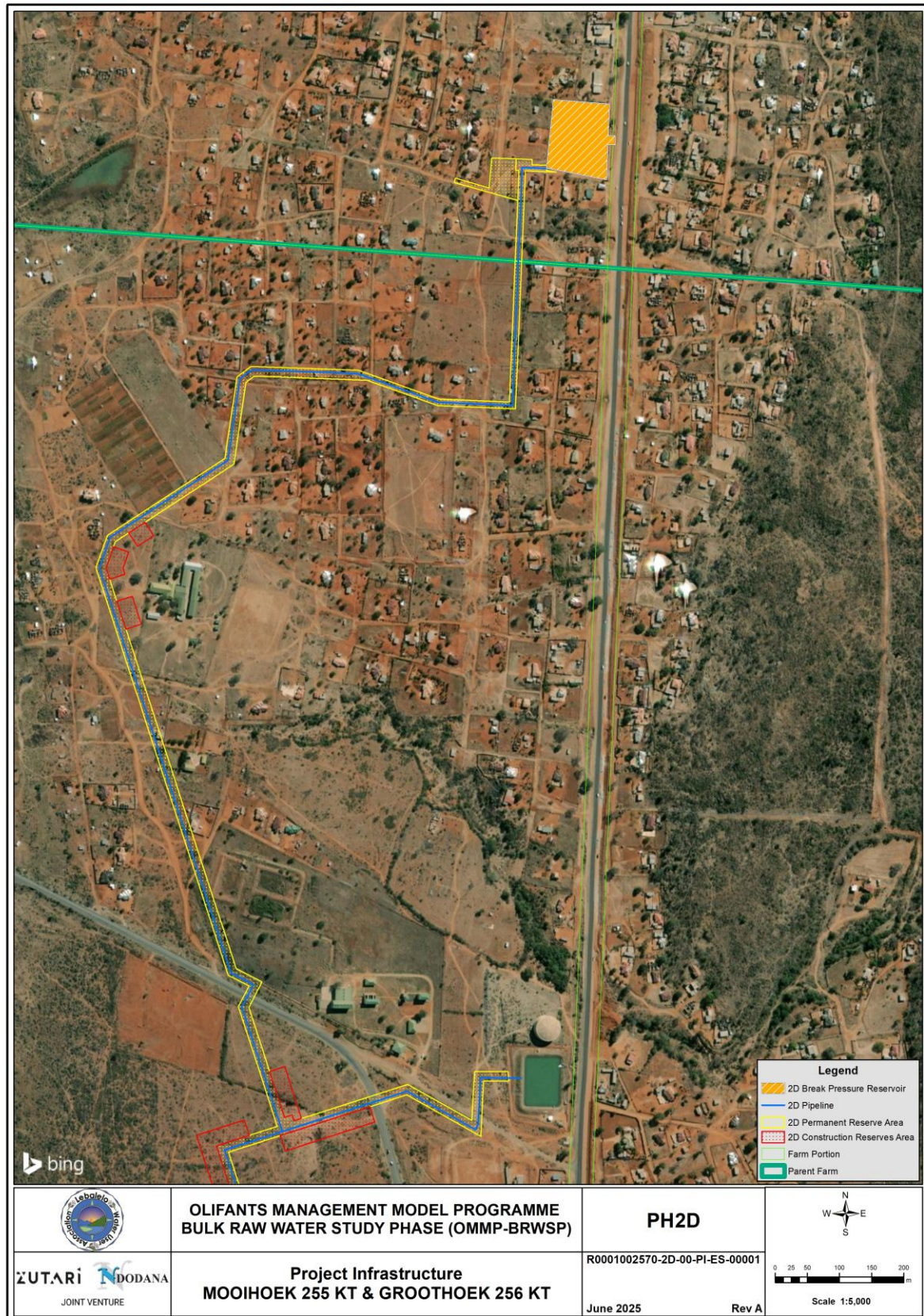


Figure 1-3: Map indicating the proposed infrastructure changes in Phase 2D (northern section).

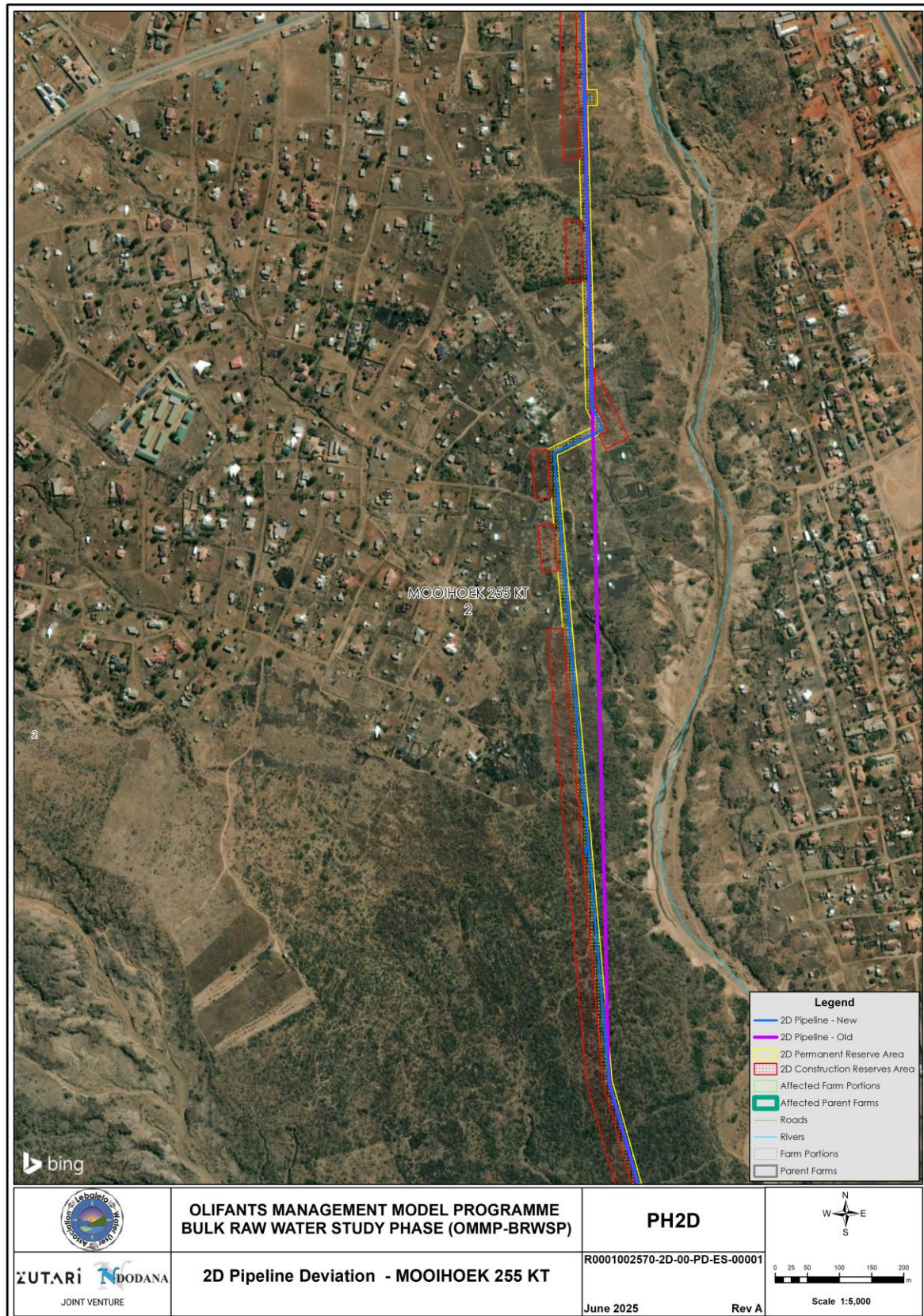


Figure 1-4: Map indicating the proposed infrastructure changes in Phase 2D (central section).

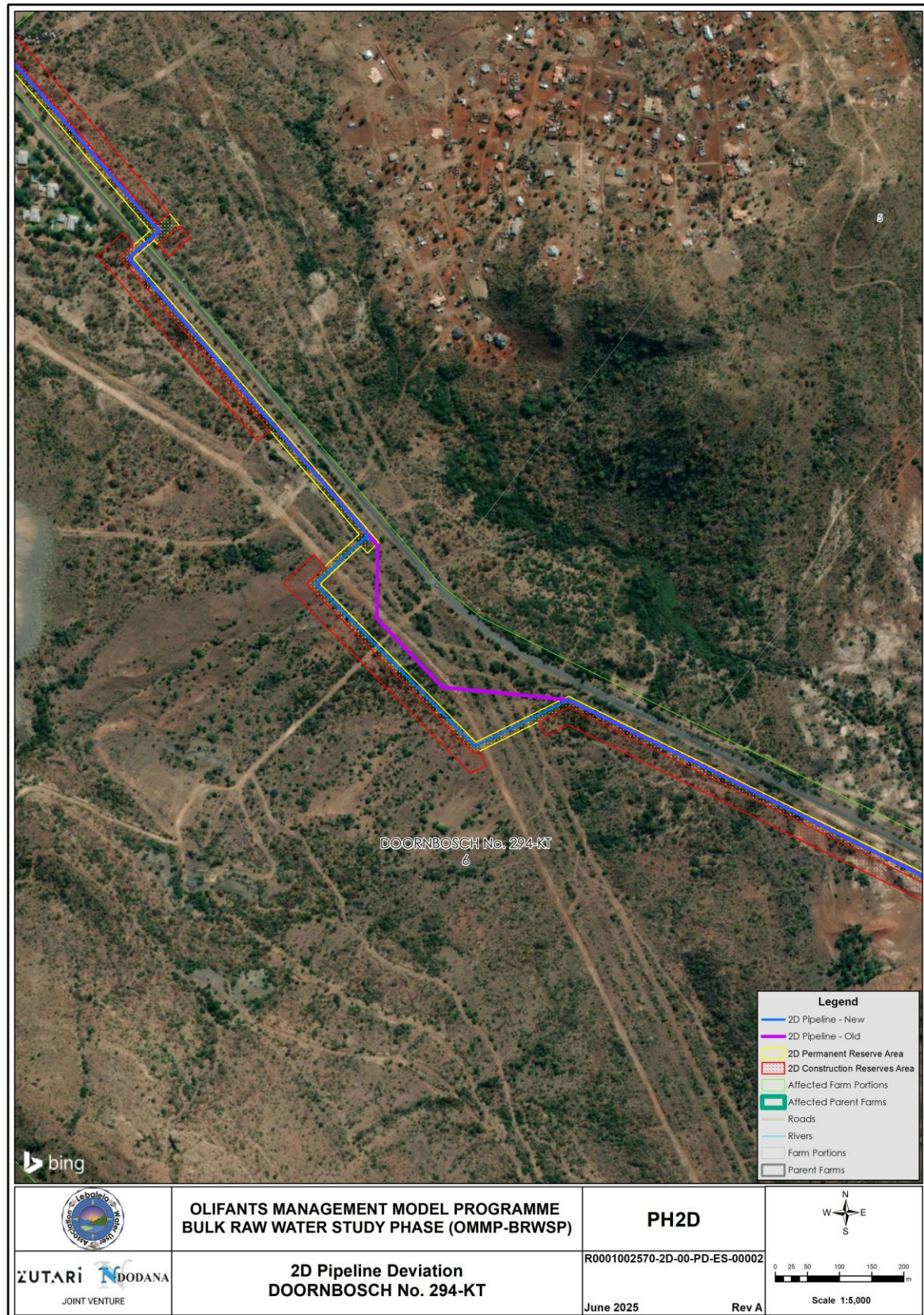


Figure 1-5: Map indicating the proposed infrastructure changes in Phase 2D (southern section).

1.4 NEED FOR THE PROJECT

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 and allow 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 the 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 allow 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, the project must 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 are 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.

1.4.1 REGIONAL CONTEXT

The Sekhukhune District Municipality (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 1-1: 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.

1.5 PROJECT LOCATION

Phase 2D is situated within the FTLM, which forms part of the 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 tables below provide general site information, including the coordinates of the previously authorised infrastructure and the newly proposed infrastructure, as well as the affected farm portions.

Table 1-2: 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 1-3: 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 EMP, 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 Roads⁶						
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"

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

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 1-4: 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

1.6 SCOPE AND PURPOSE OF THE DOCUMENT

This document aims to provide environmental management practices and recommendations to ensure that the known and possible impacts associated with the proposed Phase 2D alignment and its associated infrastructure are avoided, managed, mitigated, and/or kept to acceptable levels. This EMPr is thus intended for use by all role players in the development of the project, but most importantly, will form part of the contract documentation for all Contractors pertaining to the construction and operation of the project. The recommendations included herein apply to the following stages of the proposed development:

- ▶ Planning and design;
- ▶ Pre-construction and construction;
- ▶ Rehabilitation and Operation; and
- ▶ Closure and decommissioning.

This EMPr aims to provide for long-term management of the project area, through measures to address, inter alia, control and eradicate alien and invasive species, manage stormwater, control erosion, rehabilitate and restore ecosystems and mitigate other environmental impacts that would allow for the monitoring and control of activities associated with the Project. This EMPr aims for alignment and optimisation of environmental management processes with conditions of authorisations that may arise. Any conditions of authorisation contained in the EA that contradict the recommendations made in this EMPr, supersedes the recommendations of this document.

Note: This EMPr is an update of the previously authorised EMPr (Ref: 14/12/16/3/1/9/21), which was approved in 2016 for the entire Phase 2D alignment.

This document shall be seen as part of the contract. The EMPr, together with appropriate enabling clauses, will thus be part of the enquiry document to make recommendations and constraints, as set out in this document, enforceable under the general conditions of the contract. It must be ensured that relevant environmental management specifications as contained in the EMPr are incorporated into the

tender and contract documentation. Relevant payment items must be incorporated into the bill of quantities (BOQ). During the tender evaluations, the ability of the potential contractors to adequately manage the environmental issues must be assessed.

The EMPr has a long-term objective to ensure that:

- i) Environmental management considerations are implemented from the start of the project;
- ii) Precautions against damage and claims arising from damage are taken timeously; and
- iii) The completion date of the contract is not delayed due to avoidable environmental issues arising that could be mitigated through a well-structured EMPr.

The intention is also that the document is dynamic, and that improvements and inclusions can be added as the project progresses and as the need arises, granted the necessary authorisations for such amendments are acquired.

A hard copy of the EMPr must always be in the site office and made available to officials upon request.

2. ENVIRONMENTAL MANAGEMENT APPROACH AND POLICY

2.1 ENVIRONMENTAL MANAGEMENT APPROACH

The Environmental Management approach is based on the Deming Cycle rationale (**Figure 2-1**) which is a simplified continuous improvement model consisting of four main iterative steps, namely: Plan, Do, Check and Act (PDCA). PDCA can be briefly described as follows:

- ▶ **Plan:** Establish the objectives and processes necessary to deliver results in accordance with the applicable organisation's environmental policy.
- ▶ **Do:** Implement the process.
- ▶ **Check:** Monitor and measure processes against environmental policy, objectives, legal and other requirements and report the results.
- ▶ **Act:** Take actions to continually improve environmental performance.

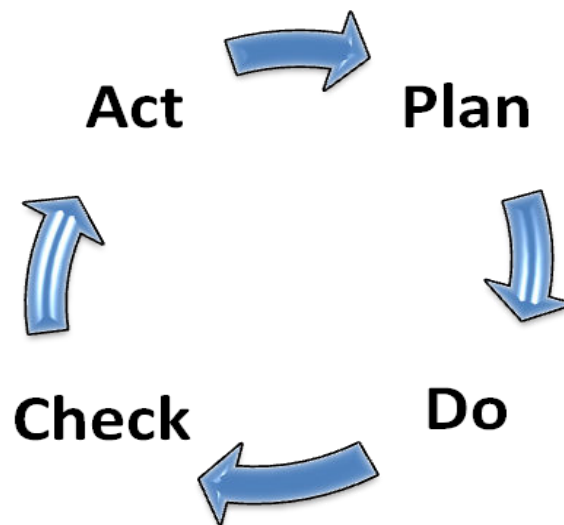


Figure 2-1: The Deming Cycle.

By basing the Environmental Management approach on the PDCA rationale, the EMPr in essence adopts the approach of the internationally recognised International Organisation for Standardisation (ISO) 14001 Environmental Management System (EMS) standard. This standard is also based on the PDCA approach, which is adaptive and is based on continual improvement (**Figure 2-2**). Continual improvement is achieved by periodic monitoring and review of the EMPr and the subsequent implementation of corrective actions when required. Error! Reference source not found. illustrates the various components of the approach and directs the reader to the relevant chapters of the EMPr that address each component. This EMPr is therefore a living document which should be continuously updated and possibly improved.

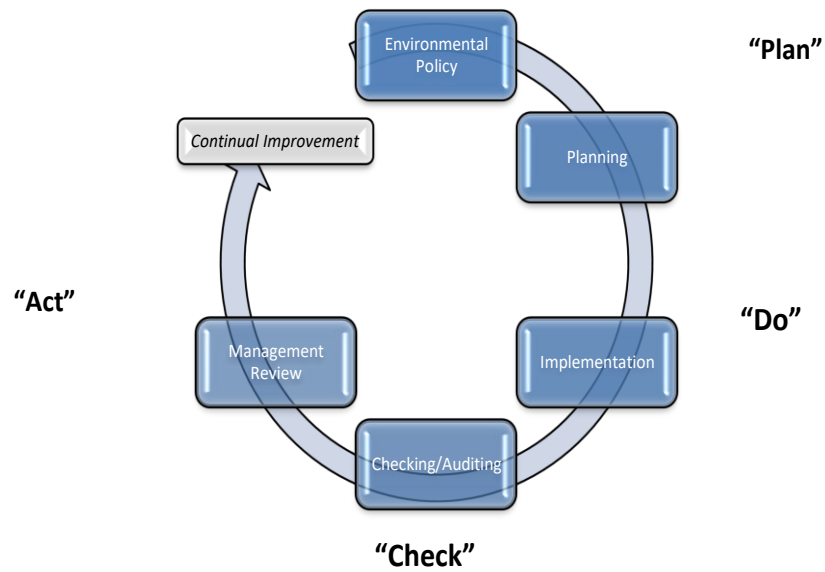


Figure 2-2: The Basic EMPr rationale based on the Deming Cycle

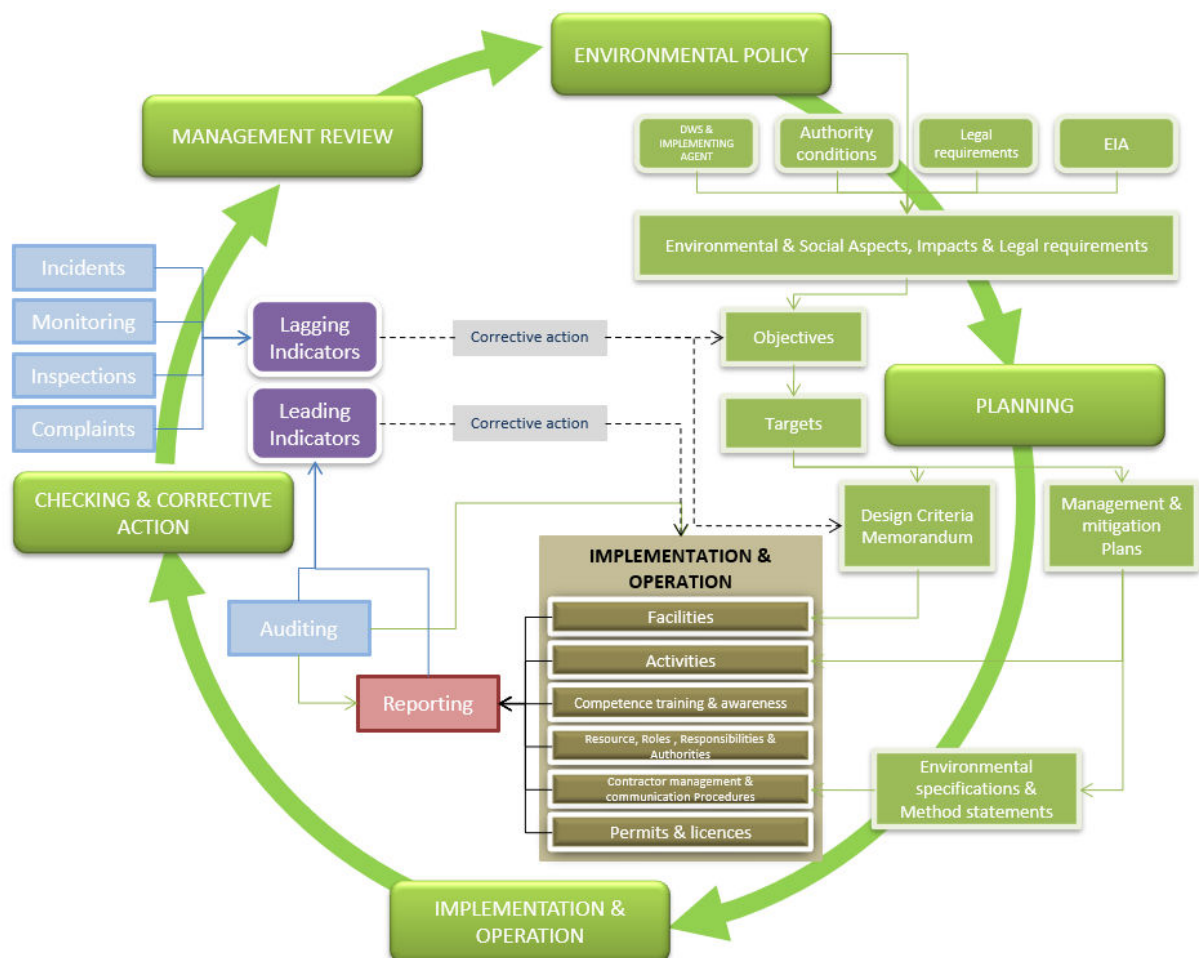


Figure 2-3: The Specific EMPr rationale based on the Deming Cycle.

The EMPr approach based on the EMS rationale is summarised and mapped as follows:

2.1.1 ENVIRONMENTAL POLICY

As part of an EMS, the environmental policy is the driver for implementing and improving the system so that it can maintain and potentially improve its environmental performance. The policy forming part of this EMPr reflects the commitment of the implementing agent, to comply with applicable legal and other requirements, to prevent pollution, and to continually improve. The policy forms the basis for the set environmental objectives and needs to be communicated to all individuals working for, or on behalf of the Project. The appointed project implementer should have relevant and signed environmental policies in place, for implementation, prior to implementation of the project.

Environmental Management Statement:

~~DWS's National Water resource Infrastructure Branch is committed to continuous improvement in environmental management and concomitant prevention of pollution or social and ecological degradation due to infrastructure development and related activities, throughout the project life cycle, to ensure environmental protection and sustainability for the benefit of present and future generations.~~

~~In accordance with this commitment we will:~~

- ~~• Comply with all applicable environmental legislation at a national, provincial and local sphere with licences, permits, policies and other standards to which the Branch subscribes;~~
- ~~• Operate in accordance with the principles of integrated environmental management, as espoused in the National Environmental Management Act 107 of 1998, and subject ourselves to peer review;~~
- ~~• Establish environmental objectives and targets, and monitor environmental performance;~~
- ~~• Adopt measures for the protection of cultural and archaeological heritage to ensure the smallest possible impact practically achievable;~~
- ~~• Wherever possible, manage environmental risks and unavoidable environmental impact during construction by means of an EMP;~~
- ~~• Assure the safety of the infrastructure during construction and future operating phases by choosing appropriate design solutions, construction methods and operational standards;~~
- ~~• Plan, implement and operate to give effect to efficient use of resources and combat corrupt activities;~~
- ~~• Promote and develop environment awareness, education and responsibility amongst employees; and~~
- ~~• Engage and communicate through structured communication mechanisms with employees, stakeholders, relevant authorities and interested and affected parties with regard to environmental commitments, and make this policy available to the public.~~

2.1.2 PLANNING

The “planning” component of an EMS (and therefore this EMPr) involves the identification of environmental aspects, legal and other requirements applicable to the organisation and those applicable to the Project are described in **Section 5**. Another important requirement of the planning component is the establishment of objectives and targets taking into account the policy, legal requirements and the principle objective of continual improvement. These objectives and targets should be specified in an EMPr.

Section 6 and Section 7 of this EMPr is the documented plan in which the objectives are set and the means by which they are to be met. The Project's activities and associated environmental aspects are identified in **Section 4, Section 6 and Section 7**.

2.1.3 IMPLEMENTATION

The “doing” component of an EMS includes the availability of resources, roles and responsibilities to implement, maintain and improve the system. It logically follows in the EMS standard that these resources are appropriately trained. Additional to this, the implementation stage requires that the organisation allow for formal internal and external communication. Operational control and emergency preparedness and response also form part of this stage. All of these components forming part of this EMPr are dealt with between **Sections 6 – 15**.

2.1.4 CHECKING

The “checking” component of an EMS essentially involves monitoring, self-evaluation of compliance, incident reporting and corrective action as well as control of records. These components forming part of this EMPr are dealt with under **Section 6 and 15**.

Checking and corrective action form the fourth component of the EMPr and serve to ensure that the:

- Required environmental management activities are being implemented; and
- Objectives are being achieved as indicated by meeting the stated targets.

A key underpinning principle for checking action is the concept of *leading* and *lagging* indicators. Leading indicators serve to pre-emptively indicate whether the required management actions are in fact being implemented, while lagging indicators present a measure of performance. It is simply inadequate to track only lagging indicators because they will always reflect only what has been achieved (or not).

As such, checking and corrective action include four key lagging indicators. These are:

- Incident recording and review;
- Monitoring selected environmental quality variables as defined in the objectives and targets;
- Monitoring and review of complaints and complaints management; and
- Ongoing inspections of the facilities and activities to identify potential non-compliances.

Leading indicators derive from direct reporting from the Implementer on what has and has not been implemented and are supplemented by an auditing regime that serves to verify the validity of that reporting.

2.1.5 MANAGEMENT REVIEW

The management review component of an EMS is the “Do” stage of the system. For this Project, a management review requirement is built into the EMPr requirements and is dealt with under **Section 15**.

3. PROJECT DESCRIPTION

3.1 DESCRIPTION OF THE AFFECTED AREA

Detailed specialist assessments were conducted during the 2015 and 2016 period. Updated specialist assessments for the newly proposed Phase 2D infrastructure were undertaken in 2024, with the final report concluded in 2025. All these specialist reports were referenced in order to update the description of the affected area of the project. Where necessary, updates were made using current information from the 2024 assessments.

3.1.1 FLORA

The Project area corresponds to five ecological types that form part of the Savanna Biome and more particularly to the Central Bushveld Bioregion. Phase 2D of the Project traverses through two of the five regions:

3.1.1.1 Sekhukhune Plains Bushveld

This area is described as a semi - arid and short thornveld with an abundance of succulent taxa, restricted to the lowland areas of Burgersfort in the south and stretches northwards through to the Strydpoort Mountains.

Although this area is considered to be vulnerable as it falls within the Sekhukhuneland Centre of Endemism which comprises of several endemic plant taxa, nearly 25% of this savanna type has been transformed by subsistence farming and is under threat by chrome and platinum mining activities.

3.1.1.2 Sekhukhune Mountain Bushveld

This vegetation type is prominent along the hills and ridges on the eastern part of the project area and comprises of dry open to closed microphyllous and broad – leaved bushveld, while edaphic species or endemics can be found on the ultramafic soils. Many of these taxa have stunted growth form as they are hyper accumulators of heavy metals. This area is considered least threatened and therefore not a conservation priority.

A total of 4681 plant species have been recorded within the Limpopo Province. Of these 35 species are considered Vulnerable, 14 are considered Endangered and 14 are considered Critically Endangered.

Based on surveys conducted certain plant taxa have been identified along the alignment which need to be removed prior to construction and be replaced during rehabilitation.

From a floristic species perspective, only one of the five plant species listed by the Screening Tool was verified during the 2024 assessment, namely the shrub *Searsia batophylla*. Based on modelling, it was evident that this species and other Sekhukhuneland endemics have a very localised distribution, of which these species occur within erosion gullies/ drainage lines.

3.1.2 FAUNA

According to the studies conducted for the EIA the proposed pipeline route supports a potential species diversity of 414 terrestrial mammals, birds and reptiles. These species can be divided into three faunal communities namely:

- a) Riparian Woodland Community.
- b) Hilly Boulder Woodland Community.
- c) Acacia Plains Woodland Community.

3.1.2.1 Riparian Woodland Community

Nineteen (19) red data species and 14 endemic species have been recorded to be found in this area. Of the 19 red data species, the following have been confirmed to be in the general vicinity:

- *Felis lybicus* (African Wild Cat)
- *Panthera pardus* (Leopard)
- *Mellivora capensis* (Honey Badger)
- *Civettictus civetta* (African Civet)
- *Orycteropus afer* (Aardvark)

3.1.2.2 Hill Boulder Woodland Community

Twenty-six (26) red data species and 25 endemic species have been recorded to be found in this area. Of the 26 red data species, the following has been confirmed to be in the general vicinity:

- *Python natalensis* (African Rock Python)

Of the 25 endemic species, the following have been confirmed to be in the general vicinity:

- *Amblysomus hottentotus* (Hottentots Golden Mole)
- *Platysaurus orientalis fitzsimonsi* (Sekhukhune Flat Lizard)
- *Kinixys lobatsiana* (Lobatse Hinged Tortoise)
- *Cordylus vandami* (Van Dam's Girdled Lizard)
- *Pachydactylus vansoni* (Van Son's Thick-toed Gecko)

3.1.2.3 Acacia Plains Woodland Community

Twenty-six (26) red data species and 12 endemic species have been recorded to be found in this area. Of the 26 red data species, the following has been confirmed to be in the general vicinity:

- *Python natalensis* (African Rock Python)

Of the 12 endemic species, the following has been confirmed to be in the general vicinity:

- *Amblysomus hottentotus* (Hottentots Golden Mole)

3.1.3 GEOLOGY

Geology plays a major role in segregating floral communities as well as explaining the reasons for areas with high floristic endemism and richness. The high floristic endemism observed along the eastern part of the project area can be explained by the ultramafic soils derived from the norites and gabbros of the Rustenburg Layered Suite (RLS), which forms part of the Bushveld Igneous Complex (BIC) as can be seen below.

Table 3-1: Geological areas for Phase 2D.

Phase	Interval (approx km)	Approx km distance	Stratigraphic description	Rock types
2D	0-2	2	Dwars River Subsuite, RLS	Various rock types: Norite, anorthosite and pyroxenite.
2D	2-24	22	Croydon Subsuite, RLS	Pyroxenite.

3.1.4 LAND COVER

The various land cover classes within the database represent the following natural areas:

- Woodland; and
- Thicket and Bushland.

Transformed areas:

- Cultivated land – commercial and subsistence;
- Degraded Forest and Bushland; and
- Mines and quarries.

3.1.5 WATER QUALITY

The proposed project is located within the central section of the Olifants River Catchment Area. The vicinity of the proposed pipeline routes comprise of temporary drainage lines, seasonal and ephemeral streams, floodlines and a few seepage wetlands.

The proposed alignment for Phase 2D will cross the Moopetsi River. The Moopetsi River is a single channel with only 6 to 25% vegetation cover. This river is classified as having a high level of disturbance due to bush clearing, vegetation removal, grazing, sand winning and inflows from the Seduku stream and perhaps point source discharges from higher up in the catchment. This river is unsuited for informal domestic use due to high bacterial counts and elevated nitrate and magnesium concentrations. The quality of water is suitable for stock watering but marginally suited for irrigation due to elevated salt concentrations and high pH.

The Seduku stream originates from the Seduku River split into two, one being the Seduku River that drains from the Doornbosch mining area, and the second originating near the Doornbosch village and which receives treated wastewater from a Wastewater Treatment Works (WWTW) for that area. The flow and water quality in the Seduku stream appeared to be dominated by effluent discharges from the Doornbosch WWTW into an unnamed tributary of the Seduku stream. Effluent discharges from WWTW resulted in the high nitrate concentrations in the stream. Salt deposits on the banks of the Seduku stream appeared to originate from intermittent high flows that are high in salt concentrations. The Seduku stream was not suited for drinking water purposes due to high bacterial counts and elevated nitrate and magnesium concentrations.

3.1.6 AIR QUALITY

Residents from the surrounding towns and informal residential areas situated along the length of Phase 2D will most likely experience elevated dust concentrations during the construction of the pipeline and associated infrastructure. The table below indicates the baseline levels monitored from October 2015 to March 2016. Note that the dust fallout standard for residential sites is 600 mg/m²/day.

Table 3-2: Baseline levels for dust fallout.

Monitoring Site	Dust Fallout Levels (mg/m ² /day)					
	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016
Phase 2D						
2D_DB1	736	X	608	749	756	93
2D_DB2	X	X	X	X	211	318
2D_DB3	X	X	X	X	273	84
2D_DB4	X	X	X	X	193	264
2D_DB5	168	1143	688	140	178	449
2D_DB6	X	189	190	116	248	169
2D_DB7	353	425	245	81	212	239
2D_DB8	620	740	454	386	510	249
2D_DB9	320	367	221	105	241	86
2D_DB10	166	345	329	121	151	123

As can be seen from the table, various exceedance were recorded for Phase 2D (shown in red text).

Particulate matter were monitored using the PM₁₀ and PM_{2.5} monitors. **Table 3-3** presents a summary of exceedances monitored at Dilokong Hospital (October 2015 to February 2016) and Samancor Chrome (February to March 2016). One exceedance of the PM₁₀ standard was recorded on 03 February 2016, with no exceedances of PM_{2.5} being recorded at each site.

Table 3-3: Baseline levels for PM₁₀ Monitoring.

Month	PM ₁₀		PM _{2.5}	
	24-hourly exceedances (>75µg/m ³)	Compliant (4 exceedances per annum)	24-hourly exceedances (>65µg/m ³)	Compliant (4 exceedances per annum)
Dilokong Hospital				
October 2015	3	Yes	0	Yes
November 2015	6	No	0	Yes
December 2015	2	No	0	Yes
January 2016	0	Yes	0	Yes
February 2016	1	Yes	0	Yes
TOTAL	12		0	
Samancor Chrome				
February 2016	0	Yes	0	Yes
March 2016	0	Yes	0	Yes
TOTAL	0		0	

A total of 12 exceedances of the PM₁₀ standard were recorded in Dilokong Hospital and no exceedances at Samancor Chrome. No exceedances of PM_{2.5} were recorded at each site.

3.1.7 NOISE

The existing (baseline) ambient noise climate was assessed and conditions for the daytime and evening periods were ascertained. The main sources of noise (or potential sources of noise) which presently affect the residual noise climate in the respective study areas were found to be the following:

- Traffic on the roads along which the pipelines are to be aligned. In particular, the high percentage of abnormal load heavy vehicles is a problem.
- General urban noise in Steelpoort, which lies on the perimeter of the study area.
- A number of mines have some of their facilities close to the planned pipeline routes.

There are a large number of noise-sensitive areas/land uses (mainly residences/residential areas and schools) that have the potential to be adversely affected by elements of the project. These are shown in **Figure 3-1**.

To obtain a baseline, noise levels were measured during 2015. The results are contained in **Table 3-4**. For the assessment of the newly proposed infrastructure, the Maputle Secondary School (Maputle: 24°32'42.11"S; 30° 9'14.76"E) and an agricultural venture located just north of Maputle were identified as potential noise-sensitive receptors.

However, the 2024 Environmental Noise Impact Assessment concluded that the agricultural venture does not qualify as a noise-sensitive location for the following reasons:

- The agricultural activities themselves generate noise; and
- Individuals at the venture are likely to be actively engaged in work, thereby reducing the likelihood of experiencing a significant noise impact.

The proposed pipeline will traverse an area with considerable residential activity, meaning that construction activities may impact several households along the alignment.

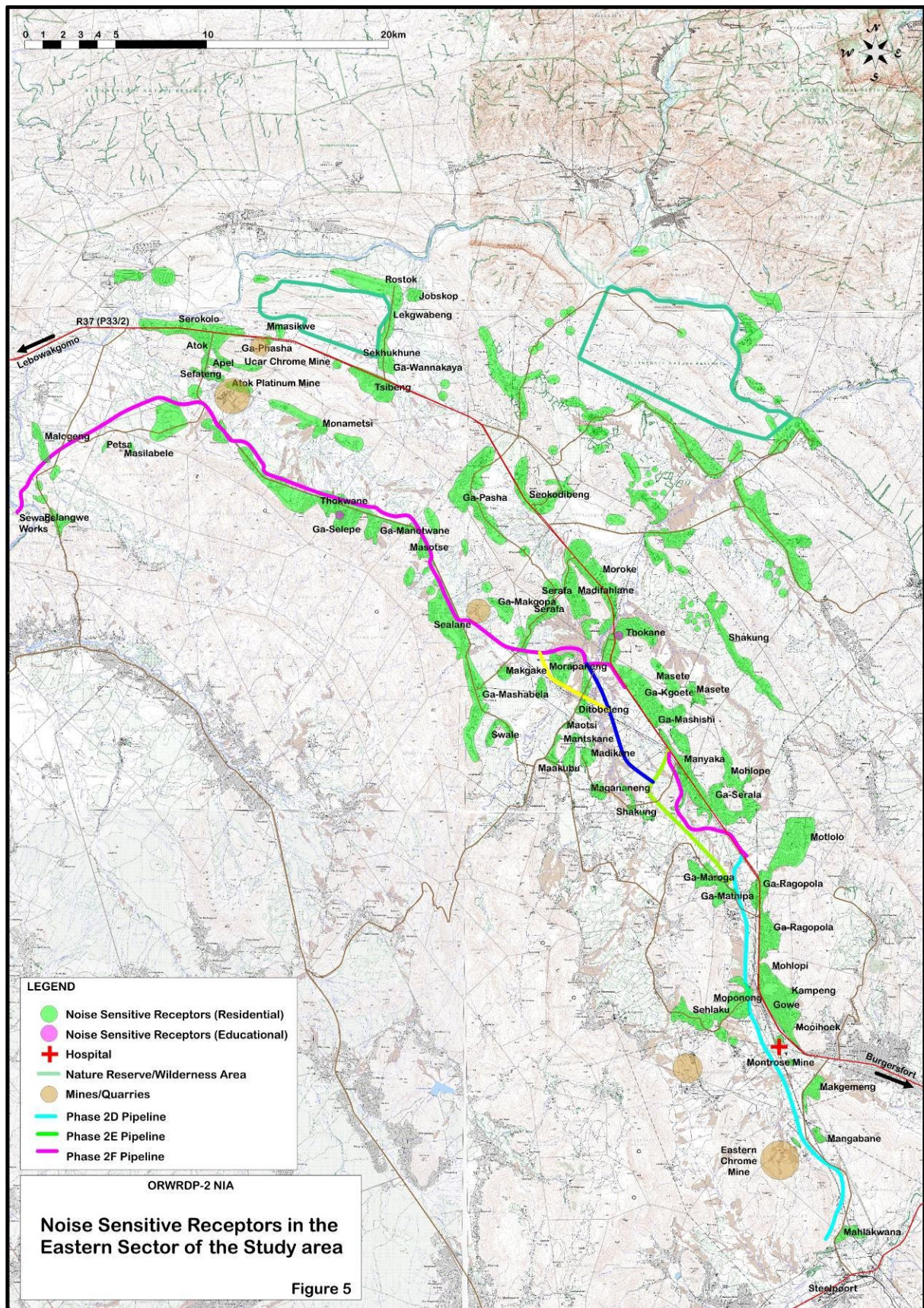


Figure 3-1: Noise sensitive receptors identified during the 2015 and 2016 assessment period.

Table 3-4: Measured noise levels year 2015.

Site	Description	Longitude/ Latitude	Measured Sound Pressure (Noise) Level (dBA)					
			Daytime Period			Night-time Period		
			L _{Aeq}	L _{max}	L _{Aeq}	L _{max}	L _{Aeq}	L _{max}
ID001	In Steelpoort Town at a T-junction along the R555, Steelpoort rail siding ~200 m to the ESE.	30.20914 E -24.7311 S	62.9	78.39	49.36	48.2	62.4	41.6
ID005	Along R37 at T-junction within Driekop settlement.	30.16091 E -24.5926 S	73.8	87.42	43.03			
ID008	Along R37 at T-junction within Ga-Manyaka settlement.	30.11576 E -24.4751 S	62.5	77.49	43.72	43.1	60.9	32.5
ID010	Along D4220 between Ditobelang and Leao settlements.	30.05563 E -24.4519 S	47.8	59.87	38.42	34.5	52.5	29.6
ID011	Along road between Manotwane and Ga-Selepe settlements.	29.96848 E -24.3582 S	54.2	78.1	36.47			
ID016	At T-junction ~ 850 m NW of Arabie Dam wall and ~2.8 km WSW of Phetwana settlement.	29.40938 E -24.7785 S	61.2	83.89	36.9			
ID018	Grassvallei, along road 15 km NNW from Arabie Dam Wall.	29.35651 E -24.6663 S	66.4	95.16	36.0			
ID020	Singapore, at T-junction.	29.31767 E -24.5407 S	50.5	72.2	34.2	46.5	66.9	36.5
ID021	Along road ~1.5 km from R519 and Immerpan train station.	29.21991 E -24.4903 S	56.8	83.5	35.6	63.1	82.4	25.3
ID025	Pruizen, along R518 ~7.5 km SE of N1 and ~13 km SE of Mokopane	29.07322 E -24.2863 S	68.2	84.3	35.3			

3.1.8 ROADS

The table below identifies the roads that were included in the survey conducted during the 2016 assessment.

Table 3-5: Roads that were surveyed for Phase 2D during the 2016 period.

Phase	Roads
2D	D1296, R37, D4172, D1392, D1296 and D1469

The Roads Condition Assessment conducted in 2016 provides an insight into the current (baseline) roads conditions. This data can be utilised as a reference to compare the post construction road conditions to. It also provides the project team with insight into areas where access problems may be experienced. The following impacts are expected to occur where access to construction activities will be required directly onto surfaced roads:

- The unpaved shoulders will deteriorate;
- The paved edge will be damaged and edge break will develop. Where roads already experience edge break the structures will deteriorate further;
- The surfacing can be damaged due to short radius turning movements of trucks; and
- Where preventative maintenance such as resealing and rejuvenations of binders are being deferred by the relevant roads authorities, accelerated deterioration will occur.

Where access to construction activities will be required directly onto unsurfaced roads, or unsurfaced roads will be used, it can be expected that:

- Gravel loss will accelerate (but in general no roads investigated had gravel wearing courses left);
- Where roads have little gravel left, travelling on in-situ subgrade will increase (fortunately in-situ subgrades are generally good materials, e.g. gabbro, norite, granite);
- Due to most gravel roads being at natural ground level or slightly below, possible problems may arise in wet weather.

The 2024 Traffic Impact Assessment provided an overview of the existing road conditions, as detailed in the table below (see **Table 3-7**). In addition to the proposed construction and operational access points, the key road networks expected to be affected by Phase 2D transport activities include the R37, D1296, D1392, D1297, D4167, and D4169. The proposed access roads, required specifically during construction and potentially for operation during maintenance, are listed in **Table 3-6** and shown in **Figure 3-2** below.

The access road widths range from 6 m to 10 m wide. The length of the access roads varies. The current status quo of each access road (16 in total) and associated access number is given in the table below.

Table 3-6: Existing status quo of the identified construction internal and access roads.

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

The following key intersections within the study area were considered as part of the assessment:

- 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

Table 3-7: 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.

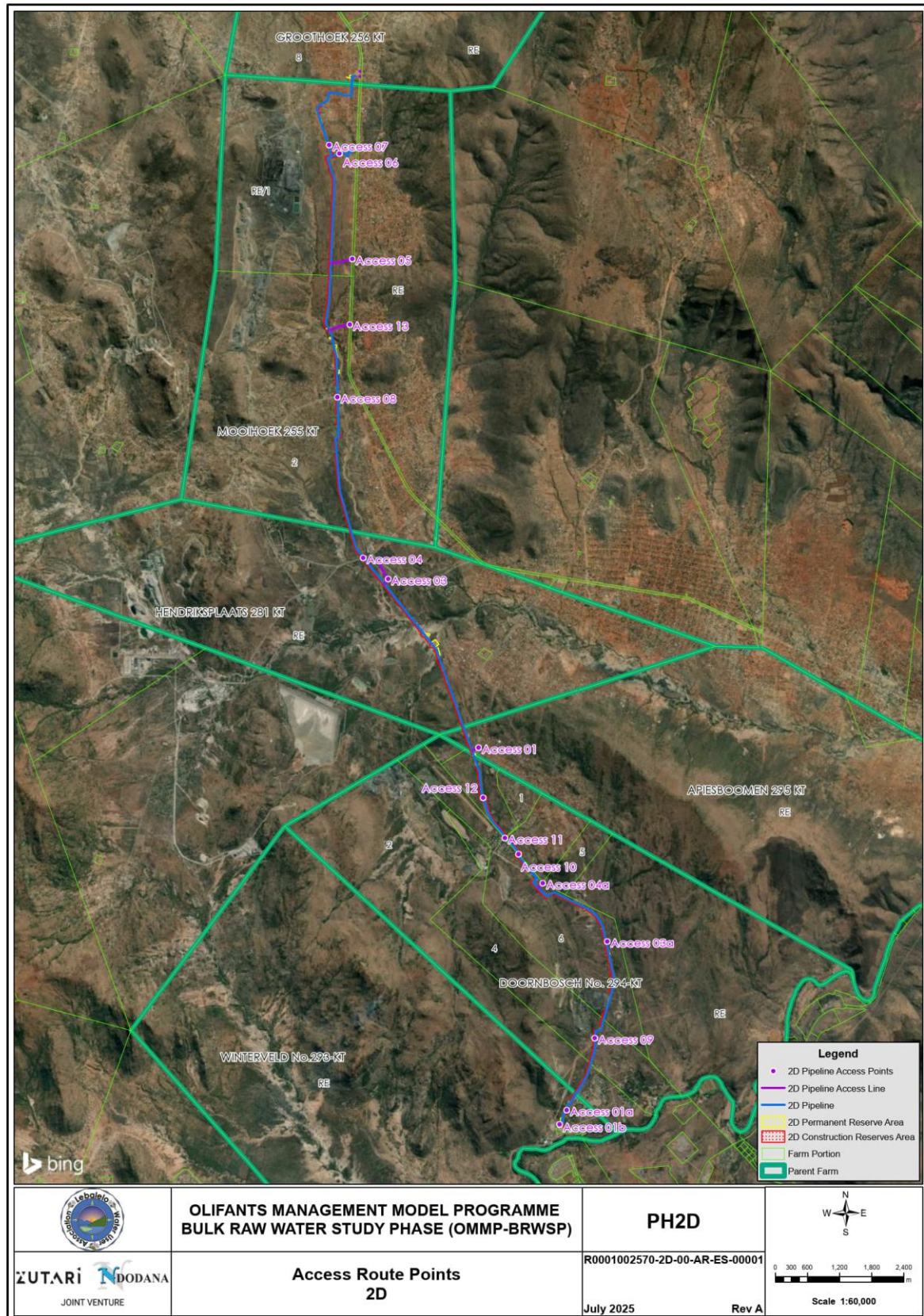


Figure 3-2: Access Route Points.

3.1.9 HERITAGE AND CULTURAL SIGNIFICANCE

The following heritage features were identified as potentially impacted by the construction of the Phase 2D alignment:

Table 3-8: Heritage sites identified for the Phase 2D alignment during the 2016 assessment period.

Site designation	Farm	Co-ordinates	Site type	Age
2D SSD1 C42	Doornbosh 294/6	S24 40 48.2 E30 12 13.1		
2D Site 1	Mooihoek 252/2	S24° 36' 17.2" E30° 08' 28.1"		Recent modern
2D Site 2	Mooihoek 252/2	S24° 36' 21.9" E30° 08' 20.3"		Recent modern
2D Site 3	Hendriksplaats 28/10	S24° 38' 46.1" E30° 10' 51.2"		Historical
2D Site 5	Hendriksplaats 28/10	S24° 38' 35.4" E30° 10' 40.1"		Recent modern
2D Site 6	Hendriksplaats 28/10	S24° 37' 46.3" E30° 10' 22.5"		Recent modern
2D Ga-Mathipa C02	Mooihoek 255/1	S24 32 44.4 E30 08 42.1		Recent modern
2D Site 4	Hendriksplaats 281/0	S24° 38' 47.0" E30° 10' 51.5"		Historical
2D Ga-Mathipa C01	Mooihoek 255/1	S24 32 46.3 E30 08 39.9	Initiation site	Recent modern
2D Ga-Mathipa C03 and C04	Mooihoek 255/1	S24 32 44.0 E30 08 46.9	Ritual well and Sacred pool	Currently in use

The 2024 Heritage Impact Assessment for the newly proposed infrastructure associated with Phase 2D identified the heritage resources listed in the table below.

Table 3-9: 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 <i>ex situ</i> .	Negligible	Not Conservation Worthy (NCW ⁷)
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 <i>ex situ</i> .	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 ⁸)

⁷ 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.

⁸ 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.

3.1.10 SOCIAL ASPECT

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 Tlokoeng 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 km². 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.

4. DESCRIPTION OF PROJECT RELATED ACTIVITIES AND ASPECTS

In order to oversee the successful construction of the pipeline and associated infrastructure, various construction activities as well as their associated aspects have been identified and listed. From the identified aspects it is possible to determine the associated environmental impacts and therefore set the base to formulate measures to manage and mitigate these environmental impacts on site. This section, along with **Sections 5, 6 and 7**, forms part of the “Plan” component of the Deming Cycle referred to in **Section 2** and therefore this EMP rationale.

4.1 PRE – CONSTRUCTION ACTIVITIES

Pre – Construction follows on from final project planning tender phase and leads up to the establishment of the appointed Contractor on site. The implementing agent, on behalf of DWS, will be responsible for overseeing the implementation of the project requirements.

The Pre-Construction activities that are going to be conducted involve, but are not limited to:

- Finalise Design Requirements of the pipeline;
- Land Acquisition and access to site;
- The surveying of the alignment;
- Walk down of the alignment with the specialists;
- Acquiring of all relevant permits and licences;
- Identified Cultural Heritage Resources and Graves rescue and relocation;
- Rescue and relocation of identified red data flora;
- Social aspects related to the employment of local labour;
- Development of Method Statements;
- Environmental Awareness Training; and
- Photographic record of areas prior to site establishment and construction.

4.2 CONSTRUCTION ACTIVITIES AND ASPECTS

Construction refers to the phase in the project during which the actual construction of the approximately 24 km pipeline from Steelpoort Pump Station to the Mooihoek BPR and associated infrastructure will take place. The construction of the associated infrastructure will include the construction of:

- Steelpoort Pump Station Installation;
- Operator Housing;
- Site Establishment Areas;
- Access Roads to the Pipeline;
- Valve chambers;
- Installation of scour and air valve installations;
- Installation of pipeline ancillaries;
- Installation of flow meters;
- Installation of pipe sleeve under roads and rail crossings;
- Installation of temporary and permanent cathodic protection;
- Installation of armoured fibre optic cable;
- Connecting to existing pipe work at the take- off locations;
- Inlet and outlet pipe work to reservoirs;
- Construction of powerlines and transformers;
- Construction of Surge Mitigation Structures (Surge Vessels and Surge Tank); and

- Construction of temporary and permanent radio masts.

The **Construction Phase** will be divided into the following activities:

- Site Establishment and Infrastructure.
- Site Operations and Construction Works.
- Earthworks.

The activities and associated aspects which have been identified for **Site Establishment and Infrastructure** are listed in **Table 4-1**.

Table 4-1: Site Establishment and Infrastructure activities and associated aspects.

No.	Activity	Aspect	Table Reference to Section 7
1	Clearing and Grubbing	• Dust generation • Loss of vegetation, habitat and soil fertility. • Increased level of noise generation	Table 7.1 No 1 Table 7.2 No 2 Table 7.5 No 5
2	Land Acquisition and Access to Site	• Physical and economic displacement of households / individuals	Table 7.10 No 32
3	Construction and use of Temporary Access Roads	• Dust generation • Loss of Vegetation, Habitat and soil fertility. • Increased potential for erosion. • Increase in vehicle movement in area. • Increased level of noise generation	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 6 Table 7.8 No 7 Table 7.5 No 5
4	Installation of parking bays for construction plant and vehicles	• Dust generation • Loss of vegetation, habitat and soil fertility • Increased level of noise generation	Table 7.1 No 1 Table 7.2 No 2 Table 7.5 No 5
5	Installation of warning signage	• Decrease in aesthetic quality of the environment • Lack of visibility of signage	Table 7.10 No 8 Table 7.8 No 9
6	Topsoil stripping and stockpiling	• Dust generation • Loss of vegetation, habitat and soil fertility. • Increased potential for erosion • Soil contamination • Encroachment and establishment of alien vegetation • Reduced productivity of subsistence farmland	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 6 Table 7.2 No 3 Table 7.2 No 10 Table 7.10 No 35
7	Provision of vehicle wash bays	• Dust generation • Loss of vegetation, habitat and soil fertility • Increased level of noise generation • Increased potential for erosion. • Soil contamination • Water contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.5 No 5 Table 7.2 No 6 Table 7.2 No 3 Table 7.3 No 4
8	Provision of sanitation systems	• Dust generation • Loss of vegetation, habitat and soil fertility • Ground water contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.3 No 11
9	Bund area for fuel storage	• Dust generation • Loss of vegetation, habitat and soil fertility • Soil contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 3
10	Demarcation, fencing and gates	• Loss of vegetation and habitat • Impede faunal movement • Impeded human movement and disrupted daily activities	Table 7.2 No 2 Table 7.2 No 12 Table 7.10 No 38
11	Provision of maintenance and workshop areas	• Dust generation • Loss of vegetation, habitat and soil fertility • Soil contamination • Water Contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 3 Table 7.3 No 4
12	Provision of oil sump and separators for construction plant wash bays, refuelling and workshop areas.	• Dust generation • Loss of vegetation, habitat and soil fertility • Soil contamination • Water Contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 3 Table 7.3 No 4

No.	Activity	Aspect	Table Reference to Section 7
13	Batch plants	- Dust generation - Loss of vegetation, habitat and soil fertility - Soil Contamination - Water Contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 3 Table 7.3 No 4
14	Provision of flammable material and other material stores	- Dust generation - Loss of vegetation, habitat and soil fertility - Soil contamination	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 3
15	Crusher Plant	- Dust generation - Loss of vegetation, habitat and soil fertility	Table 7.1 No 1 Table 7.2 No 2
16	Sand Washing Plant	- Dust generation - Loss of vegetation, habitat and soil fertility	Table 7.1 No 1 Table 7.2 No 2

The activities and associated aspects which have been identified for **Site Operations and Construction Works** are listed in **Table 4-2**.

Table 4-2: Site Operations and Construction Work activities and associated aspects.

No.	Activity	Aspect	Table Reference to Section 7
1	Blasting of hard material	- Increased level of noise generation - Vibration - Dust generation - Safety	Table 7.5 No 5 Table 7.5 No 13 Table 7.1 No 1 Table 7.11 No 14
2	Refuelling of construction vehicles and plant	- Soil contamination - Water contamination	Table 7.2 No 3 Table 7.3 No 4
3	Demolition activities	- Dust generation - Increased level of noise generation - Vibration - Increase in waste generation - Safety	Table 7.1 No 1 Table 7.5 No 5 Table 7.5 No 13 Table 7.4 No 15 Table 7.11 No 14
4	Spoil material generation and management	- Dust generation - Loss of vegetation, habitat and soil fertility - Decline in the aesthetic quality of the environment	Table 7.1 No 1 Table 7.2 No 2 Table 7.10 No 8
5	Relocation of existing services	Disruption in the provision of services	Table 7.10 No 16
6	Domestic and Construction waste collection, storage, handling and disposal	- Unpleasant odours - Increase in Waste generation - Decline in the aesthetic quality of the environment	Table 7.1 No 17 Table 7.4 No 15 Table 7.10 No 8
7	Handling, storage, disposal of hazardous waste	- Unpleasant odours - Soil contamination - Water contamination	Table 7.1 No 17 Table 7.2 No 3 Table 7.3 No 4
8	Consultation with affected parties	Insufficient consultation	Table 7.10 No 18
9	Operation and movement of construction vehicles and plant	- Dust generation - Increase in level of noise generation - Soil contamination - Safety - Vibration - Greenhouse gas emissions	Table 7.1 No 1 Table 7.5 No 5 Table 7.2 No 3 Table 7.11 No 14 Table 7.5 No 13 Table 7.1 No 19
10	Road upgrades	- Dust generation - Increased level of noise generation - Soil contamination - Safety	Table 7.1 No 1 Table 7.5 No 5 Table 7.2 No 3 Table 7.11 No 14
11	Slopes and slope stabilisation	- Dust generation - Increased potential for erosion - Water contamination - Decline in the aesthetic quality of the environment - Safety	Table 7.1 No 1 Table 7.2 No 6 Table 7.3 No 4 Table 7.10 No 8 Table 7.11 No 14
12	Maintenance of sanitation systems	- Unpleasant odours - Mismanagement of sewerage	Table 7.1 No 17 Table 7.4 No 20
13	Transportation of hazardous waste	- Potential Spillages of hazardous waste - Safety - Greenhouse gas emission	Table 7.5 No 21 Table 7.11 No 14 Table 7.1 No 19
14	Transportation and storage of pipes and associated materials	- Increase in vehicle movement in area - Impact on the existing road conditions - Safety - Increase in the level of noise generation - Greenhouse gas emissions	Table 7.8 No 7 Table 7.8 No 22 Table 7.11 No 14 Table 7.5 No 5 Table 7.1 No 19
15	Use of generators	- Increase in level of noise generation - Soil contamination	Table 7.5 No 5 Table 7.2 No 3
16	Water abstraction	Decline in water availability of water resource	Table 7.3 No 23
17	Protection of archaeological findings	Destruction of graves and other sites of archaeological value	Table 7.7 No 24

No.	Activity	Aspect	Table Reference to Section 7
18	Welding	- Safety - Emission of noxious fumes	Table 7.11 No 14 Table 7.1 No 25
19	Cooking of food	- Fire hazard - Illegal wood harvesting	Table 7.9 No 26 Table 7.2 No 27
20	Employment of local labour	- Insufficient employment of local labour - Presence of construction workforce - Influx of job – seekers - Loss of farm labour to construction work	Table 7.10 No 28 Table 7.10 No 36 Table 7.10 No 33 Table 7.10 No 34
21	Construction near or under powerlines	Damage and inaccessibility to powerlines	Table 7.10 No 29
22	Security	Trespassing	Table 7.10 No 30
23	Fire Control	Loss of vegetation, habitat and soil fertility	Table 7.2 No 2
24	Water Use and Management	- Water contamination - Misuse of available water	Table 7.3 No 4 Table 7.3 No 31

The activities and associated impacts which have been identified for **Earthworks** are listed in **Table 4-3**.

Table 4-3: Earthwork activities and associated aspects.

No.	Activity	Aspect	Table Reference to Section 7
1	Cut and Fill	- Dust generation - Increased potential for erosion	Table 7.1 No 1 Table 7.2 No 6
2	Trenching	- Dust generation - Increased potential for erosion - Safety	Table 7.1 No 1 Table 7.2 No 6 Table 7.11 No 14
3	Importing of suitable bedding and backfill material	- Dust generation - Loss of vegetation, habitat and soil fertility. - Reduced productivity of subsistence farmland - Increased potential for erosion	Table 7.1 No 1 Table 7.2 No 2 Table 7.10 No 35 Table 7.2 No 6
4	Topsoil stripping and storage	- Dust generation - Loss of vegetation, habitat and soil fertility. - Increased potential for erosion - Soil contamination - Reduced productivity of subsistence farmland - Encroachment and establishment of alien vegetation	Table 7.1 No 1 Table 7.2 No 2 Table 7.2 No 6 Table 7.2 No 3 Table 7.10 No 35 Table 7.2 No 10
5	Slopes and slope stabilisation	- Dust generation - Increased potential for erosion - Water contamination - Decline in aesthetic quality of the environment - Safety	Table 7.1 No 1 Table 7.2 No 6 Table 7.3 No 4 Table 7.10 No 8 Table 7.11 No 14
6	Crushing of material	- Dust generation - Loss of vegetation, habitat and soil fertility	Table 7.1 No 1 Table 7.2 No 2

4.3 REHABILITATION

Rehabilitation will run concurrently with the actual construction of the pipeline and associated infrastructure. Rehabilitation will consist of, but is not limited to, the following rehabilitation measures:

- Removal of structures and infrastructures;
- Removal of inert waste and rubble;
- Hazardous waste and pollution control;
- Final shaping of disturbed areas;
- Topsoil replacement and soil amelioration;
- Ripping and scarifying;

- Planting;
- Grassing;
- Maintenance; and
- Management of alien vegetation.

Rehabilitation measures mentioned above are dealt with in more detail in **section 8**.

5. LEGISLATIVE AND OTHER REQUIREMENTS

An overview of the relevant legislation is provided below in **Table 5-1**.

Table 5-1: Relevant legislation and the applicability thereof.

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 <u>clean running water in their homes</u> 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	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.

2013 (SPLUMA)		
Aviation Act, No. 74 of 1962	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.
Civil Aviation Act, No. 13 of 2009 (CAA)		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 of the Basic Assessment Report (BAR) 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.: ref: 03/2/4 and 12/12/20/553) was granted on 16 October 2006 (refer to Annexure C).
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. <u>No mining permits for borrow pits</u> 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 “<i>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</i>”. 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 <i>Asparagus sekukuniensis</i>, <i>Polygala sekhukhuniensis</i>, and <i>Seersia batophylla</i>. 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 <i>Seersia batophylla</i>. 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. <i>Sclerocarya birrea</i> subsp. <i>caffra</i> (Marula tree). 2. <i>Balanites maughamii</i> subsp. <i>maughamii</i> (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 Data⁹ 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

⁹ <http://redlist.sanbi.org/>

		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. 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.
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 EMP. 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 clear 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.

Other relevant South African legislation must be adhered to during all life cycles of the proposed Phase 2D project, including Provincial Legislation and Local By-laws applicable to this project.

5.1 LISTED ACTIVITIES IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, NO. 107 OF 1998 (NEMA)

The NEMA provides the framework for environmental decision-making in the country and specifically the EIA Regulations [GN R982 in the Government Gazette (GG) of 8 December 2014]] serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing the degradation of the environment. Section 28(1) of NEMA places a “duty of care and remediation of environmental damage” on every person who causes, has caused, or may cause significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g., watercourses. If a development triggers a Listed Activity, it is required to undergo an EIA through a BA process or Scoping and Environmental Impact Reporting (SEIR) in terms of the EIA Regulations (GN R982 of 2014).

The proposed deviations and newly proposed infrastructure for Phase 2D, as considered under the new application, trigger activities listed in the 2014 EIA Regulations (GN R982 of 2014), as indicated in **Table 5-2**. Other relevant activities for the remainder of the Phase 2D alignment, as a component of the ORWRDP-2, were authorised in the RRoD (Ref. No.: **03/2/4** and **12/12/20/553**) issued in 2006 in terms of the ECA (refer to Annexure C).

Table 5-2: 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— <u>(i) with an internal diameter of 0,36 metres or more; or</u> <u>(ii) with a peak throughput of 120 litres per second or more.</u>	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 <u>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</u> where such development occurs— <u>(a) within a watercourse;</u> (b) in front of a development setback; or <u>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</u>	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 <u>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</u>	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. 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 1-4. 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 <u>widening of a road by more than 6 metres</u>, or the lengthening of a road by	The project area is located within farms with existing farm roads. The Applicant may need to

	more than 1 kilometre — (i) where the existing reserve is wider than 13,5 meters; or <u>(ii) where no reserve exists, where the existing road is wider than 8 metres.</u>	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 1-4. 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; <u>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</u> (ff) Core areas in biosphere reserves; or <u>(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.</u>	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. <u>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 endangered in the National Spatial Biodiversity Assessment 2004;</u> ii. <u>Within critical biodiversity areas identified in bioregional plans;</u> 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	The proposed development <i>may</i> 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 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 <i>Sclerocarya birrea subsp. caffra</i> (Marula tree) and <i>Balanites maughamii subsp. maughamii</i> (Torchwood), identified during the site investigation, will require a permit from DFFE and/or LEDET for

	equivalent zoning.	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 <u>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</u> where such development occurs— <u>(a) within a watercourse;</u> (b) in front of a development setback; or <u>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</u> excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. <u>e. Limpopo</u> <u>i. Outside urban areas:</u> (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; <u>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</u> (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 <u>widening of a road by more than 4 metres</u>, or the lengthening of a road by more than 1 kilometre. <u>e. Limpopo</u> <u>i. Outside urban areas:</u>	There are existing roads along the proposed footprint of the proposed pipeline. These roads will be incorporated into the design as far as possible. Upgrades to these roads will be required. The roads may need to be widened by more than 4 m.

(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; <u>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</u> (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 <u>(hh) Areas within a watercourse; or within 100 metres from the edge of a watercourse.</u>	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.
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5.2 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 5-3: 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.

5.3 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.

6. SPECIALIST SPECIFIC ENVIRONMENTAL ASPECTS AND MANAGEMENT OF THE NEWLY PROPOSED INFRASTRUCTURE DURING CONSTRUCTION

During the Basic Assessment (BA) process of the newly proposed infrastructure, the following specialist studies were undertaken:

- ▶ Agricultural Compliance Statement
- ▶ Heritage and Archaeological Impact Assessment
- ▶ Palaeontological Impact Assessment
- ▶ Freshwater Biodiversity Assessment
- ▶ Terrestrial Impact Assessment
- ▶ Social Impact Assessment
- ▶ Visual and Landscape Impact Assessment
- ▶ Civil Aviation Impact Assessment (CAA) (compliance report)
- ▶ Defense Impact Assessment (compliance report)
- ▶ Air Quality Impact Assessment
- ▶ Traffic Impact Assessment
- ▶ Noise Impact Screening
- ▶ Hydrology Impact Assessment

The various specialists identified a number of impacts to be assessed and proposed mitigatory measures to manage the various potential impacts. The outcome, and intent, of the impact management recommendations i.e., mitigation measures, is to reduce the level of an impact on the environment to acceptable levels. The preferred method would be to avoid impacts; however, this is not always possible.

The various identified impacts were assessed as part of the BA process and were assigned an anticipated impact rating (significance) for both pre-and post-mitigation. The significance ratings are summarised according to environmental impact and project phase in the following tables.

Provided below is a summary of the specialists' impacts and their recommended mitigation measures as detailed in the BA specialist studies. These mitigation measures must be implemented together with the mitigation measures as set out in the Construction, Operational and Decommissioning Environmental Management Chapters below.

6.1 AGRICULTURE

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)¹⁰ 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. 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.

¹⁰ As recommended by the specialist.

6.2 AIR QUALITY

6.2.1 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 6-1**.

Table 6-1: 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.
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 American Society for Testing and Materials (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).

Criteria	Dustfall Monitoring
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.

6.2.2 BEST AVAILABLE INDUSTRY TECHNIQUES

6.2.2.1 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:

- Measures aimed at reducing the extent of unpaved roads, such as paving. Permanent improvements in road surfaces result 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.

6.2.2.2 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.

6.3 CIVIL AVIATION

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.

6.4 DEFENCE

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.

6.5 HERITAGE AND ARCHAEOLOGY

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.

Table 6-2: Summary of the Impact Assessment on Heritage Resources of High Significance.

IMPACT DESCRIPTION: Direct Impact on Heritage Resources Oli6				
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 m¹¹ no-go buffer zone around all four 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	<i>In situ</i> 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 <i>in situ</i> conservation and management of the sites will affect only the affected sites.		
Intensity	Low positive	The <i>in situ</i> 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.		

6.5.1 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

The following section must be read in conjunction with **Table 6-4** of this report.

6.5.1.1 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.

¹¹ Please refer to **Section 8.1.1 of the draft BAR** 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.

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.

6.5.1.2 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**.
- 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.

6.5.1.3 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.

6.5.1.4 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 6-3** gives guidelines for lead times on permitting.

Table 6-3: 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

6.5.1.5 Heritage Management Plan for EMPr Implementation

Table 6-4: 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

6.6 PALAEONTOLOGY

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

Table 6-5: 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	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	Only the site will be affected		
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 / Environmental Safety Officer (ESO) 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 / ESO (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 / ESO. 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			

6.7 FRESHWATER AQUATICS

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.

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

Table 6-6: 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 area¹² 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

¹² 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 be 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 Drainage Systems (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

Additional “good practice” mitigation measures applicable to a project of this nature are provided in Appendix H of the Freshwater Biodiversity Impact Assessment report.

6.8 TERRESTRIAL BIODIVERSITY

6.8.1 FLORA COMPONENT

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.

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.

6.8.1.1 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.

Further recommendations are as follows:

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 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.

6.8.2 FAUNA COMPONENT

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.

6.8.2.1 Loss of habitat and displacement of fauna taxa

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

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 colonisation 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.

6.8.2.2 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 include:

- 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.

6.8.2.3 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 advise on a resolution, which may involve a re-location strategy.

6.8.2.4 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 advise on a resolution, which may involve a re-location strategy.

Further recommendations are as follows:

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.

6.9 SOCIAL IMPACTS

The socio-economic impact assessment revealed a number of impacts that are anticipated to arise during the life cycle (i.e., construction, operation, rehabilitation and decommission phase) of the proposed sections of the Phase 2D alignment, as well as the associated infrastructure and proposed access roads. Key impacts determined during the assessment, as well as recommended mitigation measures, are summarised in **Table 6-7** below.

Table 6-7: Summary of social impacts and recommended mitigation measures.

Project Phase	Impact Description	Mitigation Measures
Pre-construction and Construction	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.	As per International Finance Corporation (IFC) Performance Standard (PS) 5, Land should always be accessed or acquired in consultation and negotiation with the affected people. LWUA has already initiated the process with the TA and private landowners.
	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.	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.
	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.	It is recommended that resettlement be guided by international best practices and accompanied by a comprehensive Resettlement Action Plan (RAP). This approach goes beyond simply meeting legislative compensation requirements. According to best practices, the IFC PS 5 encourages project sponsors to plan and implement involuntary resettlement as a development initiative, ensuring that the livelihoods and living standards of affected people are improved.
	Employment Opportunities It is anticipated that employment opportunities will arise for skilled, semi-skilled, and unskilled workers during the construction phase. This is expected	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

	to have a positive socio-economic impact, particularly for the local population, by providing income-generating opportunities and promoting skill development. The number of locally employed individuals during the construction phase will depend on the developer's project activities and recruitment policy. It is further anticipated that certain skilled and specialised positions will be sourced nationally.	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.
	Procurement of Goods and Services During the construction phase, development projects typically require the procurement of various goods and services. It is anticipated that this project will similarly require the procurement of goods and services, including equipment and building supplies. This requirement is expected to create economic opportunities for existing and new Small, Medium and Micro Enterprises (SMMEs) in the area. The proposed development may lead to the establishment of new SMMEs. However, certain goods and services may need to be sourced from outside the project area, which could result in the developer procuring goods and services from SMMEs beyond the local area.	Procurement of goods and services will be done as per the existing OMM Procurement Policy which aims to support and develop local communities, suppliers, and previously disadvantaged groups for economic upliftment. Furthermore, the procurement of goods and services will be guided by the Preferential Procurement Policy Framework Act, No. 5 of 2000. The contractor will need to implement quality control measures, to ensure that all goods and services are of required quality. It is essential that the contractor notes that The IFC Performance Standards require responsible procurement by ensuring fair, transparent, and competitive sourcing, prioritising 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 (LED).
	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	To manage community expectations, project information should be made readily available to the community. This information should include detailed requirements for employment, procurement, and other project-related opportunities. An information centre should be strategically placed to house project-related information and provide space where community members can log their project-related grievances through a grievance mechanism. The contractor should also seek information on wages paid to the

	or disrupt its progress by holding the project office accountable for unmet employment demands.	locals on previous projects in the area and clearly communicate the proposed wages and benefits to the community. This communication should take place before the recruitment process commences, to better manage community expectations regarding wages and benefits associated with the project.
	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.	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 <i>Standard Specifications for Roads and Bridge Works for State Road Authorities</i> (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.
	Health, Safety and Security Construction projects are generally known to have negative impacts on the health and safety of both communities and employees, and it is anticipated that similar impacts will arise from the proposed development. During the construction phase, nearby communities and workers may be exposed to increased dust, noise, visual disturbances, and other nuisances, as well as risks related to 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, potentially affecting the respiratory health of those exposed. Construction noise, generated by machinery and transport vehicles, is unlikely to damage hearing but will likely reach nuisance levels. Additionally, an influx of job seekers and opportunity seekers, particularly if the influx is male dominated, can result in higher health risks, including an increased burden of disease and a rise in HIV/AIDS rates (Daniel Owens, <i>et al.</i>).	Impact related to health and safety will be managed as per the recommendations made in other specialist studies such as the defence compliance statement and 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 for 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,

	Furthermore, construction activities may attract criminal elements to the area, thereby compromising the security of nearby farms, communities, and employees. It is anticipated that criminal activities, including trespassing, will increase during the construction phase.	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.¹³.
	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.	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.
	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	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.

¹³ Construction mafias, 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.

	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.	
Operation	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.	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.
	Access to Bulk Raw Water for Mine Members During the operational phase, it is anticipated that mine ¹⁴ personnel will have access to a reliable supply of bulk raw water, which is essential for maintaining efficient operations. A consistent water supply enables mines to optimise production, minimise potential financial losses, and mitigate environmental impacts. However, water for industrial use is becoming increasingly scarce in Southern Africa (Mining Industry Association of Southern Africa, 2022). While the mining industry has faced criticism for perceived water wastage, mines contend with a range of water management challenges. These challenges may arise from environmental, climatic, and geopolitical factors encountered throughout the mine's life cycle. As a result, effective water management has evolved from being merely an operational necessity to a strategic imperative.	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
	Employment Opportunities	It is recommended that the developer engage with the affected

¹⁴ The 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.

	During the operational phase, employment opportunities will be limited, as the project will require only a small workforce to carry out routine inspections, maintenance, and repairs. In contrast to the construction phase, which demands a larger labour force, the operational phase will primarily involve specialised roles such as pipeline monitoring, technical maintenance, and occasional rehabilitation work. Consequently, the project is not expected to generate substantial long-term employment for local communities. However, where feasible, priority should be given to local workers for available maintenance activities. Additionally, implementing skills development programmes during the construction phase could help equip local labourers with the necessary competencies to qualify for these operational roles.	communities to implement sustainable SED initiatives in the area, ensuring that community members are not solely dependent on the project.
	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.	It is recommended that the developer develop a health and safety plan that outlines the safety measures and procedures implemented when undertaking maintenance at the project's infrastructure.
Decommissioning	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.	Prior to the decommissioning of the potable water supply, beneficiaries should be notified. Additionally, the municipality should ensure that an alternative source of potable water is available to the affected communities.
	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	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.

	significant financial losses which include a loss on the return of investment.	
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6.10 VISUAL AND LANDSCAPE IMPACTS

The following recommended mitigation measures are primarily intended to minimise the intensity of the landscape and visual impacts.

6.10.1 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.

6.10.1.1 Break Pressure Reservoir

a. 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.

6.10.1.2 New/Widening of Access Roads

a. 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.

b. 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 reseedling or revegetation (if applicable) as well as post-construction monitoring of erosion and rehabilitation; and
 - The use 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.

c. 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.

6.10.1.3 All Work Areas

a. 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.

b. 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.

d. 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.

6.10.2 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.

6.10.2.1 Break Pressure Reservoir

a. 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.

b. 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 (LED₂) 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.

6.10.2.2 Re-routing of Sections of the 2016 Pipeline

a. 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.

6.11 TRAFFIC IMPACTS

The traffic impact assessment revealed a number of impacts that are anticipated to arise during the life cycle (i.e., construction, operation, rehabilitation and decommission phase) of the proposed sections of the Phase 2D alignment, as well as the associated infrastructure and proposed access roads. Key impacts determined during the assessment, as well as recommended mitigation measures, are summarised in **Table 6-8** below.

Table 6-8: Summary of traffic impacts and recommended mitigation measures.

Project Phase	Impact Description	Mitigation Measures
Construction	Decrease in 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.	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.
	Increased 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.	• 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 loads 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.
	Increase in Public Transport and Non-Motorised Transport (NMT) Demand	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

	NMT (walking and other) account for 140 person trips, therefore there is public transport and NMT infrastructure demand. 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.	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. 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.
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Further recommendations are as follows:

- ▶ 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.

6.12 NOISE IMPACTS

The following mitigation measures are proposed to address noise impacts:

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.
6. 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 learners);
 7. 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]);
 8. 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
 9. No construction activities should take place during the night-time period in the communities.

6.13 HYDROLOGY

6.13.1 DETAILED MITIGATION

Several residential properties located directly downstream of the Mooihoek BPR scour valve are at risk of localised inundation. Two primary risks were identified when the BPR scour valve is opened to drain the BPR:

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.

An overview of the general locations of the proposed measures is shown in **Figure 6-1**:

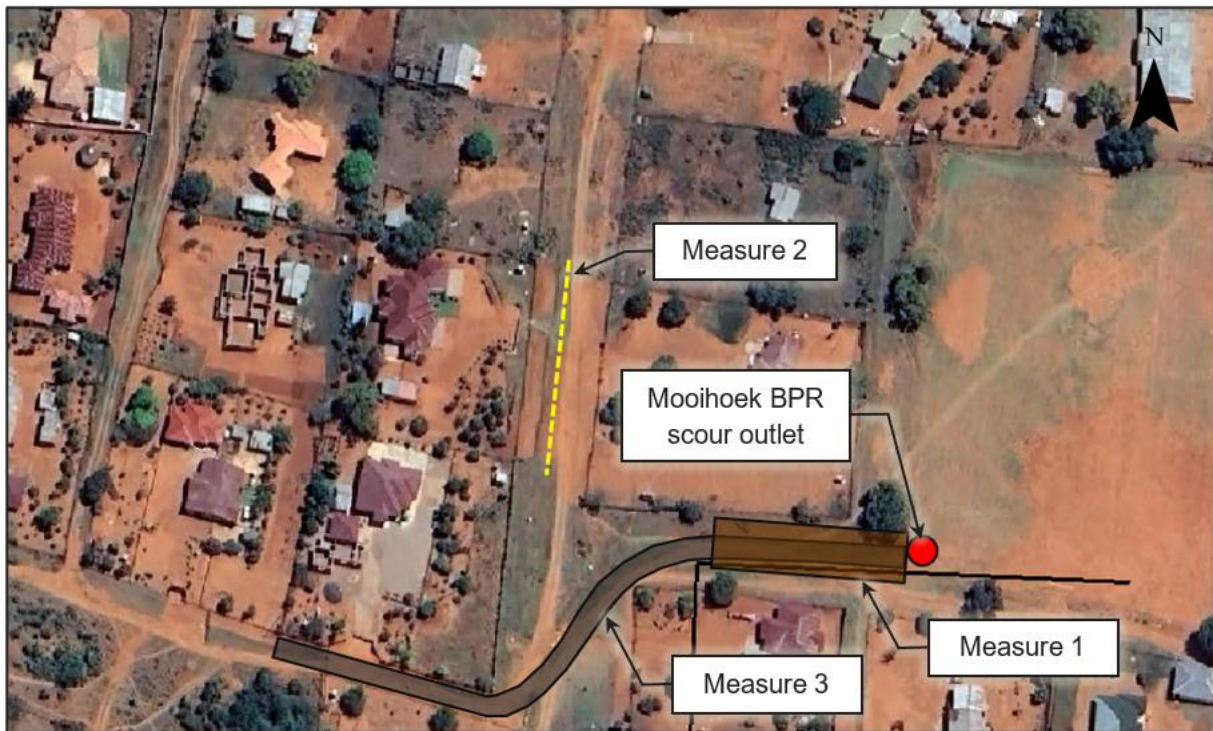


Figure 6-1: Scenario 2 - Overview of proposed mitigation measures.

Mitigation measure 2 indicate that the berm effectively reduces flood risk in the area identified. However, this also led to localised 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.

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. 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.

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.

6.13.2 GENERAL MITIGATIONS

The receiving environment's susceptibility to erosion is influenced by both soil type and land cover. 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 6-9**, to improve surface stability and reduce erosion potential.

Table 6-9: 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

6.13.3 ACCESS ROADS

6.13.3.1 Classification and Mitigation

A summary of all the planned access roads for Phase 2D, as well as their classification, are provided in **Table 6-10**. The table also states whether specific mitigation measures would be necessary. Section 6.13.3.2 provides additional information on access roads for which additional context was deemed necessary, and Section 6.13.3.3 provides general mitigation measures which could be taken into account for the other access roads.

Table 6-10: Detailed classification of access roads.

Access Number	Status	Road Type	Proposed Mitigation Measures
Access 01b	New	Informal Tyre Tracks	See Section 6.13.3.2 aError! Reference source 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 6.13.3.2 b
Access 03	New	Informal Tyre Tracks	See Section 6.13.3.2 c
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	—

6.13.3.2 Detailed Mitigations

This section provides a more detailed description of the proposed mitigation measures for the access roads identified in **Table 6-10**. General mitigation measures outlined in Section 6.13.3.3 may also be considered for implementation where applicable.

a. 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 6-2**.

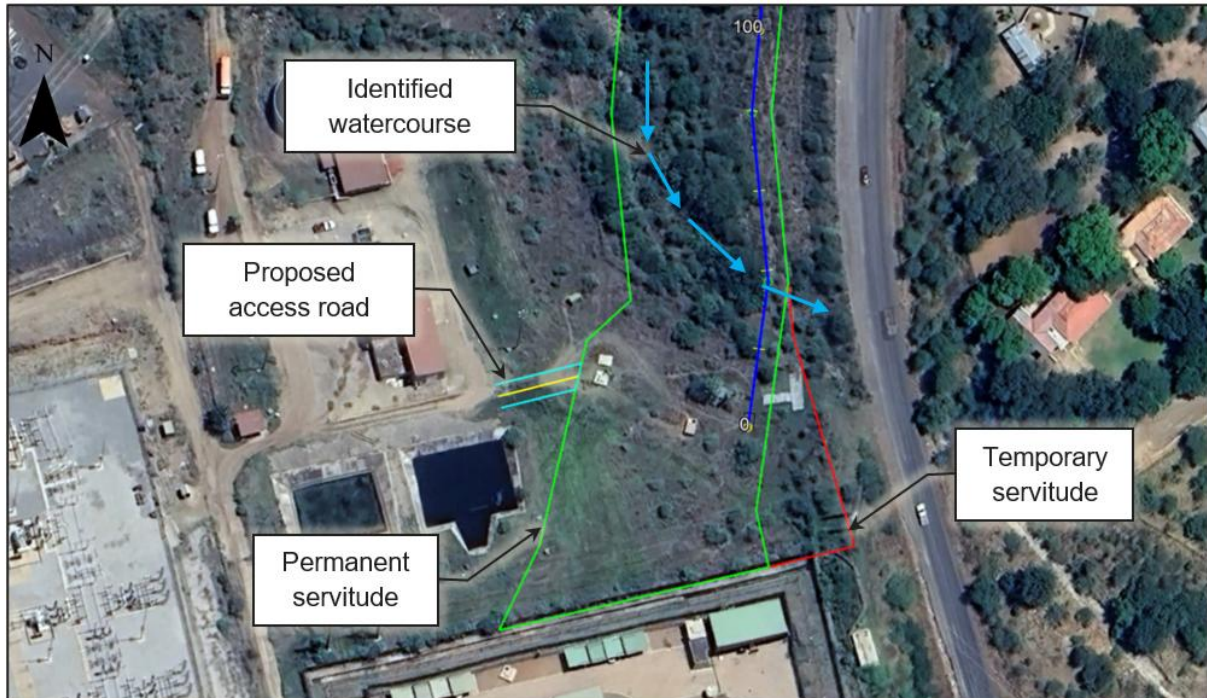


Figure 6-2: Access Road 01b.

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.

b. 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 6-3**.



Figure 6-3: 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 6.13.3.3 may also be incorporated.

c. Access 03

Access Road 03 is situated near an identified watercourse. This reconstructed access road is designed to include a bellmouth 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 6-4**.



Figure 6-4: Access Road 03.

As shown in **Figure 6-4**, 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 6.13.3.3 should be applied where necessary.

6.13.3.3 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.

6.13.4 SPECIALIST RECOMMENDATIONS

6.13.4.1 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 exacerbate 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.

6.13.4.2 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 6.13.3.2. 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 6.13.3.3):

- ▶ 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.

6.13.4.3 Access Roads

The access roads were assessed based on the criteria set out in section 2.3 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. ENVIRONMENTAL MANAGEMENT FOR CONSTRUCTION

As described in **Section 2.1.2**, the setting of *Objectives* and *Targets* form an important part of this EMPr. Objectives are driven by certain requirements set in the EIA Report, Legal Requirements of the Project as well as Best Practice the Implementer aspires to. The Objectives are achieved by implementing and achieving measurable Targets. Management and Mitigation measures are also set

to afford guidance and parameters to the Implementer to achieve the set Targets and ultimately the set environmental Objectives. The following section describes **Management Plans** for different environmental and social attributes pertaining to the construction of the Project. As part of the Management Plans, the section describes the potential environmental impacts which may result from the identified aspects, the objectives of mitigating these impacts as well as the targets used to measure the level of environmental compliance.

7.1 AIR QUALITY MANAGEMENT

7.1.1 OVERVIEW

The air quality of construction areas and its immediate surroundings is inevitably negatively impacted on during construction activities – the severity of which is dependent on the magnitude and duration of the construction activities. Large construction sites involving heavy engineering generally are sources of dust emissions. Other negative impacts to the ambient air quality are exhaust emissions from vehicles and plant and unpleasant odours from incorrect handling of putrescible wastes.

7.1.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project where activities associated with dust, vehicle exhaust emissions and unpleasant odours are undertaken.

Table 7-1: Air Quality Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
1	Dust Generation	- Negative effects on floral photosynthetic functioning. - Potential increase in breathing ailments of site staff, surrounding landowners, communities and fauna. - Decreased visibility. - Nuisance.	Dust emissions are kept to a minimum. Dust does not disturb the economic or social activities in the vicinity of the construction site.	- Dust levels at active working sites do not exceed the pre-determined baseline levels by more than 10%. - Zero number of complaints from site staff, surrounding landowners and communities.	- The Contractor is to take appropriate measures to minimise the generation of dust such as, the frequent spraying of roads during low rainfall periods or by using a chemical dust binding agent approved by the Engineer. - Dust must be controlled through the regular watering of active work areas. - A dust control system must be installed and maintained during the operation of the batch and crusher plant. - A maximum speed of 40 km/h for passenger and light commercial vehicles and 30 km/h for heavy vehicles and equipment must be enforced on site with the construction of speed bumps. - Fine materials (such as bedding material) must be covered during transportation. - All trucks and vehicles removing spoil from the site must have their load areas covered by a tarpaulin to prevent rocks and spoil falling onto the road surfaces. - Disturbed areas no longer used for construction purposes shall be re-vegetated immediately when no longer required. - Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place.	ASTM D1739 reference method (dust fallout) and Continuous particulate monitoring (PM ₁₀ and PM _{2.5}) by use of an Osiris monitor.	Monthly	National Environmental Management: Air Quality Act, No. 39 of 2004 (NEMAQA) National Dust Control Regulations (GNR 827)	Pre-construction, Construction and Rehabilitation	Engineer and Environmental Monitor (EM), Contractor	Monthly air quality reporting will highlight any monitoring locations that exceed acceptable limits and suggest appropriate mitigation / corrective measures.
2	Unpleasant odours	Nuisance to local communities and land users in close proximity to construction area.	No unpleasant odours are experienced on site.	- All toilets are serviced - All putrescible waste removed and disposed of off-site.	- Putrescible waste must be handled, stored and disposed of before the probability of it generating odours. - Chemical toilets must be emptied / serviced at a frequency as agreed between the Engineer and the Contractor and in accordance with health and safety standards. Proof of this must be provided to the Engineer. - Sewage tanks must be emptied at a frequency as agreed between the Engineer and the Contractor. Proof of this must be provided to the Engineer. - Scouring of water from pipelines with unpleasant odour to be undertaken in consultation and agreement with the Engineer.	Site monitoring	Daily	As per the Occupational Health and Safety Act, No. 85 of 1993 (OHSA) and safety standards	Construction until demobilisation by the contractor	Engineer and contractor	Reporting and auditing.
3	Greenhouse gas emissions	- Decrease in air quality - Contributing influence to global warming.	The level of greenhouse gas emissions emanating from plant and vehicles on site is kept to a minimum.	- All vehicles, plant and equipment serviced as per manufacturer's maintenance schedules - Evidence available of service records kept for all vehicles, plant and equipment. - No evidence of plant, equipment or vehicles in bad condition.	- Plant and equipment to function at an optimal level. - Where possible lead replacement petrol to be used. - Where possible low sulphur containing diesel to be used. - All vehicles and equipment must be maintained and serviced according to manufacturer's specifications.	Site monitoring	Daily monitoring of the condition of vehicles. Quarterly feedback on the project's carbon footprint at the Environmental Management Review sessions.	NEM:AQA	Construction until demobilisation by the contractor	Engineer and contractor	Reporting and auditing.
4	Emission of noxious fumes from	Development of Respiratory problems.	Damage caused to lungs and eyes is prevented.	Use or appropriate/required Personal	Required PPE must be worn at all times.	Site monitoring	Daily	As per the OHSA and safety standards	Construction until demobilisation	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
	welding	Irritation to eyes.		protective equipment (PPE) including, welding mask, gloves and overall. Medical test results prior to construction not to be exceeded.					by the contractor		

7.2 TERRESTRIAL ECOSYSTEMS MANAGEMENT PLAN

7.2.1 OVERVIEW

The Project's construction activities, whether within or outside of the working servitude, may have an effect to certain terrestrial ecosystems or features. Loss of floral or faunal species must be prevented as far as practicable possible and all areas disturbed as a consequence of the construction activities must be fully rehabilitated to the satisfaction of the ECO, the Engineer, the Environmental Monitoring Committee (EMC) and servitude granters where servitudes have been registered.

7.2.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project where activities which may pose negative effects to terrestrial ecosystems are undertaken.

Table 7-2: Terrestrial Ecosystem Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
5	Loss of Vegetation, Habitat and Soil Fertility	- Decrease in faunal diversity and density. - Decrease in floral diversity. - Increased potential for erosion and soil loss. - Increase in dust emissions. - Potential decrease in soil organisms.	To minimise the extent of the contractors camp, construction footprint and spoil storage footprint, as well as remain outside of sensitive areas.	- Contractor's camp and construction works kept within confines of demarcated footprint. - All the sensitive or protected flora identified to be rescued and relocated from site. - No accommodation on site.	- The planning and design for the construction camp and construction site must ensure that there is a minimum impact on the environment. These areas must be kept to a minimum footprint size. - A method statement is required from the Contractor at tender stage that includes the layout of the camp, management of the ablution facilities and wastewater management. The method statement must be approved by the Engineer. - A site plan of the construction camp must be provided and approved by the Engineer. - As far as possible the construction camp must be placed on already disturbed land. - The width of the construction footprint may not exceed 40 m for the pipeline and as far as possible must be kept to a minimum for the construction of the associated infrastructure. Where turning circles and laydown areas are required at river crossings, reservoirs and pump stations, an additional space of between 1000 and 2000 m² shall be provided with the guidance of the ECO to ensure any identified sensitive areas are avoided as far as possible. - The working servitude must be reduced in sensitive environments such as pristine or valuable vegetation as well as sensitive social environments. - A nursery must be established at the Construction Camp. Protected flora species must be removed and kept in the nursery during construction to be used for the rehabilitation of the disturbed areas. - The contractor's camp and construction sites must be demarcated using fencing as approved by the Engineer. - Fences must be constructed so as to avoid significant vegetation, natural features, and sites of cultural and historical significance. - No personnel or construction materials will be allowed outside the designated / demarcated site. - Limit clearing for fencing to the removal of trees and shrubs within 1 m of the fence line. No removal of the grass cover or topsoil is to occur within this width. - Site demarcations must remain in position until the completion of construction. - Once the site has been cleared of vegetation (i.e. trees and shrubs), the topsoil including the existing grass cover is to be shallowly ripped before removal. - Topsoil shall be stripped from the boundaries of working areas inward where topsoil will be impacted by construction activities, including areas for temporary facilities, as directed by the Engineer. - The soil profile as obtained from the test pits conducted by the Contractor shall be investigated per chainage to ascertain the depth of the fertile soil. A Record of the stripping depth in each area will be kept for reference during rehabilitation.	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					• Topsoil must only be handled twice, once to strip and stockpile and once to replace and level. • Topsoil must be stripped in as dry condition as possible in order to prevent compaction. • Topsoil shall be stripped over the entire width of the temporary pipeline construction servitude, spoil and borrow pit areas, except for the topsoil storage area, and to a maximum depth of 150 mm • In areas where indicated and agreed with the Engineer, the fertile soil shall be removed over the trench width, spoil and borrow pit areas as measured at ground level. The depth of the fertile soil shall be informed by the chainage based soil profile but limited to 800 mm below the OGL i.e. maximum excavation depth of 650 mm below the topsoil layer. Fertile soil removed during battering and shoring of trenches shall also be stockpiled. • Topsoil must be stored in a demarcated area which is protected from wind and rain. • Topsoil should not be stored for more than two weeks during the peak growing season (October – April). • Topsoil stored for longer than two weeks should be covered with tarpaulins to prevent waterlogging. • Where practical, topsoil and fertile soil shall not be left for longer than six months before being used for rehabilitation. • If topsoil and fertile soil are left for longer than 6 months, the stockpiles shall be placed as to occupy minimum width compatible with the natural angle of repose of material and measures shall be taken to prevent the material from being spread over too wide a surface. The Contractor shall ensure that all stockpiles do not cause the damming of water or run off and shall also ensure that the materials are not eroded away. • The topsoil stockpiles must not exceed 2 m in height, unless otherwise approved by the Engineer. • Topsoil stockpiles must be above the 1:50 year flood line. • Stockpile topsoil in windrows parallel to the excavation. • Do not stockpile topsoil in drainage lines. • The stockpiles shall be formed such that no ponding of surface water forms on the surface of the stockpile. • Erosion of the topsoil stockpiles by wind and/or water shall be minimised by providing suitable storm water and cut off drains, and by establishing temporary vegetation on the stockpiles • All grass and other vegetation should be left on the topsoil stockpiles so that they colonise the area after construction. • No storage of vehicles or equipment will be allowed outside of the designated area. • Plants outside of the construction area are not to be						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					disturbed, destroyed or removed. • The Contractor will be held liable for the replacement of any plant or feature under the protection of local by-laws, provincial ordinances or national legislation that is removed or damaged by the Contractors negligence or mismanagement. The Engineer is to indicate the plants or features to be avoided. • The Contractor with the assistance of a qualified botanist should familiarise themselves with the protected, orange listed, range restricted or endemic species. • Protected or endangered species of plants shall not be removed unless they are interfering with the construction. Where such species have to be removed due to interference the construction, the necessary permission and permits shall be obtained from Provincial Nature Conservation or Department of Environmental Affairs. • All protected species not removed must be clearly marked and such areas fenced off for the duration of the construction works. • All protected species not removed must be clearly marked and such areas fenced off for the duration of the construction works. • A certified horticulturist should be employed to supervise the transplantation process and to oversee the nursery. • A management plan must be compiled for nursery operations to ensure the persistence of "rescued" plant specimens. • The EM should keep a database (approximate number, identity and geographic position) of all of the protected and endangered plant species lost during the construction phase. • The number of endemic and/or protected individuals removed during the construction phase should be replaced during rehabilitation. • All endemic or protected species will be rescued from the construction site and maintained in the onsite nursery. Alternatively seeds of the species should be harvested in a 5 km radius prior to construction and then cultivated in the onsite nursery. • Endemic or protected species which are commercially available should be sourced from nurseries within a 50 km radius. • Any 'remarkable tree' (species older than 200 years or taller than 10 m) should be left <i>in situ</i> or relocated. • Should any 'remarkable trees' be relocated, a tree surgeon must be appointed. • The removal of harvesting of plant species for medicinal or cultural use by an employee is strictly prohibited or <u>penalties will be issued to any individual that is caught harvesting plant species for medicinal or cultural use, the penalties will be in line</u>						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					with the contract specifications - The width and depth of the trench, as well as the working place (footprint) adjacent to the trench must be specified in the form of a method statement that will have been approved by the Engineer. - Planning of access routes must be done in conjunction between the Contractor, Engineer, ECO, DWS and the relevant landowners. - Slight deviations of the access road alignments are permitted, so as to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance. - Any additional routes and turning areas required by the Contractor must be approved by the Engineer. - Make use of existing roads and tracks where feasible, rather than creating new routes. - No off-road driving is permitted, unless authorised by the Engineer. - No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed on river- and stream banks, unless authorised by the Engineer. - Do not disturb, deface, destroy or remove plants or natural features outside of the construction area, whether fenced or not, for the duration of the Contractors presence on site, unless otherwise specified. - Do not establish any Site Works besides those specified and allowed for in the successful tender. - Do not paint or mark any natural feature. Marking for surveying and other purposes must be done using pegs, beacons, rope or droppers. - For significant trees as indicated by the Engineer or appointed specialists, trenching must occur 3 m away from the stem.						
6	Soil contamination	- Decline in soil organisms. - Potential sterilisation in the carrying capacity of the soil.	Adequate protection of soil and soil remediation measures in case of spills is ensured.	- No evidence of hydrocarbon and hazardous spills. - No release of contaminated water into the natural environment. - Immediate removal and remediation of all spills.	- Topsoil stockpiles may not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation. The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation. This topsoil will be sourced from commercial sources. - Do not mix topsoil obtained from different sites. - Do not mix sub-soil and topsoil stockpiles. - Fuel must be stored in above ground storage tanks or sealed containers – both such vessels being contained within a bunded area with sump drainage. - All bunds must be designed to contain at least 110 % of the tank or drum storage capacity (this shall include fuels for, welding equipment and oxy – acetylene cutting equipment). - No drainage from fuel storage areas shall be permitted. - Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents. These plans must include rehabilitation procedures.	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					• All spills (minor and major) must be cleaned and remediated to the satisfaction of the EM within 24 hours of occurrence. • Any spillage on site will be excavated to the visible depth of impact and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable material. Alternative in-situ remediation techniques could be used if approved by the Engineer and EM. • The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and cleanup materials readily available to absorb, breakdown and, where possible, encapsulate minor material spillages. • Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop area. Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of the oil. The area for emergency repairs should be identified between the Contractor and Engineer. • Vehicles and equipment must be checked on a daily basis. Checklists for all vehicles and plant must be kept as a record. • Workshop areas shall have a concrete floor and fitted with sumps and collection tanks for wastewater that is contaminated with oil, diesel and petrol. • Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use. • <u>The appropriated size and design (i.e no holes) must be used in right places. The recommended material should be stainless steel or strong rigid plastics that can be readily moved.</u> • Drip trays must be used where dispensing mechanisms or stored receptacles may leak. • All vehicles and equipment must be well maintained to ensure that there are no oil and fuel leakages. • Leaking equipment shall be repaired and immediately removed from site to a facility for repair. • Site establishment shall take place in orderly manner and all amenities shall be installed at the camp sites before the main workforce move onto site. • No permanent structures will be permitted at the contractor's camp. • Storage areas and material laydown sites must be located within a pre-determined zone and should be indicated on the site plan. • Additional laydown and storage areas required must be approved by the Engineer. • Temporary structures shall be placed in a predetermined area and be founded on a platform, of either subsoil or screed slab. • Vehicles, plant and equipment may only be washed in designated areas. • Cement must be delivered in sound and properly						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					secured bags or in approved bulk containers. • Cement products in bags must be stored in storage containers to be provided at the construction camp and should only be opened when needed. • Limit cement and concrete mixing to single sites where possible. • No concrete batching on bare soil. • Dispose of all visible remains of excess cement and concrete after the completion of tasks. • Do not allow the washing of trucks delivering concrete anywhere but within designated wash bays equipped with runoff containment. • Any spilled concrete shall be cleaned up immediately. • The siting of batching plants shall be done in consultation with the ecologist and the archaeologist. • Avoid stripping borrow pit areas to bedrock as it limits the rehabilitation potential for these areas.						
7	Increased potential for soil erosion	• Loss of valuable topsoil. • Loss of vegetation habitat. • Formation of rills and gullies. • Loss of agricultural potential. • Decrease in surface quality of access roads. • Increased sedimentation of watercourses.	To prevent any erosion and to provide adequate erosion control measures where required.	• No visible evidence of erosion activity. • Sedimentation loads of streams and rivers do not exceed baseline levels by more than 10 %. • Erosion control measures present in all higher risk areas.	• The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding. • The depth of the topsoil shall be determined before soil stripping commence and shall form part of the rehabilitation specifications. • Topsoil should not be stored for more than two weeks during the peak growing season (October – April) and should be kept free of weed species and subsoil. If necessary, topsoil that are to be stored for more than two weeks must be covered by tarpaulins to prevent waterlogged conditions that could lead to excessive decay of the seed bank or leaching of valuable nutrients. • Identify all areas susceptible to erosion so that these can be protected from undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Retain natural trees, shrubbery and grass species wherever possible. • Institute sedimentation control measures at river crossings and when excavation or disturbance within riverbanks, or the riverbed takes place. • Address erosion channels (“donga”) crossings as river crossings, applying soil erosion control and bank stabilisation procedures as specified by the Engineer and approved Specifications. • Do not let erosion develop beyond the formation of rills. • Repair all erosion damage as soon as possible and not later than a target specified by the Engineer. • Slopes steeper than 1(V):3(H) or slopes where the soils are by nature dispersive or erodible must be stabilised. • Dust and erosion of topsoil from runoff must be minimised through watering or similar dust control	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					measures. Placing of topsoil in areas exposed to high wind or excessively rainy conditions must be avoided. • The contractor shall devise a soil conservation and stockpiling plan, to be approved by the Engineer. • Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting on berms. • Access routes should not traverse slopes with gradients in excess of 8 %. • Wherever possible, access routes should not traverse drainage lines and riparian zones. • Drainage lines are not to be altered and these areas should be level with the surrounding land once subsidence has occurred. • Runoff from roads must be managed to avoid erosion and pollution problems. • Minimise the flow of any surface water or floodwater into borrow areas. Deflect clean surface runoff away from excavations.						
8	Encroachment and establishment of weeds	• Decrease in indigenous floral habitat availability. • Decrease in floral populations and diversity. • Spread of weeds to other environments.	Alien plants / seeds are prevented from being introduced on site and spreading to surrounding areas. Alien plants are eradicated and removed from site.	• No visible presence of weeds on site.	• Weeds growing on topsoil stockpiles must be removed. • All sites disturbed by construction activities must be monitored for exotic or invasive plant species and weeds. • Herbicides and pesticides may only be used during vegetation clearance and the eradication of alien plant species with the prior approval of the ECO. If necessary a method statement shall be submitted for approval. • Chemical removal shall be used in accordance with manufacturer's specification for weeds where mechanical eradication / control are no longer effective. • Those exotic / invasive plant or weed which cannot be eradicated by means of herbicides, need to be manually removed from site. • The herbicide consultant must have a Pest Control Operators license. • The Contractor must consult a flora specialist or the herbicide consultant in developing a brochure for those eradicating weeds which identifies declared weeds and alien species that can be totally eradicated. • Control the type of material imported to site to ensure that soil contamination, in terms of weed and alien invasive plants, does not occur.	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.
9	Impede faunal movement and disrupt livelihood	• Decrease in faunal diversity. • Obstruction to faunal migratory patterns. • Potential decrease in faunal populations.	All possible impacts on faunal movement are kept to a minimum. Consideration is given to faunal movements before demarcation of areas and	• No visible impediment of faunal corridors. • Trenches are not left open for long distances at a time. • All fences removed at	• All excavations must be demarcated using danger tape with steel droppers or other methods approved by the EM. • The contractor must ensure that domesticated animals belonging to the local community are kept away from the construction site. • The footprint of disturbance should be kept to a minimum. • Trenches must be checked on a daily basis for any	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
		Potential injury and death to fauna.	trenching.	- completion of construction work. - No hunting or poaching of fauna	- signs of fauna which may have fallen in. - Access roads should be planned so that only minimum linear distances are developed. - Maintain animal movement corridors as far as possible. - No wild animal may under any circumstance be handled, removed or interfered with. - No wild animal may under any circumstance be hunted, snared, captured, injured or killed. This includes animals perceived to be vermin. - The Contractor must regularly undertake checks of the surrounding natural vegetation, in fences and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. - Ensure that the Work site is kept clean, tidy and free of rubbish that would attract animal pests. - Ensure that bins and waste storage facilities are scavenger proof. - The Contractor must report problem animals and vermin to the Engineer who will facilitate any removal by the relevant organization or authority. - Ensure that domesticated animals belonging to the local community are kept away and are safe from any unprotected Works. - Do not make use of any pesticides, unless approved by the EM. - Fences must be aligned to avoid the significant impact on animal movement corridors. - The Contractor must communicate the benefits of the ecological conservation being practiced by the project and encourage active participation by all employees.						
10	Illegal wood harvesting for creation of fires	- Loss of indigenous woody vegetation. - Decrease in habitat for fauna and avifauna. - Increased potential for erosion. - Possible loss of protected species.	The unnecessary harvesting of wood from the surrounding area is prevented.	- No visual evidence of wood harvesting. - No change to vegetation baseline.	- After consultation with the community, woody material removed during construction must be placed in a designated area for collection by the local community. - No vegetative matter, besides the woody material mentioned above, may be removed for firewood.	Site monitoring	Daily	NEM:BA	Pre-construction (for search and rescue of protected species), construction, rehabilitation and demobilisation by the contractor	Engineer and contractor	Reporting and auditing.
Annexure E contains the specific Environmental Sensitivity Maps for Phase 2D.											

7.3 WATER MANAGEMENT PLAN

7.3.1 OVERVIEW

The Project falls within the confines of an already severely stressed water catchment, namely the Olifants River catchment. Working in close proximity to surface water means that discharges of waste water or releases of contaminated storm water pose a risk to the integrity of such surface water. In cases of spillages, ground water may also be affected. For this specific phase (sub-phase 2D) of the Project, the activities that invoke the risk of surface water impacts must be effectively managed and controlled to minimise or prevent such impacts. Surface water along or in close proximity to the alignment includes rivers such as the Steelpoort and Moopetsi Rivers.

7.3.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project where activities which may pose negative effects to surface water are undertaken.

Table 7-3: Water Quality Aspects and Impacts with associated Objectives and Mitigation Measures

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
11	Water contamination	- Impact on the wellbeing and reproduction potential of the aquatic biota. - Potential decrease in surface- and ground water quality. - Potential decline in the use of water for activities on site.	No pollutants are being released to the aquatic environments. Wastewater is appropriately managed. Erosion is prevented. Sedimentation is prevented.	- The quality of the water from upstream of construction and downstream of construction will not differ with more than 10%. - No evidence of pollutants released into streams and rivers. - No erosion caused by construction activities. - No sedimentation caused by construction activities.	- The Contractor must identify sources of process water and quantify quantities for approval and monitoring by the Engineer. - The Contractor shall supply a wastewater management system that will comply with legal requirements and be approved by the Engineer. - Wash bays, service areas and fuel storage areas may not be located within the 1:100 year flood line or horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. - No detergents may be used. - Workshops, refuelling depots and washing areas shall be bunded. - Water from wash bays, service areas and fuel storage areas must be discharged into oil separators and sumps. Oils collected in this manner should be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites. - No drainage from fuel storage areas shall be permitted. - Never hose oil or fuel spills into storm water drain or sewer, or into the surrounding natural environment. Any contaminated storm water and other run-off from the site shall be contained and cleaned. Any spill which may contaminate water must be treated according to the approved spill management method statement the Contractor compiled. - Contain oil or fuel spills in water using an approved oil absorbent fibre. - Grey water not deemed suitable for dust suppression by the Engineer must be stored in sealable marked containers and disposed of with other waste water. Wastewater as well as spilled fuel collected within bunded areas and refuelling areas shall be disposed of as hazardous waste. - The Contractor shall inform all site staff of the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities. - Drainage lines are not to be altered and these areas should be level with the surrounding land once subsidence has occurred. - Concrete trucks shall not be washed on site outside of designated concrete washbays. Such washbays must be constructed in such a manner to ensure adequate settlement of concrete from water and cleaning of such settled concrete from the washbay. The washbay must be bunded to prevent water from leaving the washbay and contaminating surrounding	Site monitoring and water sampling and testing as per section 14.2 and 14.3.	Daily	General limits listed in the NWA (see Table 14-14-9) and the Classes and Resource Quality Objectives of Water Resources for the Olifants Catchment, GN 466 of 22 April 2016.	Construction until demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					soil and/or waterbodies. - The batching plant area shall be operated in such a way as to prevent contaminated water to run-off the site, polluting nearby streams or water bodies. To this effect diversion berms can be installed to direct all wastewater to a catchment area. Alternatively these areas shall be bunded to contain contaminated water. - Do not locate batch and crusher plants or associated sludge dams within the 1:100 year flood line or within a horizontal distance of 100 m (whichever is greater) of a watercourse or drainage line. - Do not locate sand washing plants or associated settlement ponds within the 1:50 year flood line or within horizontal distance of 100 m (whichever is greater) of a watercourse. - Construct earth berms up-slope of the batch, crusher and sand washing plant to deflect clean surface runoff away from the batch, crusher and sand washing plant. - Contain the contaminated run-off emanating from within the batch, crusher and sand washing plants within a sludge dam for later disposal in the appropriate manner. - Clean out all sludge dams on a regular basis, and dispose of sludge in the appropriate manner. - Do not locate any site toilet, sanitary convenience, septic tank or French drain within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of stream or rivers. - Do not allow the use of any watercourse for swimming, bathing, or the cleaning of clothing, tools and equipment by any persons associated with the project. - Prevent the discharge of water containing polluting matter or visible suspended materials directly into drainage lines or streams. - Deflect any unpolluted water/runoff away from any dirty area. - Where necessary, turbid water pumped from excavations within rivers must be passed through a sand filter or settling pond before being releases back into the river. Ensure that no storm water is allowed to enter any drainage installation for the reception, conveyance, storage and or treatment of sewage. - Before any water is permitted to enter natural drainage lines, the quality of the water must comply with the standards contained within the General Authorisations of the DWS which has been authorised by DWS.						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					• Ensure that water passing through vehicle wash bays and workshops pass through oil separators before passing into the conservancy tank. • No roads shall cut through river- and stream banks except where duly authorised by a water use license as this may lead to erosion causing siltation of streams and downstream dams. Where such roads are constructed in wet areas, adequate erosion and sedimentation prevention measures must be applied. • Existing drifts and bridges may be used if the Landowner gives his consent. Such structures shall then be thoroughly examined for strength and durability before they are used. • New drifts and bridges shall only be constructed with the approval of DWS. • A licence must be acquired from DWs for all water use crossings before construction starts. • During construction through a drainage line, the majority of the flow must be allowed to pass down the stream. In-stream diversions should be used rather than the construction of new channels. • Erosion from the construction activities must be prevented. Measures to control erosion include: - Minimising removal of vegetation, - Clearly demarcate boundaries in order to limit construction activities, - Permanent or temporary fences shall be erected and maintained to ensure that activities are conducted within the demarcated area, - Erosion sensitive zones shall be clearly marked. No persons, machines, equipment or materials shall enter these areas, - Vehicles and plant to utilise dedicated routes only; - Make use of erosion berms and silt fences where applicable and approved by the Engineer.						
12	Groundwater contamination	• Decrease in groundwater quality. • Decrease in the populations of aquatic micro-organisms. • Decrease in floral reproductively.	No contamination of groundwater.	• No evidence of pollutants being released into groundwater.	• No residue or substance which causes or is likely to cause pollution of a water resource may be placed in the workings of any underground or opencast excavation.	Site monitoring	Daily	NWA and the Classes and Resource Quality Objectives of Water Resources for the Olifants Catchment, GN 466 of 22 April 2016.	Construction until demobilisation by the contractor	Engineer and contractor	Reporting and auditing.
13	Decline in water availability	• The decrease in the habitat for aquatic biota	Full compliance to the limits provided by DWA for	• Volume of water abstracted from the watercourse	• Water may only be abstracted from a water course for use during construction once all grey water from batch, crusher and sand washing plants has been	Site monitoring.	Daily	NWA and the Classes and Resource Quality Objectives of Water	Construction until demobilisation	Engineer and contractor	Reporting and auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation on responsibility	Mechanism for monitoring compliance
	of water resource	and riparian vegetation. - Negative effect on the wellbeing of terrestrial fauna. - Decrease in the effective functioning of the aquatic biota. - Decrease availability of water for downstream users of the water course.	abstraction volumes from a watercourse.	on an annual basis not to exceed the DWA Water Use License provisions by more than 5 % on an annual basis.	utilised on site for dust suppression. - The volume of water abstracted from a water course may not exceed the limits stipulated by DWS by more than 5 % on an annual basis. - Do not drain, fill or alter in any way, any drainage line, including the riverbanks unless this forms part of the construction Works, or upon specific instruction by the Engineer and as authorised by the water use license.			Resources for the Olifants Catchment, GN 466 of 22 April 2016.	by the contractor		
14	Misuse of available water on site	- Unsustainable utilisation of available wastewater resulting in increased abstracted volume of water from natural water courses. - The decrease in the habitat for aquatic biota and riparian vegetation. - Decrease availability of water for downstream users of the water course.	Wastewater generated from construction activities is as far as possible recycled for reuse.	Abstraction from natural watercourses is kept to a minimum and does not exceed the DWA Water Use License provisions by more than 5 % on an annual basis.	- Filtered water from the sludge dams may be released into the environments should they conform to the sediment load requirements of DWS. - Monitor water use and ensure that areas of waste are identified and minimised. - Repair identified leaks and address issues of water wastage as soon as these are identified. - Where possible, reuse water on the construction site for dust suppression on roads. - Create awareness of water conservation in toolbox talks.	Site monitoring	Daily	NWA	Construction until demobilisation by the contractor	Engineer and contractor	Reporting and auditing.

7.4 WASTE MANAGEMENT PLAN

7.4.1 OVERVIEW

Waste generated during construction activities will need to be managed in compliance with waste management principles. This means that if waste cannot be prevented, attempts should be made to re-use the waste or else the waste would have to be recycled or disposed of. Waste generated during the construction phase needs to be effectively handled, separated, stored, transported and ultimately safely disposed of while trying to reduce the amounts of waste generated.

7.4.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project where activities are the cause for generation of different wastes.

Table 7-4: Waste Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
15	Increase in waste generation	- Decrease in the aesthetic quality of the environment. - Unpleasant odours. - Potential injury and death to local fauna and livestock. - Shortening the lifespan of the local waste disposal sites. - Potential disease and injury to site staff and local inhabitants. - Land surface pollution.	Re-use and recycling of waste is promoted where prevention thereof is not possible. The disposal of waste to local waste disposal sites is limited.	- No visible waste from construction activities observed on site. - No unpleasant odours. - Marked and sealable bins observed. - Evidence of waste disposal certificates.	- Characterise and quantify all waste streams across the project in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options approved by the Engineer. - As part of the characterisation, define opportunities for source reduction, as well as reuse and recycling as opposed to simply disposing of waste. - Ensure segregation of hazardous wastes from non-hazardous. - Sealable bins and containers must be made available by the contractor for the storage of construction and domestic waste. - Temporary storage of construction waste will take place within areas designated by the Engineer and the Environmental Officer (EO). <u>In terms of the NEM:WA states in section 21: General requirements for storage of waste: Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that—</u> <u>(a) the containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste;</u> <u>(b) adequate measures are taken to prevent accidental spillage or leaking;</u> <u>(c) the waste cannot be blown away;</u> <u>(d) nuisances such as odour, visual impacts and breeding of vectors do not arise; and</u> <u>(e) pollution of the environment and harm to health are prevented</u> <u>It will be the contractor's responsibility to undertake this task</u> - The Contractor will be responsible for the removal and transportation of all construction waste material off site to a registered waste disposal facility (e.g. Burgersfort). Proof of this must be provided by the Contractor to the Engineer. Maintain a waste register for materials removed from the site, indicating type, quantity, date, haulage contractor, delivery point and safe disposal certificate. - Clearly marked waste bins are to be provided for the separation of waste. - Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled where possible, for example waste oil should be recycled. - Personnel must be informed about the necessity of using waste drums. - The Contractor must do site clean-ups on a daily basis and dispose in the designated refuse bins provided. - The Contractor must dispose of all domestic refuse	Site monitoring	Daily	NEM:WA ECA: Sections 19 and 19A.	Construction	Contractor and Engineer	Inspection of waste management facilities e.g. waste skips or bins Inspection of waste and waste removal documentation (e.g. waste manifests and certificates of safe disposal)

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					generated by the staff and sub-contractors on a weekly basis at a registered waste disposal facility. Proof of this must be provided by the Contractor to the Engineer. • Ensure that solid waste is transported so as to avoid waste spills <i>en route</i>. • Sealable waste drums should be provided at least every 100 m along the construction of the pipeline. • Litter bins must be emptied on a weekly basis (or as required before they reach capacity). • The Contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests and that rubbish bins are scavenger proof. • Collect waste, concrete and cement sludge off the side of the batch plant on a regular basis and dispose of according to the Contractor's approved method statement. • Do not dump waste of any nature, or any foreign material into any drainage line or stream. • During transportation of waste, the Contractor must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations.						
16	Mis-management of sewage	• Unpleasant odours • Potential outbreak of disease • Infringement on human rights • Spillages which could result in increase in microbiological pollutants to watercourses and soil.	The required number of latrines are provided and emptied on a regular basis.	• The required number of chemical toilets • Record of sewage waste disposal certificates. • Water quality of streams and rivers are maintained within baseline levels.	• A minimum of one toilet must be provided per 15 persons at each working area within 100 m from worker activity. • Separate toilets must be provided for males and females. • Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the EM. The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.	Site monitoring	Daily	NEM:WA NWA	Construction	Contractor and Engineer	Auditing of sewage related aspects on site.

7.5 HAZARDOUS SUBSTANCES MANAGEMENT PLAN

7.5.1 OVERVIEW

Hazardous substances pose risks to health, safety and the environment if incorrectly handled, stored, transported or disposed of. Hazardous substances on the Project are typically limited to fuels and oils but may include other substances as well. It is necessary to ensure that hazardous substances are transported, stored, handled and used in a safe manner that poses minimal risk to human health and the environment.

7.5.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project in cases where hazardous substances are utilised.

Table 7-5: Hazardous Substances Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
17	Potential spillages of hazardous waste	- Decrease in water quality of watercourses. - Soil contamination. - Potential negative effects to the wellbeing of fauna and flora.	Hazardous spills are prevented and no incidents to human health.	- Water quality of streams and rivers are maintained within baseline levels. - Immediate removal and remediation of all spills. - All staff trained. - All hazardous substances are documented.	<u>Training</u> - Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials; - Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release; and - Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact. <u>Control planning</u> - Document the types and amounts of hazardous materials present on the project site including the following information: - Name and description (e.g. composition of a mixture) of the hazardous material; - Classification (e.g. code, class or division) of the hazardous material; - Regulatory reporting threshold quantity of the hazardous material; - Quantity of hazardous material used per month; - Characteristics that make the material hazardous (e.g. flammability, toxicity); - Analysis of potential consequences based on the physical geographical characteristics of the site, including aspects such as its distance to settlements, water resources, and other environmentally sensitive areas. - Identify locations of hazardous materials and associated activities on an emergency plan site map; - Detail the availability of specific PPE and training needed to respond to an emergency; and - Detail availability of spill response equipment sufficient to handle at least initial stages of a spill and a list of external resources for equipment and personnel, if necessary, to supplement internal resources. <u>Uncontrolled Releases and Spillages</u> - Implement all measures detailed in the spill prevention method statement - Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard; - Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures; - Store all hazardous (reactive, flammable, corrosive and	Site monitoring	Daily	Hazardous Substances Act, No. 15 of 1973 (HSA) South African National Standards (SANS) 10234 NEM:WA ECA: Sections 19 and 19A	Construction	Contractor and Engineer	Inspections of site conditions, waste management facilities and hazardous chemical storage facilities

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					toxic) materials in clearly identified, fit-for-purpose containers or vessels; - Describe response activities in the event of a spill, release, or other chemical emergency including: - Internal and external notification procedures; - Specific responsibilities of individuals or groups; - Decision process for assessing severity of the release, and determining appropriate actions; - Facility evacuation routes, and - Post-event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment. <u>Reaction, fire and explosion prevention</u> - Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. Such prevention practices include: - Storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas; - Provision of material-specific storage for extremely hazardous or reactive materials; - Use of flame arresting devices on vents from flammable storage containers; - Provision of grounding and lightning protection; and - Storage of hazardous materials in an area of the facility separated from the main construction activities. <u>Planning co-ordination</u> - Procedures should be prepared for: - Informing the public and emergency response agencies; - Documenting first aid and emergency medical treatment; - Taking emergency response actions; - Reviewing and updating the emergency response plan to reflect changes, and ensuring that employees are informed of such changes; and - Using, inspecting, testing, and maintaining the emergency response equipment. <u>Storage of hazardous materials</u> - Chemical products must be secured when not needed to prevent tampering and vandalism. - Provide warning notices, fire-fighting facilities and protection from weather damage. - Each shift supervisor or safety officer is to report on the integrity of the hazardous materials storage. - Keep products in their original container unless they are not re-sealable; with all stored products and containers being labelled, and original labels and Material Safety						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					Data Sheet (MSDS) retained. - Store acetylene, propane, and oxygen cylinders in dedicated areas where they will be protected from collision or ignition sources. - Label containers so that the hazard nature of the material is clear. <u>Handling of hazardous materials</u> - Obtain MSDS for all chemicals before use and all materials must be handled according to the instructions. - In response to and in addition to the information contained on the MSDS the following must also be determined: - Location, or where the material is to be moved; - The weight of the container so that proper personnel and/or equipment will be utilized during handling; - Access and egress routes; - What PPE is required; - What emergency actions may be needed (i.e., first aid, firefighting media, etc.); and - Containers holding flammable materials to be grounded during any transfers of contents. <u>Transport of hazardous materials</u> - Transporters of hazardous materials must ensure that: - The vehicle is suitable and registered for the purpose it is being used; and - The vehicle displays clear markings in English indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency. <u>Flammable liquids</u> - No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids. 'No Open Flames' and 'No Smoking' symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas. - Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job. - All cables are to be grounded as appropriate. - An adequate number (according to safety regulations) and type of fire fighting equipment is to be available in the close vicinity of the flammable liquid store. - Flammable liquid stores are to be well ventilated and free of explosive vapours. - Flammable liquid containers in the flammable liquid stores are to be clearly marked / labelled as to their contents. They are to be provided with earthed drip trays. - Locations are to support MSDS information and						

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					handling/storage instructions. • Flammable liquid tanks are to be properly earthed in order to prevent static electricity accumulating. • Drainage points on flammable liquid tanks are to be provided with threaded caps or blanking plates. • Bund walls are to surround storage tanks containing flammable liquids and these must be able to contain the entire volume of the contents plus 10% in case of spillage. • Earthing is to be tested regularly (according to safety regulations).						

Specific site requirements:

The effective management of hazardous materials on site should ensure that there are no uncontrolled releases of the same to the environment. That said it has to be recognised that spillages can occur as a result of accidents or other anomalous circumstances. In the event of a spill, quick and effective remedial action can ensure little or no significant impact especially if there is effective rehabilitation as well.

Training:

- Train vehicle drivers to be aware of the loads they are carrying, spill prevention in respect of the loads and the possible spillages of materials that could arise in the event of a vehicle accident or collision with infrastructure such as a pipe that could be ruptured by the collision;
- Only trained employees must be entitled to refuel equipment. The training of employees for refuelling must include spillage prevention, containment and cleanup and the necessary reporting of spills that do occur;
- Operators must be trained on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training;
- Operators must also be trained in the safe transfer and filling of the hazardous material, and in spill prevention and response.

Spill prevention:

- Implement inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems, containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment;
- Prepare written Standard Operating Procedures (SOPs) for filling storage tanks or other containers or equipment as well as for transfer operations by personnel and for the management of secondary containment structures, specifically the removal of any accumulated fluid, such as rainfall, to ensure that the intent of the system is not accidentally or wilfully defeated;
- Monitor containment areas, valves, tanks, and pipelines for potential ruptures, failures or overfilling;
- Each shift supervisor/ foreman is to report on the status of spillage prevention infrastructure in the area of their jurisdiction confirming that it is in a serviceable state or requesting that maintenance be affected.

Refuelling:

- Fuel dispensing hoses shall be of approved non-electrically conductive types with automatic shut-off nozzles;
- Nozzles used for vehicle and equipment fuelling should be equipped with an automatic shutoff to control drips;
- All fuelling equipment is to be inspected regularly and all leaks must be repaired immediately;
- Absorbent spill clean-up materials should be available at fuelling areas and should be disposed of properly after use;
- Fuelling operations should not be left unattended; and
- Fuelling stations and trucks must be equipped with fire extinguishers.

Overfill protection

- Overfilling of vessels and tanks must be prevented as this is one of the most common causes of spills.
- Overfill protection measures must include:
 - Written procedures for transfer operations that includes a checklist of measures to follow during filling;
 - Operations and the use of filling operators trained in these procedures;
 - Installation of gauges on tanks to measure volume inside; and
 - Use of dripless hose connections for vehicle tank and fixed connections with storage tanks.

Spill containment and countermeasures

- Spill response procedures must be prepared and suitable spill response equipment available when and where required – locate spill response equipment at various strategic locations across the project site;
- In the case of a spill, immediate action must be taken to stop and contain the spill;
- Any observed spills / leakage must be removed and the cause remedied;
- Spill reporting procedures to be posted at all storage facilities so that the appropriate emergency response can be mobilised;
- Spills into a containment area are to be removed/pumped out of the containment area. The water release valve is not be used to drain the spill; and
- The recovery of all spills to be treated as hazardous waste – this includes all contaminated materials such as sand, soil, gravel and stones - and appropriate temporary storage, transport and final disposal to meet the requirements for hazardous waste.

7.6 NOISE AND VIBRATION MANAGEMENT PLAN

7.6.1 OVERVIEW

Most of the Phase 2D pipeline alignment and surrounding areas have vehicle generated noise emanated mostly during the day. Noise may also be augmented by a variety of activities across the construction site. Given the nature of the area the noise can result in nuisance disturbance and actions need to be taken to control noise or to ensure that noisy activities occur at a time that will ensure no disturbance to surrounding landowners.

As per the vibration baseline assessment conducted in 2015, potential vibration impacts from blasting activities and construction machinery and vehicles should be controlled and monitored to ensure damage to existing structures is avoided.

7.6.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project to prevent or mitigate any possible noise and vibration sources.

Table 7-6: Noise and Vibration Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
18	Increased level of noise generation	- Nuisance factor to surrounding landowners and fauna. - Potential negative effects to hearing of construction staff.	Level of noise generation kept to a minimum.	- No complaints from site staff and surrounding landowners. - Noise levels do not exceed baseline levels by more than 10 % at active sites.	- Construction may only occur during work hours as specified per regions in the Contract Specification. - Should construction have to continue after hours, all residents affected must be notified. - No loud music is permitted on site or in the Construction Camp. - All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems. - The Contractor shall take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisance from sources. - Equipment shall be turned off when not in use. - Where possible material stockpiles should be placed so as to protect site boundaries from noise from individual operations.	Site monitoring. Complaints from surrounding landowners or users of the site.	Weekly, as per section 14.4.	National Noise Control Regulations SANS 10103:2008	Construction	Contractor	Reporting on noise monitoring by the noise specialist.
19	Vibration	- Decrease in habitats of subterranean fauna. - Decrease in the breeding potential of subterranean fauna. - Nuisance to surrounding landowners and communities. - Formation of cracks and deterioration of existing buildings.	Identified subterranean habits prior to blasting and compaction activities are considered. The effects of blasting and compaction activities are limited.	- Evidence of consultation with surrounding landowners and communities. - Visible warning signs. - Measures in place for controlled blasting.	- The Contractor shall take preventative measures (e.g. timing, pre-notification of affected parties, calculation of charge size, overseeing of correct stemming of blast holes) to minimise complaints regarding noise and vibration nuisance from sources. - The Contractor will be held responsible for the damage to structures as result of blasting. - Blasting Plan to be approved by the Engineer. <u>Each separate blast shall be designed in accordance with modern blasting practice to break out the rock with the minimum explosive force. Full details of each blast shall be submitted to the Engineer for scrutiny not later than 24 hours prior to the commencement of drilling for that blast. The details shall include the location, depth and area of blast holes, the type, strength, amount, column load and distribution of explosives to be used per hole, per delay and per blast, the sequence and pattern of delays, the maximum expected amplitude of vibration on adjacent structures, and the description and purpose of any special methods to be adopted by the Contractor.</u> - The approval by the Engineer of any blasting proposals shall not relieve the Contractor of his responsibilities under the Contract and the Law. <u>The Contractor shall do a crack survey and prepare a photographic record of each structure, especially houses, buildings, ruins, etc., of the local communities within 250 m of any works, whether on the surface or underground, prior to any blasting. The owner shall approve the record. A copy of this approved record shall be provided to the Engineer prior to any blasting.</u> <u>The Contractor shall also undertake a borehole census and obtain a record of the yield of water boreholes within 250 m of a blast. A copy of the record, approved by the owner, shall be provided to the Engineer prior to any blasting.</u>	Site monitoring. Complaints from surrounding landowners or users of the site.	Weekly, as per section 14.4.	SANS 10328:2003	Construction	Contractor	Pre-construction surveys must be done in order to compare post-construction damage (if any). This will be audited as part of the EM's responsibilities.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
					• In populated areas, a representative sample of the closest dwellings shall be surveyed, and experienced building consultants employed if necessary. • The Contractor shall also obtain a census of all boreholes within 250 m and a yield test of water boreholes within 50m of a blast. A copy of the record, approved by the owner, shall be provided to the Engineer prior to any blasting taking place.						

7.7 HERITAGE AND ARCHAEOLOGICAL MANAGEMENT PLAN

7.7.1 OVERVIEW

Any additional heritage or archaeological chance finds must be managed in such a way as to preserve the heritage value.

7.7.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project for areas with heritage value as well as any possible chance finds.

Table 7-7: Heritage Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
20	Destruction of graves and other sites of archaeological value	- Loss of archaeological valuable artefacts. - Loss of cultural and heritage value to society. - Social unrest.	Preserve sites and artefacts of archaeological interest, unearthed during construction as well as ensure that the correct protocols for grave relocation are adhered to.	- Sites demarcated prior and during construction. - Evidence of records should further discoveries be identified during construction. - Full compliance to all mitigation measures required.	- The position of known sites will be shown on the final profiles. Such areas shall be marked as no-go areas. - Artefacts may not be removed under any circumstances. - Do not disturb deface, destroy or remove protected features and sites, whether fenced or not for the duration of the Contractor's presence on site unless, otherwise specified by the Engineer. - The graves are generally protected and although it is possible to relocate graves under Section 36 of the NHRA it is not advisable. It is suggested that the spoil site be reduced in this location to exclude the graves and that the construction activities be strictly monitored to avoid any damage to graves. A minimum 5 m buffer zone around the cemetery is required. - Permits shall be obtained from SAHRA should the proposed line affect any world heritage sites or if any areas are to be destroyed or altered. - Construction must be immediately stopped, should any elements of cultural or heritage significance be found and the Engineer must be informed. - Do not resume Works in the area in question without permission from the Engineer. - A qualified and registered archaeologist must be appointed and consulted at such a finding to appropriately excavate any artefacts in agreement with the LPHRA and the SAHRA. - Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in the potentially fossiliferous superficial deposits, the contractor must ensure that a professional Palaeontologist Desk top study is undertaken. If deemed unnecessary, a letter of recommendation for exemption from a professional Palaeontologist is needed.	Site monitoring	As part of the daily site monitoring.	NHRA	Pre-construction and construction	Contractor and Engineer	Audits by the EM.
Mitigation: - If human remains are uncovered during the course of archaeological work, the excavations affecting the burial must be stopped. SAHRA should then be consulted and depending on the situation, the remains are either covered and left <i>in situ</i>, exposed (but not removed) and studied <i>in situ</i>, or fully excavated and studied with the consent and participation of the interested parties. It is, therefore, advisable that if it is foreseen that any archaeological research will uncover human remains, an agreement with the interested parties and a permit for burials be obtained beforehand. - For human remains inadvertently discovered in other situations, all activities affecting the burial must be stopped, and the discovery must be reported to SAPS and SAHRA, and the status of the remains must be ascertained. If the remains are forensic in nature (younger than 60 years and perceived to be a victim of crime), recovery by the Provincial Forensic Pathology Services in conjunction with SAPS is mandated. If the remains are of cultural, historical or archaeological origin, recovery will be facilitated by SAHRA by means of a Rescue Permit. - Appoint a suitably accredited archaeologist on a watching brief to monitor construction activities. - At the onset of construction, all graves that might be affected should be clearly demarcated and if possible, fenced off to protect them from any accidental damage, whether they are earmarked for relocation or not. - Should the decision be taken to propose the relocation of the affected graves, a suitably accredited and experienced service provider must be appointed to undertake the relocation. Please note that grave relocation is dependent on permission for the action by the close relatives and interested and affected parties from the community, and the requirement is that the developer must assist this community to fulfil their cultural and religious requirements during the process. All provisions as stipulated in section 36 of the NHRA must be adhered to. Also refer to section 6.5 above for a Chance Find Procedure.											

7.8 TRAFFIC MANAGEMENT PLAN

7.8.1 OVERVIEW

The largest part of the construction of the Phase 2D pipeline would require the use of the R555 provincial road as access to the construction servitude. This road carries a lot of traffic and a significant number of heavy trucks moving between the mines closer to Steelpoort. Moving on and off the R555 requires proper planning in advance of construction. Traffic generated as a result of the Project can result in additional congestion, noise, dust emissions and damage to roads, which can result in turn in severe potential impacts on road users and potential safety risks. Mitigation must be implemented to reduce the severity of these effects and ensure that they do not result in significant impacts.

7.8.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project to manage, prevent and mitigate any potential traffic and traffic safety risks to construction staff and road users.

Table 7-8: Traffic Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
21	Increase in vehicle movement in the area	- Nuisance. - Increase in potential vehicle accidents. - Potential increase in pedestrian and livestock accidents. - Decrease in the surface quality of roads.	Accidents are kept to a minimum. The surface quality of the road is not negatively impacted on by the construction activities.	- No incidents of reported vehicle, pedestrian and livestock accidents. - Condition of road surface maintained. - No complaints from surrounding landowners or road users.	- All incidents should be reported to the Engineer, investigated, documented and kept in the safety file. - Deliveries should preferably be scheduled for off-peak hour traffic times. - Access roads should be planned so that only minimum linear distances are developed. - Where construction will obstruct existing access, be sure to allow for alternative temporary access routes. - Allow for safe pedestrian crossings where necessary. - Traffic calming measures must be implemented in consultation with the provincial traffic department. Traffic calming measures will be required at the points indicated at the end of this table.	Site monitoring	Weekly	South African Road Traffic Act, No. 29 of 1989 National Road Traffic Regulations (2000)	Pre-construction surveys and construction monitoring. The rehabilitation phase will deal with the rehabilitation of damages to utilised roads.	Contractor and Engineer	Part of EM audits.
22	Lack of visibility of warning signage	- Increase in potential vehicle accidents. - Potential increase in pedestrian and livestock accidents.	The presence of construction activities and vehicles is continually clearly indicated thereby minimising the potential for accidents.	- No incidents of reported vehicle, pedestrian and livestock accidents. - Clear visibility of warning signage.	- Warning signs must be placed on and around the site as per the Occupational, Health and Safety Act requirements. - Clearly indicate which activities are to take place within which areas of the site using demarcation and/or signage. - All incidents should be reported to the Engineer, investigated, documented and kept in the safety file. - Traffic warning signage must be erected where applicable, along transport routes and access roads. - The Contractor shall properly mark all access roads. Markers shall show the direction of travel. Roads not being used shall be marked with a "No Entry" sign. - Position security lighting so that it does not pose a nuisance to residential properties or tourists facilities or a danger to road users. - Warning barricading should be placed around open trenches and should be suitable for varying weather conditions.	Site monitoring	Daily	N/A	Construction	Contractor and Engineer	Part of EM audits.
23	Impact on existing road conditions	- The development of potholes. - Damage to vehicles - Potential increase in vehicle accidents.	Sections of existing road surfaces which have been impacted on by the construction activities are remediated.	Existing road surfaces are utilised and maintained within the baseline levels.	- Access roads should be planned so that only the minimum linear distances are developed. - Maintain stormwater control mechanisms. - Clean and make good any damage to public or private roads caused by the Contractor during the construction phase.	Site monitoring	Daily	South African Road Traffic Act, No. 29 of 1989 National Road Traffic Regulations (2000)	Pre-construction, construction and rehabilitation phase	Contractor and Engineer	Part of EM audits.

7.9 FIRE RISK MANAGEMENT PLAN

7.9.1 OVERVIEW

The largest risk of uncontrolled fire is that it can result in severe human injury and even death. Uncontrolled fire also poses a risk of impacts on neighbouring activities. As such it is necessary to ensure that there are multiple preventative measures in place to reduce the risk of fire. In the event that fire occurs it is necessary to be able to quickly and effectively bring the fire under control before it causes damage and possible injury to adjacent properties.

7.9.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project to prevent, manage, and mitigate any potential fire risks to construction staff, local inhabitants and the environment.

Table 7-9: Fire Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
24	Fire hazard	- Fire damage to surrounding properties, vegetation, crops and grazing land. - Potential injury or death of fauna, avifauna species, and humans. - Fire damage to equipment, plant, vehicles and construction materials.	No uncontrolled fires were started.	- Adequate cooking facilities - No evidence of open fires. - Adequate and serviced firefighting equipment and materials are easily accessible on site.	- Establish and maintain fire breaks around the Work Sites and Camp as and when specified by the Engineer and as required by applicable legislation and the local authority. - Basic firefighting equipment must be available on site. This includes rubber beaters, gloves, fire extinguishers and masks. A water cart with a minimum capacity of 5000 litres, equipped with a pump and hose must be permanently on sites susceptible to the spread of uncontrolled fires. - The contractor must supply gas cooking facilities for the labourers at the construction camp. - No vegetative matter may be removed from the area for firewood. - Do not store any fuel or chemicals under trees but rather in properly bunded vessels and flammable stores. - Do not store gas and liquid fuel in the same storage area. - Staff must be adequately trained to operate all firefighting equipment on site. - All incidents should be reported to the Engineer and ECO, investigated, documented and kept in the safety file. - No decanted fuel to be left unattended in the sun to avoid fire. - No open fires permitted anywhere on site. No on-site burning of waste materials, vegetation, litter or refuse shall be permitted. - Smoking shall only be allowed in designated areas. - Appropriate facilities such as sand bins, must be provided at dedicated smoking areas. - Emphasis must be placed on the risk of cigarette butts during toolbox talks.	Site monitoring and inspections by fire coordinators, equipment inspectors / wardens and safety officers.	Weekly	Construction Regulation 27 of the OHSA (appointment of fire coordinators and equipment inspectors / wardens).	Pre-construction, construction and rehabilitation	Contractor and Engineer	Auditing by the environmental and safety spheres.

7.10 SOCIAL MANAGEMENT PLAN

7.10.1 OVERVIEW

There are a number of ways in which the Project will interact with the social environment. Negative impacts that may manifest include public health and safety risks (real and perceived), exacerbated crime, direct loss of property as a result of inundation, relocation of property owners. Potential benefits like procurement and general economic development effects that may stem from the Project.

7.10.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must be met during the construction of the Project to manage its social aspects. Instead of the Project possibly being perceived as being negative on the social dynamics of the surrounding areas, the social aspects, when well-managed, may depict the positive outcomes of the Project.

Table 7-10: Social Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
25	Decrease in the aesthetic quality of the environment	- Negative effect on sense of place of the surrounding area. - Negative effect on sense of being. - Disruption of landscape visibility	The disruption of the natural and existing landscape characteristics is limited.	No decrease in the visible characteristics of the site's surrounding areas.	- Do not perform any activities or operations that are likely to adversely affect the aesthetic quality of the environment. - Inert building rubble and waste rock may not be dumped indiscriminately on site or surrounding areas but must be used for the rehabilitation of the quarries. - In linear project, spoil must be positioned in windrows parallel to the excavation. - Spoil must be stored in heaps not exceeding 2 m in height. - Do not store spoil in drainage lines. - Surplus building rubble and waste rock shall be disposed of at a registered waste disposal site. - No vegetation shall be pushed into heaps or left lying all over the veld. - Shape cut and fill slopes to emulate the natural surroundings. - Shape areas to correct contours to within a tolerance of 300 mm. - Trim areas already shaped to within an acceptable tolerance, with all undulations following a smooth curve. Ensure that final trimmed levels make provision for the specified depth of the reapplied topsoil. - Reservoir earth berms should extend from the highest level of the reservoir's side wall to the natural ground level at a slope of 1:2.5 in order to hide open concrete surfaces. - The reservoir embankment should be hydroseeded and planted with indigenous shrubs and bigger tree species at the foot of the embankment. - Any reservoir concrete that might be visible after such landscaping should be stained to a lighter or brown colour to mask the light grey of colour of the concrete.	Site monitoring and regular follow-ups on complaints received.	Daily	N/A	Construction	Contractor and Engineer	EM audits
26	Disruption in the provision of services	- Disruption of the availability of water, electricity and telecommunications to surrounding landowners. - Negative effects on the well-being of the local inhabitants as well as the potential outbreak of disease. - Decline in the micro-economic output of the surrounding area.	Disruption of all major services to the affected area is prevented.	- No disruptions to daily activities of local communities and land users - No complaints received from local communities and land users	- Where pipelines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. - Any damage to pipelines shall be repaired immediately. - All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. - Care must be taken not to damage irrigation equipment, lines, channels and crops.	Site monitoring and regular follow-ups on complaints received.	Daily	N/A	Construction	Contractor and Engineer	EM audits
27	Insufficient consultation	Social unrest.	Surrounding landowners and	Records of consultation	Access to privately owned land must be arranged in advance with the various landowners and occupiers along the alignment by the contractor.	Site monitoring and regular follow-ups on	Daily	N/A	Construction	Contractor and Engineer	EM audits

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
	n with affected parties	- Delay in progress of construction. - Noise nuisance.	communities have been consulted with prior to and during construction.	- with surrounding landowners and communities are available prior to and during construction. - No complaints from surrounding landowners and communities.	- All agreements reached should be documented and no verbal agreements should be made. - The success of the project depends a lot on the good relations with relevant affected parties. It is required that the Contractor will supply one person to be the liaison officer (SO) for the entire contract, and that this person shall be available to investigate all problems arising on the work. - The contact numbers of the <u>Community Liaison Officer</u>, the ECO and the EM shall be made available to landowners. This will ensure open channels of communication and prompt response to queries and claims. - All contact with the landowners shall be courteous at all times. - The rights of the landowners shall be respected at all times and all staff shall be sensitised to this. - Response must be made to landowner and community complaints taking reasonable action to ameliorate the impact. - Where complaints regarding noise nuisance cannot be addressed to the satisfaction of all parties, then the Contractor will upon instruction by the Implementer or Engineer provide an independent and registered Noise Monitor to undertake a survey of the noise output levels.	complaints received.					
28	Insufficient employment of local labour	- Social unrest. - Potential delays in construction programme. - Limiting growth in local economy.	Local labour where applicable have been employed as far as possible.	- Evidence of staff employment record. - No complaints received from local community.	The Contractor must ensure that a percentage of the labour employed is from the local community.	Site monitoring and regular follow-ups on complaints received.	Monthly - Reporting at CRE monthly meeting	Contract specification	Pre-construction and throughout the construction phase.	Contractor, Engineer and Project Implementer.	Audits on Contractor's appointments.
			Development of unskilled, semi-skilled and skilled personnel recruited from the Project Area, and wider Limpopo Province respectively	- Expenditure by Contractor on training equals 3 % of wage bill. - Training of females, expenditure on learnerships and expenditure on internships each equals 0.5% of the wage bill.	- Contractor must institute an approved training and skills development programme to meet targets and criteria. - The training shall be restricted to trade skills for the construction industry in categories: trade workers, machine operators, elementary workers, safety representatives, supervisors, etc. - Additional training must be provided for workers for the duration of construction, directed towards: (i) satisfying the immediate requirements of the Works, and (ii) introducing unskilled employees to the constraints and requirements of an organised working environment, and (iii) to the use of construction tools and equipment.	Site monitoring and regular follow-ups on complaints received.	Monthly – Reporting at CRE monthly meeting	Contract specification	Pre-construction and construction phases	Contractor and Engineer	Audits on Contractor's appointments
29	Damage and inaccessibility to powerlines	- Disruption of the provision of electricity supply to the surrounding areas. - Impeding the maintenance of the	Damage is prevented and allowance is made for easy accessibility for Eskom to powerlines and servitudes at all times.	- No recorded damage to power lines. - No complaints received from Eskom. - No visible impediment of servitudes observed.	- A formal application must be submitted to Eskom stating exactly what construction procedures will be used near the Eskom power lines. - A locality and layout plan of the pipeline must be provided indicating how the Eskom services will be affected. - Any cost and claims due to interruptions or interference to Eskom Services causing power supply loss or loss of income, due to this application will be borne by the Implementer. - Eskom must have ingress to and egress from its services at all times. - No mechanical equipment, including mechanical excavators, may be used under or in close proximity to Eskom services without the prior approval of Eskom's authorised representatives. - The consent is further subject to the land owner's permission for the	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Construction phase	Contractor and Engineer	Monthly auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
		powerlines. • Potential injury and death of site staff.			proposed works. A copy of the permission must be filed with Eskom seven days before any work is carried out in the servitude. . • No excavations may be executed closer than 6 metres from any of Eskom's overhead power lines and 1,5 metres from Eskom's underground cables unless Eskom's authorised representative is on site. • Blasting may only occur under the strict supervision of Eskom's authorised representative and after at least three days notification to Eskom. • Should any of Eskom's services be damaged during commencement of any work, the incident must be immediately reported to Eskom's 24 hour fault number 0860 037 566 • Statutory ground or structure to conductor clearances is to be maintained at all times.						
30	Trespassing on construction site and private properties	• Theft. • Vandalism. • Safety to site staff jeopardised. • Injury to trespassers resulting in possible lawsuits.	The construction site is fully secured with adequate access control.	• Secure and adequate fencing and access control. • 24 hour security evident on site.	• Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name/logo etc), and no non-labourer will be allowed within the construction camp at any time. • The Contractor shall take all necessary precautions against trespassing on private properties. • The contractor will be responsible for his own security arrangements and shall comply with all site security instructions. • Gates shall be installed where necessary. • All gates shall be fitted with locks and be kept locked at all times during the construction phase. Gates shall only be left open on request of the Landowner. • Protect and maintain existing private property, fences and gates. • Respect the open or closed status of gates for the duration of the construction period.	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Construction phase	Contractor and Engineer	Monthly auditing.
31	Physical and economic displacement of households/ individuals	• Loss of assets. • Increased socio-economic vulnerability. • Fragmentation of communities.	All households physically relocated and displaced by the project have been compensated for or all lost assets have been replaced.	• Existence of Resettlement Action Plan (RAP), including record of consultation with affected households/ communities. • Record of implementation of RAP.	• Selective narrowing of construction servitude to minimise the need for relocation must be undertaken. • Development of RAP document which includes the extent of displacement and appropriate compensation/ relocation measures. • Where displacement is unavoidable, provision of adequate compensation must be made by the Implementer for all loss of assets/ land uses, whether loss is temporary or permanent. • Where feasible, compensation should be made in similar kind rather than in cash. • Relocation of homes must as close as possible be done to their original location, taking into account relevant factors such as soil productivity, etc. at the new site. • Provision of post-relocation support must be provided for a predefined time period to ensure re-establishment of livelihoods, for example, this could potentially take the form of agricultural extension services. The support measures are to be identified in consultation with affected households/ communities and documented in the RAP.	Daily site monitoring and evaluation of complaints received. As per section 13.6.	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.
32	Influx of job-seekers	• Loitering at construction site. • Increase in crime and social pathologies. • Pressure on existing services/ infrastructure.	The influx of job-seekers is minimised and the risk of their presence leading to negative social impacts is reduced.	• Records of resident status of temporary workers. • Existence of labour desk. • No complaints from local residents	• Employ people from local communities as far as possible, with adequate verification of applicants' local resident status. • Clear communication of preference for local labour to surrounding communities. • Establishment of labour desk away from site for recruitment; alternatively, working through office of the local Department of Labour. • Strict control of access to construction site. • Labourers associated with the contractor must be easily recognisable (i.e. the Contractor must issue overalls with company name/logo etc.), and no non-labourer will be allowed within the construction camp at any time. • The Implementer in consultation with the local SAPS/ community policing	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
		Development of informal settlements.		regarding population influx.	forum must set up an adequate response plan to criminal incidents.						
33	Loss of farm labour to construction work	- Landowner resistance to the project. - Increased unemployment after construction ends.	Local people are encouraged not to leave current employment for temporary work on the project.	No complaints from local landowners regarding loss of farm labour.	- During community engagement/ information dissemination, emphasis must be placed on the temporary nature of construction employment. - Strict adherence to Labour legislation (in terms of employment of minors, etc.) must at all times be made.	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.
34	Reduced productivity of subsistence farmland	- Increased socio-economic vulnerability. - Reduction in food security.	The impact of the project on the productivity of subsistence farmland is kept to a minimum.	- Implementation of measures to minimise impact on soil productivity. - Where loss of soil productivity is inevitable, evidence of measures to compensate for its impact on households/ communities is available.	- Management measures to limit impact of disturbance on soil fertility. - The Implementer must make provision for post-relocation support for a predefined time period to ensure restoration of livelihoods. - Possible provision must be provided for agricultural extension services and treatment of disturbed soil with basal fertiliser.	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.
35	Presence of a construction workforce	Increased prevalence of HIV/AIDS.	Opportunities for the transmission of HIV between newcomers and the incumbent population is minimised.	- Records of implementation of HIV/AIDS awareness programme. - No accommodation on site.	- Appointment of qualified service provider to implement HIV/AIDS awareness programme. - Implementation of HIV/AIDS awareness programme for construction workforce and local communities (including incorporation of HIV/AIDS training in induction curriculum and H&S toolbox talks). - Placement of HIV/AIDS awareness material (posters, pamphlets, etc.) at construction site. - Provision of free condoms on site. - Ensure access of workers to voluntary testing and counselling. - Where possible, housing of construction workforce in existing residential areas rather than construction camps. - Strict control of access to the construction camp, to reduce likelihood of prostitution.	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.
36	Impeded human movement and disrupted daily activities	- Impeded access to services/ facilities. - Obstruction of pedestrian traffic routes.	Minimal disruption of daily activities of local communities during the construction phase is ensured.	- No visible impediment of human movement corridors. - Trenches are not left open for long distances at a time. - Fences removed at completion of	- The footprint and period of disturbance should be kept to a minimum. - Fences must be aligned to avoid the significant impact on human movement corridors. - The Contractor must install temporary crossings/ walkways at points where construction work will obstruct important human movement corridors. - Location of crossings must take into account recommendations based on available baseline data. - The original cadastral boundary fences must be replaced as certified by a surveyor from the Department.	Daily site monitoring and evaluation of complaints received	Daily monitoring and monthly auditing	N/A	Pre-construction and Construction phase	Contractor and Engineer	Monthly auditing.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementati on responsibility	Mechanism for monitoring compliance
				construction work. Temporary crossings installed to maintain important pedestrian routes.							
<u>Specific site requirements:</u> - Identify the type, nature and duration of job opportunities and who would be the likely recipients of these opportunities; - Undertake monthly monitoring and analysis of job creation figures (disaggregate into skills categories and employment curves); - Monitor the effectiveness and impact of the project skills training programme; - Identification of anticipated direct and cumulative impacts and impact areas (possible hot spots); - Monitor the compliance of the project against the social aspects identified in the RRoD and EMPr; - Implement a monitoring framework and feedback loops to identify unintended social changes and social impacts of the project (i.e. there is a need to recognise the stochastic nature of impacts flowing from large infrastructure projects); - Monitor community and social group perceptions and identify and evaluate any possible reputation risks or social actions; - Recommend mitigation measures for the appropriate management of construction impacts. - Monitor the implementation, impact and effectiveness of mitigation measures; and - Develop an Exit Policy and Strategy to mitigate the negative impacts of the end of the construction period.											

7.11 SAFETY MANAGEMENT PLAN

7.11.1 OVERVIEW

Construction projects and the associated construction activities pertaining to them hold numerous safety risks to construction workers and the surrounding inhabitants around the construction sites if safety is not treated as a first priority. Large construction projects such as the OMMP-BRWSP would require full compliance with the OHSA and its associated Regulations as well as Provincial and local By-laws.

7.11.2 OBJECTIVES, TARGETS & MITIGATION MEASURES

The following requirements must as a minimum be met during the construction of the Project to manage its safety aspects.

Table 7-11: Safety Aspects and Impacts with associated Objectives and Mitigation Measures.

No	Aspect	Potential Impact	Objectives	Targets	Management and Mitigation Measures	Method of monitoring implementation	Monitoring frequency	Applicable standards or practices	Time period for implementation	Implementation responsibility	Mechanism for monitoring compliance
37	Safety	• Injury to site staff from construction, demolition and blasting activities. • Damage to vehicles and building as a result of blasting activities. • Injury or fatal accidents of construction workers during the upgrade of roads. • Burning and the development of “arc eyes” from welding. • Potential injury and death to fauna and livestock from falling into open trenches.	The safety of all personnel on site during the construction phase is ensured.	• Low incidents of injured on duty on site. • Low incidents of reported pedestrian accidents. • Records kept of health and safety training conducted for all staff on site. • Visible evidence and use of PPE. • Trenches are demarcated.	• PPE to be provided and well maintained at contractor’s camp. • The Contractor will adhere to all requirements of the OHSA, including the drafting of suitable Health and Safety Plan which will be implemented during the construction phase. • All incidents should be reported to the EM, investigated, documented and kept in the safety file. • All personnel are to undergo Environmental Awareness and Safety Training. A signed register of attendance must be kept for proof. • Open trenches must be checked on a daily basis for any wildlife that may have fallen into them. • The Contractor shall recognise that the site is situated close to inhabited areas and shall therefore take all reasonable measures to ensure the safety of people in the surrounding area. • Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and Sepedi, all to the approval of the Project Manager. • All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands or wire and made clearly visible). • Storage areas shall display the required safety signs depicting “No smoking”, “No naked lights” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements. • Adequate first aid services must be provided by the contractor at the contractor’s camp.	Daily site monitoring	Daily	OHSA and associated Construction Regulations of 2014.	Construction phase	Contractor and Engineer	Safety and EMPr audits

Closer to the completion of construction, rehabilitation of all disturbed areas must be undertaken as detailed in **section 8** to follow.

8. REHABILITATION

The landscaping and rehabilitation of disturbed areas shall occur as soon as practically possible following the completion of the work in a specific area. Therefore, the rehabilitation process will immediately be executed, per phase, upon the completion of the work within a specific area, utilising specified methods and species.

8.1 REMOVAL OF STRUCTURES AND INFRASTRUCTURE

- The removal of all construction facilities and materials from the construction camp will be required and rehabilitation will have to be carried out, including the removal of the following:
- Removal of construction site and/or camp as sections of work is completed.
- Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures, concrete and compact earth platforms, fuel storage tanks and bund areas, chemical toilets and any other temporary works.
- Materials that will not be used again must be removed by the Contractor.
- Ensure that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state and/or a state no worse than prior to construction.
- Ensure that all access roads earmarked for closure and rehabilitation are ripped and that all imported material is removed. Rehabilitation should follow the first out; last in principle (i.e. rehabilitation should occur as follows subsoil, topsoil, hydro seeding).

8.2 INERT WASTE AND RUBBLE

- Clear site of all inert waste and rubble, including surplus rock, foundations, batching plant aggregate and soil crete. After the material has been removed, the site shall be re-instated and rehabilitated.
- Load and haul excess spoil in dongas and inert rubble to dump sites and spoil areas as indicated / approved by the Engineer.
- Subject to approval by the Engineer in consultation with the EM, certain quarries may be utilised for the disposal of waste rock.
- Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site. Proof of this must be provided by the Contractor to the Engineer.

8.3 HAZARDOUS WASTE AND POLLUTION CONTROL

- Remove from site all pollution containment structures such as temporary sanitary infrastructure, wastewater disposal systems and oil separators. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.

8.4 FINAL SHAPING

- Make sure all dangerous excavations are safe by backfilling and grading as required.
- In general, no slopes steeper than 1(V):3(H) are permitted, unless otherwise specified by the Engineer, in consultation with the Engineer. Steeper slopes require protection.
- Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.

- Should a deficiency of backfill may not be made up by excavating haphazardly within the Work Site.
- Additional fill may only be imported from approved borrow areas as indicated by the Engineer.
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
- Dismantle and flatten temporary drifts and river crossings, reinstating all drainage lines to approximate their original profile.
- Shape all disturbed areas to blend in with the surrounding landscape.
- To avoid double haulage, trucks should remove spoil from the construction site as they deliver bedding material.
- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfilling is removed to a dedicated spoil area.

8.5 TOPSOIL REPLACEMENT AND SOIL AMELIORATION

- The principle of “progressive reinstatement” must be followed as determined by the EM and Contractor. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded.
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
- Execute topsoil placement concurrently with construction where possible and as agreed by the Engineer.
- Redistribute stockpiled topsoil. Replace herbaceous vegetation and reinstate grass in all areas cleared by the Contractor for the construction site, including temporary access routes and roads. Replace topsoil to the original depth.
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. Ensure that the soil brought in undergoes both physical and chemical tests and is to the satisfaction of the Landowner and Engineer.
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage.
- Topsoil suspected to be contaminated with the seed of weeds must be sprayed with specified herbicides.
- Herbicides should be for selective broad-leaved weeds as approved by the Engineer.
- Ensure that storm water run-off is not channelled parallel to the prevailing contours.
- After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.
- Soil samples should be taken from the B1/2 horizon, typically at a depth of approximately 300 mm. This position in the soil horizon is where the nutrient levels are most available to plant roots, and is where the soil moisture/water content (TAWM) is best assessed. Recommendations as made by an accredited soil lab should be adhered to.

8.6 RIPPING AND SCARIFYING

- Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be based on the site conditions immediately before these works begin.
- All soil to be rehabilitated shall be ripped with a mechanical ripper to a depth of 300mm or as agreed by the Engineer. No section of ground shall remain undisturbed after ripping. All agricultural fields will be ripped to a depth of 600mm or as agreed by the Engineer.
- Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the Works.

- Rip and/or scarify along the contour to prevent the creation of down-slope channels.
- Do not rip and/or scarify areas under wet conditions, as the soil will not break up.

8.7 PLANTING

8.7.1 TRANSPLANTED PLANTS

- All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
- Trees to be transplanted must be carefully removed from the soil so as to retain as large a root ball as practically possible. Use the tree's driplines as an indicator: the larger the tree the larger the root ball (and subsequently the planting hole).
- Minimise disturbance of the soil and the remaining roots in the root ball during the lifting, moving and or transportation of all species.
- Plant trees and shrubs so that their stems or trunks are at the same depth as in their original position.
- Orientate trees and shrubs in the same direction as in their original position.
- Plant aloe and bulbs in similar soil conditions and to the same depth as in their original position.
- The plant must be planted into the specified hole size with the approved soil, compost and fertiliser mix used to refill the plant hole and must cover all the roots and be well firmed down to a level equal to that of the surrounding in situ material, as per the rehabilitation specification.
- After planting, each plant must be well watered, adding more soil upon settlement if necessary.
- Fence all rehabilitated areas to exclude livestock, and to prevent grazing of germinating plant species. It is essential to fence rehab areas on alluvial soils (along rivers) since these areas are earmarked with a high intrinsic yield of palatable grass and forb species.

8.8 GRASSING

- Suitably trained personnel must undertake grassing by making use of the appropriate equipment and using grass species as specified by the Engineer pending availability.
- Trim areas to be grassed to the required level.
- Hydroseeding with a winter mix will only be specified where re-grassing is urgent, and cannot wait for the summer.
- Depending on soil texture and slope stability, it may be necessary to establish a temporary (annual) grass cover consisting of artificial composition to aid soil binding.

8.9 MAINTENANCE

- Fence all rehabilitated areas to exclude livestock, and to prevent grazing of germinating species. Fences may only be removed when basal cover has sufficiently recovered, and density values are proximal to those assessed in the Ecological Baseline study.
- The Engineer will monitor the re-growth of invasive vegetative material for one year, as per the RRoD.
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers (or other approved method). If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type, which previously existed, unless otherwise indicated in the Contract Specifications or specified by the Engineer.
- Base the new carrying capacity of rehabilitated land on the status quo rather than the regional estimate.

- Control invasive plant species and weeds by means of extraction, cutting or other approved methods.
- For planted areas that have failed to establish, replace plants with the same species as originally specified.
- A minimum grass cover of 80% of the planted area sown, hydro-seeded or planted shall be covered with live plants of the specified species measured as basal cover, and that there shall not be any bare patches larger than 500 mm maximum in diameter.
- Individual plants must be strong and healthy growers at the end of the Defects Notification Period.
- The entire process of rehabilitation shall be meticulously documented so that the methods used on a specific part of the alignment can be replicated on other parts or even other future projects.

8.10 ERADICATION OF WEEDS

All weeds spread over the entire construction footprint must be removed, irrespective of its existence prior to construction. Chemical removal shall be used in accordance with manufacturer's specification for weeds. All chemicals used must be approved by the ECO. Once the weeds have perished they shall be removed mechanically by use of an offset disk plough thereby digging up the vegetation including the root ball.

8.11 CONTROL OF WEEDS

The remainder of the site including the re-vegetated areas shall be kept free of all weeds.

It is important that the entire process of rehabilitation shall be meticulously documented so that the methods used on a specific part of the alignment can be replicated (if necessary) on other parts or even other future projects.

9. RESOURCES, ROLES, RESPONSIBILITIES AND AUTHORITIES

A project the magnitude and intricacy of the OMMP–BRWSP, which includes the development of the proposed Phase 2D component, inevitably requires the assistance and active management of numerous role players. Due to the Project's environmental obligations, it is important to clarify the roles and responsibilities required to successfully implement the Project in an environmentally responsible and sound manner (**Figure 9-1**).

The Section below, as well as **Sections 6 – 15** is the “Do” component of the Deming Cycle and therefore this EMPr.

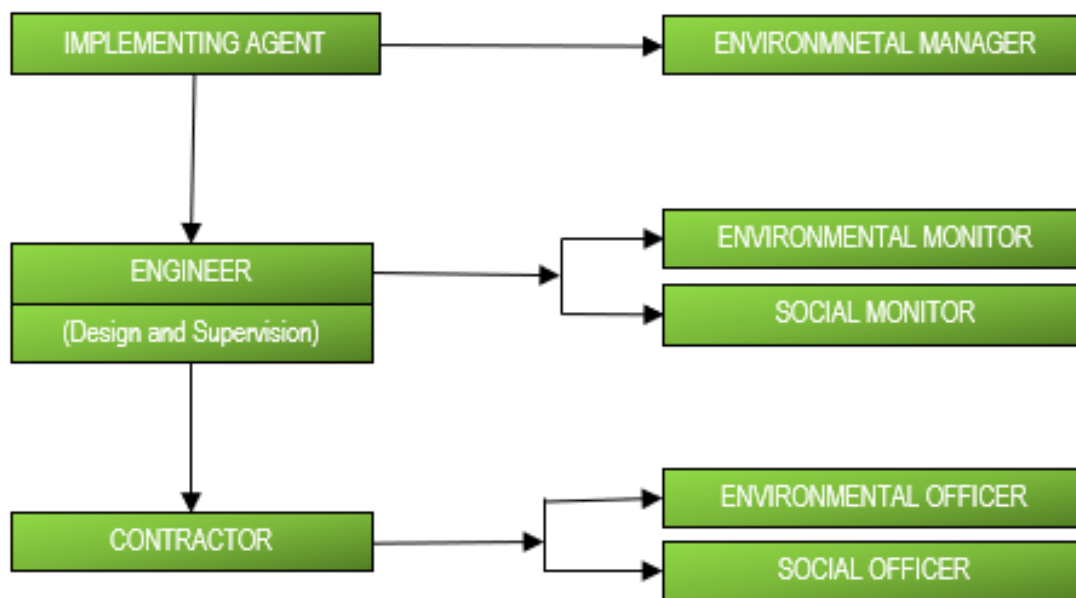


Figure 9-1: Staffing arrangements.

9.1 PROJECT PROPONENT

DWS will be the Project Proponent for the proposed Phase 2D re-alignment and associated infrastructure, including the proposed access roads for the entire alignment. An Implementing Agent is appointed to implement and oversee the development of the Phase 2D alignment. Ultimately, the liability associated with environmental non-compliance rests with the Project Proponent, as they are held accountable for all legal requirements related to the project.

9.2 CLIENT

The Implementing Agent acting on behalf of DWS has been appointed to implement the Project. As implementers, part of their responsibilities is to oversee the overall implementation of the construction of the Phase 2D alignment as well as the compliance with the applicable legislation, the authorised EA, and approved EMPr.

9.3 ENGINEER – ZNJV

The ZNJV is the appointed Engineer responsible for the design of the Phase 2D alignment and associated infrastructure. It will be the responsibility of the Engineer to ensure that the Contractor

adheres to construction specifications, the EA and EMPr. The Engineer has the authority to stop any construction activity that is in contravention of any of the specifications within the documents mentioned above after consultation with the ECO. All major decisions which may affect the programme or costs of the project with regard to the environmental procedure or protocols must be approved by the Employer via the Engineer.

9.4 ENVIRONMENTAL MONITOR

The EM is employed by the Engineer and is responsible for overseeing the daily implementation of the EMPr and relevant specifications for the duration of the project. The EM should have a clear understanding of the project as well as all the environmental matters pertaining to the project and should have a good knowledge on the applicable environmental legislation and processes.

Responsibilities of the EM include:

- To advise and provide recommendations to the EO on all environmental and related issues based on the requirements of the EMPr.
- To record and forward complaints received from the public to the Engineer and Employer.
- Resolve conflicts.
- Keep detailed and accurate records of the EMPr related activities on site.
- Report to the ECO on the monitoring of environmental issues.

9.5 SOCIAL MONITOR

The Social Monitor (SM) will act on behalf of the Engineer in all social matters pertaining to the project.

Responsibilities of the SM are:

- Resolve conflicts.
- Ensure the implementation of the Social Monitoring Plan as well as social-related requirements in the EMPr.
- Monitor the progress, impact and sustainability of the project.
- Ensure that all community and landowner complaints are reported to the Engineer and DWS, recorded and dealt with in a timeous manner.

9.6 CONTRACTOR

In order to carry out the requirements of this EMPr, the Contractor must make sure that he has a clear understanding of all environmental matters relating to the project.

The responsibilities of the Contractor will include:

- The implementation of and adherence to the applicable environmental contract specifications in accordance with the requirements of the EMPr.
- The compliance to all national, provincial and local legislation related to the management of environmental aspects, including ensuring all applicable and required site specific permits, authorisations and licenses which are triggered by the Contractor's activities are applied for and obtained timeously. Examples of such permits include the removal of protected plant species and the storage of flammables and hazardous material.
- To ensure all subcontractors under his supervision adhere to the applicable environmental contract specifications in accordance with the requirements of the EMPr.

- Report any incident to the Engineer immediately and follow the initial notification with a flash report within 12 hours of the event occurring. The flash report will include details of the incident, which includes the extent, reasons, preventative actions and corrective actions taken.
- To ensure that all employees and subcontractors attend Environmental Awareness Training provided by the EO.
- To conduct any remedial work required in terms of this EMPr as a result of environmental negligence, mismanagement and/or non-compliance.

9.7 ENVIRONMENTAL OFFICER

A suitably qualified senior employee of the Contractor stationed full time on site shall be responsible for implementing the EMS, environmental monitoring and control. This position shall be designated the EO. The EO shall be responsible for:

- Aiding the Contractor to comply with all the project environmental requirements, objectives and targets;
- Facilitating environmental activities and environmental awareness training of all personnel on site, and
- Implementing an internal EMS.

9.8 SOCIAL OFFICER

In addition to the EO, a suitably qualified (social sciences degree with at least 5 years working experience) employee of the Contractor who is stationed full time on site, shall be responsible for social environmental monitoring and control. This position shall be designated the Social Officer (SO).

The duties of the SO will include:

- Aiding of the Contractor with liaison with landowners and other interested and affected parties (I&APs),
- Facilitating the resolution of potential and actual challenges experienced during construction where these relate to landowners and their special requirements, and
- Aiding the Contractor in keeping accurate records pertaining to issues, complaints and the associated corrective actions.

9.9 ENVIRONMENTAL CONTROL OFFICER

The Project Implementer must appoint a suitably qualified and experienced independent ECO who will be responsible for the monthly monitoring of the project compliance with the EA, EMPr, and applicable environmental legislation. The contract for the ECO will extend from the commencement of the Construction Phase to the handover of the site by the Project Implementer to DWS for operation. During this time the ECO will also report to and be held accountable by the EMC of the overall OMMP-BRWSP project.

The responsibilities of the ECO include but are not limited to:

- Undertaking a due diligence audit at least a month prior to the commencement of construction. The audit will include a site visit and a qualitative survey of the status of the area prior to construction.
- Review and analyse the monitoring data which will include but not be limited to water, dust and noise monitoring, complaints and pollution incidents, and non-conformances against the limits that have been set in the environmental specifications and/or the EA.
- Site inspections will be conducted in such a way that all the construction activities are covered in the month. The site inspection will include a physical visit to the construction sites. The

ECO will inform the client of the visit and will commence the visit with an opening meeting on site to gather information regarding the level of operations and a closing meeting to provide feedback to the Resident Engineer and Project Implementer. A report will be compiled to summarise the findings.

- Every second month the ECO will also provide a monitoring report to the DFFE based on the data gathered by the Contractor and evaluate the information against the performance targets set out in the EMPr.

As part of the ECO's contractual responsibilities, an internal six-monthly audit will be undertaken to provide guidance to the project. This will require a compliance audit at six monthly intervals. The audit will be a more in-depth compliance audit than the monthly site inspections and will include a review and report of the Contractor's implemented systems/measures to determine the effectiveness of the implementation of the EMPr and EA. The audit will systematically review and evaluate the progress of the EMPr implementation.

It is further expected that the ECO will maintain open communications with the Project Implementer to ensure that non-conformances are addressed as soon as possible on site. The ECO will also be expected to report on how issues were resolved with the Stakeholders.

9.10 ENVIRONMENTAL MONITORING COMMITTEE

According to the RRoD issued on 13 October 2006 it is the responsibility of the DWS to establish an EMC before the commencement of any construction activities, which will meet on a bi-monthly basis (every second month). The frequency of these meetings may be varied should the need arise. As stipulated in the RRoD, the EMC as far as reasonably possible should consist of the following people listed below:

- An independent chairperson with the appropriate people and project management skills;
- Representatives of the affected residents, mines, farmers associations; rate payers associations;
- Ward Councillors;
- Community Leaders;
- Non-Governmental Organisations;
- Representatives of Farmers Associations;
- The independent ECO; as well as
- The Implementer's representatives;

The purpose of the EMC will be to:

- To monitor the construction of the project to the specific and general conditions of the RRoD, Environmental Impact Assessment and Environmental Management Programme as well as all applicable environmental legislation.
- The EMC will report to the Director General of DFFE where recommendations will be made relating to issues identified pertaining to the monitoring and auditing of the project.

9.11 AUTHORITIES CO-ORDINATING COMMITTEE

~~The DWS is also responsible for assembling the Authorities Coordinating Committee (ACC). This committee will meet at least four times a year from the date of commencement of the Pre-construction activities. As stipulated in the RRoD the ACC should consist, but not be limited to, the following organisations listed below:~~

- ~~• Department of Environmental Affairs;~~
- ~~• Mpumalanga Department of Agriculture and Land Administration;~~
- ~~• Limpopo Department of Finance and Economic Development;~~

- ~~Limpopo Office of the Department of Labour;~~
- ~~South African National Parks; and~~
- ~~Relevant affected municipalities.~~

~~The responsibilities of the ACC will be to:~~

- ~~To ensure that all conditions of the RRoD and EMPr are met;~~
- ~~To consider all relevant information and issues raised by the stakeholders when making project decision; and~~
- ~~To review all of the reports and correspondence received from the Chairperson of the EMC in an effort to provide guidance.~~

10. COMPETENCE, TRAINING AND AWARENESS

Prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite clearly describing their obligations towards environmental controls and methodologies in terms of this EMP. This training and awareness will be achieved in the following ways:

10.1 INDUCTION TRAINING

Environmental induction training must be presented to all persons who are to work on Phase 2D alignment – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site. This induction training should include discussing the Implementer's environmental policy and values, the function of the EMP and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall dos and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the EO on site.

10.2 ENVIRONMENTAL AWARENESS TRAINING

Environmental Awareness Training will take the form of on-site talks and demonstrations by the EO before the commencement of site establishment as well as throughout the construction of the pipeline and associated infrastructure. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the EO on site.

10.3 TOOLBOX TALKS

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

11. COMMUNICATION PROCEDURES ON SITE

To ensure effective on site communication and maintained environmental performance, copies of all documentation described in the EMPr must be maintained on site at all times and be available to both the Engineer, the EM and ECO, and will be provided on request to authorities or stakeholders for inspection.

11.1 SITE INSTRUCTION ENTRIES

The Site Instruction journal entries will be used for the recording of instructions as they relate to implementation of the EMPr. Entries could also include stoppage of work orders for the purposes of immediately halting any particular activities of the contractor.

11.2 ECO DIARY ENTRIES

The purpose of these entries will be to record the comments of the ECO as they relate to activities on the site. Both the Site Instruction journal and ECO Diary must be available on the site at all times. These documents will be made available to all relevant authorities for inspection if requested.

11.3 SITE MEETINGS

Regular site meetings will be held between the Contractor and its EO, the Engineer and its EM, and the ECO (optional). The purposes of the meetings shall be:

- To establish the suitability of the Contractor's methods and machinery in an effort to lower the environmental, social and health risk involved;
- To discuss and resolve non-conformance to environmental legislation / policies or the EMPr;
- To assess the general state of the environment on site and discuss any environmental problems which may have arisen;
- To act as a forum for input into the nature and environmental performance of the construction works;
- To accommodate all stakeholders in the decision-making process regarding social and environmental issues on site.

11.4 NON-CONFORMANCE REPORTS

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the EO and EM. The EO and EM may also report non-conformances. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously as well as the effectiveness of the remediation measure in order for the non-conformance to be closed-out at the satisfaction of the EM and ECO.

12. OPERATIONAL CONTROL

The Implementer is required to ensure that the Contractor identify those operations that are associated with the identified environmental aspects consistent with the Policy and Objectives in order to ensure that they are carried out under specified conditions by establishing documented procedures to control situations where their absence could lead to deviation from the Policy and Objectives. These procedures should be developed in the form of Method Statements and must clearly state the operating criteria required to comply with Policy and Objectives.

12.1 METHOD STATEMENTS

The Implementer must ensure that Method Statements are developed by the Contractor which sets out the exact methods to be followed during construction to address specific requirements of the Policy and Objectives i.e. ultimately this EMPr. These method statements must be approved by the Engineer prior to the applicable activities being undertaken on site. All method statements will form part of the EMPr documentation.

A method statement describes the scope of the intended work in a step-by-step description in order for the ECO and Engineer to understand the Contractors intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. For each instance wherein it is requested that the Contractor submit a method statement to the satisfaction of the ECO, the format should clearly indicate the following:

- What - Brief description of the activity to be undertaken;
- How - Detailed description of the process of work, methods and materials;
- Where - Description/sketch map of the locality of work (if applicable); and
- When - Sequencing of actions with commencement dates and completion date estimates.

The Contractor must submit the method statement prior to commencement of any particular construction activity. Work may not commence until the method statement has been approved and signed by the ECO, Contractor and Engineer.

Method statements must be prepared for all work planned in environment and social sensitive areas, such as stream crossings and grave sites.

13. EMERGENCY PREPAREDNESS

The Contractor must ensure that the following elements are present and easily accessible on site for the management of any emergency or accidents which may occur.

13.1 CONTACT NUMBERS

The Contractor must ensure that the numbers of the following persons are displayed at a prominent place on site at all times:

- The local Police Stations
- The nearest Ambulance
- Doctors
- Snake Handler
- Representative of the Engineer, for example, the Resident Engineer
- Representative of the Contractor

13.2 SPILL KITS

The Contractor must ensure that spill kits and associated equipment are present onsite and easily accessible for the potential occurrence of hazardous waste and/or material spills. Staff should be trained in the use thereof.

13.3 FIRE EXTINGUISHERS

Adequate and well-maintained firefighting equipment - according to the fire hazard strategies and safety requirements set out in the Contract Specifications, must be maintained at the Contractor's camp as well as on the construction site during the entire project.

14. MONITORING AND MEASUREMENT

The Project Proponent, DWS, is required to ensure that the key characteristics of the Project's construction operations, that can have a significant environmental impact, are monitored and measured on a regular basis. The baseline levels of environmental components will be established prior to the start of construction which will provide the prevailing conditions and environmental health of the environment which could be affected by the construction of sub-phase 2D. During the construction of the Project, the DWS is required to ensure that the Contractor regularly monitors and measures the environmental components in order to determine whether or not the Project is causing a negative impact to its immediate and surrounding environment. This provides for quantitative data to be used to manage the construction activities to minimise negative influence to the environment. The Section below, together with the following Section 14, is the "Checking" component of the Deming Cycle and therefore this EMP.

The following environmental components are required to be monitored and measured:

14.1 AIR QUALITY

Air quality monitoring must focus on areas where construction activities could impact negatively on ambient air quality. These activities are typically at road crossings, planned infrastructure facilities such as pump stations, spoil areas and at borrow areas.

14.1.1 MONITORING SITES

Air quality monitoring should be conducted at the following sites as seen in **Table 14-14-1** and **Table 14-2** and illustrated in **Figure 14-1** below, as identified by the specialist.

Table 14-14-1: Monitoring sites for air quality monitoring on sub-phase 2D for dust.

Monitoring Site	Co-ordinates	
	Latitude (S)	Longitude (E)
2D_DB1	24°43'35.44"	24°43'35.44"
2D_DB2	24°42'40.10"	30°12'8.17"
2D_DB3	24°40'34.86"	24°40'34.86"
2D_DB4	24°39'41.83"	24°39'41.83"
2D_DB5	24°38'13.09"	24°38'13.09"
2D_DB6	24°37'5.77"	24°37'5.77"
2D_DB7	24°35'40.63"	24°35'40.63"
2D_DB8	24°35'40.63"	24°35'40.63"
2D_DB9	24°34'39.00"	24°34'39.00"
2D_DB10	24°33'8.93"	24°33'8.93"

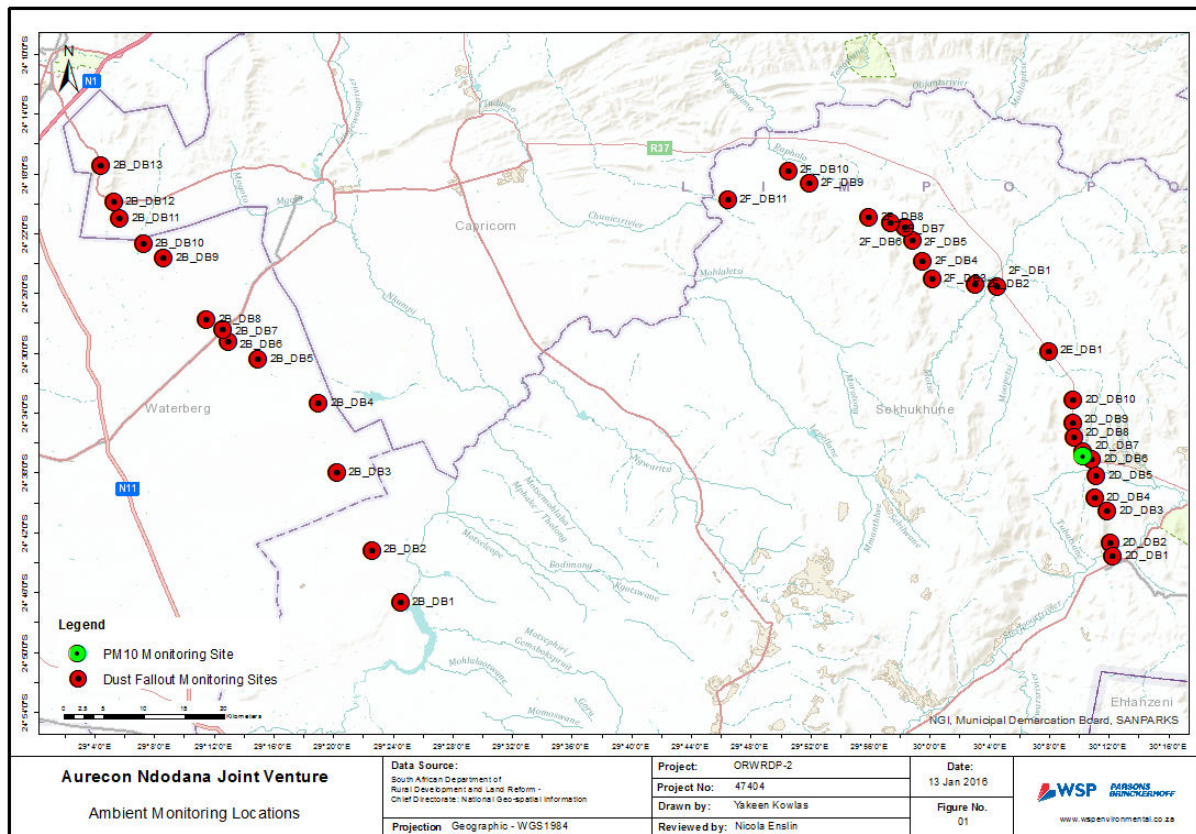


Figure 14-1: Location of Dust fall out monitoring points for all Phases of the OMMP-BRWSP Monitoring points for Phase 2D can be seen along the eastern most alignment.

Table 14-2: Location of the PM₁₀ monitoring site.

Phase	Location	Co-ordinates	
		Latitude (S)	Longitude (E)
2D	Dilokong Hospital, Driekop	24°13.71"	29°22'23.84"

14.1.2 STANDARDS AND VARIABLES FOR MONITORING

Dust deposition:

Air quality standards and guidelines are specified in the NEMAQA; the SANS 69 Framework for Setting and Implementing National Ambient Air Quality Standards; as well as the SANS 1929:2005 Ambient Air Quality - Limits for Common Pollutants. The priority pollutants as defined by the Act are sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), ozone (O₃), benzene (C₆H₆), lead (Pb) and carbon monoxide (CO). Most recently (01 November 2013), the legislated standards for dust fallout were promulgated by the Minister of Water and Environmental Affairs in the form of the NEMA:QA National Dust Control Regulations (GN R827). These newly promulgated regulations are based on the SANS standards and present acceptable/allowable dust fallout rates for both residential and non-residential areas. These dust fallout rates, as applied in this report for compliance assessment purposes, are presented below in **Table 14-3**.

Table 14-3: Acceptable dust fallout rates as per National Dust Control Regulations (GNR 827, 1 November 2013).

Restriction areas	Dustfall rate, D (mg/m ² /day, 30-day average)	Permitted frequency of exceeding dust fallout rate	Reference method
Residential area	D < 600	Two within a year, not sequential.	ASTM D1739
Non-residential area	600 < D < 1200	Two within a year, not sequential.	ASTM D1739

If the above regulations are exceeded, it must be noted that the dust fallout monitoring report must be submitted to the local authorities. Within three months after submission of the report, the Client must develop and submit a dust management plan to the local air quality officer for approval. Such a plan must:

- Identify all possible sources of dust within the affected site;
- Detail the best practical measures to be undertaken to mitigate dust emissions;
- Detail an implementation schedule;
- Identify the line management responsible for implementation;
- Incorporate the dust fallout monitoring plan; and
- Establish a register for recording all complaints received.

Particulate matter:

Deposition of large (>10 µm) solid particles is a function of the airborne concentration and the particle gravitational speed. The monitoring of fugitive dust is therefore conducted principally by passive dust deposition gauges, whereby an open-mouthed container is partially filled with distilled water and exposed for a designated period of time. The container is then collected, and the insoluble particles are removed by filtering the water and weighing, whilst the soluble particle mass is determined after evaporation of a sample of the filtered solution. This is a standardised sampling technique in South Africa, commonly referred to as 'bucket-monitoring', that was originally derived from the ASTM standard method for collection and analysis of dust fallout (ASTM D1739). It has now been defined in the local context as a SANS (SANS1929:2005/2009).

To ensure compliance with the ASTM method, which does not recognise directional units as being compliant with the method, compliance with the standards is only assessed with the use of fallout levels obtained from single fallout units. Fallout levels obtained with the use of directional units are included only to assess the predominant origin (direction) of fallout dust. The sampling equipment consists of a non-directional fallout bucket with a circular opening of 19 cm and a depth of 33 cm. The specifications are as close as possible (with available materials) to those recommended by the International Standards Organisation. The low aspect ratio (i.e. the height to width ratio) is required to keep collected particulates in the bucket before they settle in the sample water that is treated with a small quantity of algaecide to prevent algal growth. The ASTM method stipulates that the stand which supports the container needs to be two meters above the ground as there is a large variability in the concentration of particles subject to settling at heights less than two meters.

The units are exposed for a predetermined period as specified in the SANS 1929:2005 prescribed methodology, ASTM D1739, which stipulates samples be exposed for thirty (30) days (± 2 days).

Particulate matter must be continuously monitored using an *Osiris*TM continuous dust monitor. The *Osiris*TM analyser is capable of measuring a number of size fractions simultaneously, namely TSP, PM₁₀, PM_{2.5} and PM₁. The instrument is also equipped with a wind monitor that allows for emissions to be correlated with wind speed and wind direction data, making it possible for recorded dust emissions to be traced back to the probable source of the emissions.

Table **Table** 14-4 indicates the baseline levels for particulate matter monitored from October 2015 to February 2016.

Table 14-4: Baseline levels for PM10 Monitoring.

Month	PM ₁₀		PM _{2.5}	
	24-hourly exceedances (>75µg/m ³)	Compliant (4 exceedances per annum)	24-hourly exceedances (>65µg/m ³)	Compliant (4 exceedances per annum)
Dilokong Hospital				
October 2015	3	Yes	0	Yes
November 2015	6	No	0	Yes
December 2015	2	No	0	Yes
January 2016	0	Yes	0	Yes
February 2016	1	Yes	0	Yes
TOTAL	12		0	
Samancor Chrome				
February 2016	0	Yes	0	Yes
March 2016	0	Yes	0	Yes
TOTAL	0		0	

14.1.3 SAMPLING FREQUENCY

Dust fallout should be conducted on a monthly basis while PM₁₀ monitoring should be conducted continuously.

14.2 SURFACE WATER QUALITY

Construction will include activities that could directly or indirectly affect the quality of water in the area's rivers and streams. Construction activities must be managed so as to prevent any further degradation of the area's already stressed water courses. Over and above the requirements of this EMP, any additional requirements mentioned in the Water Use Licence (WUL) must be adhered to.

14.2.1 MONITORING SITES

These construction activities are typically at river and stream crossings, at planned infrastructure facilities such as pump stations, and at borrow areas. Apart from the Olifants River it is important to note that most of the other rivers / streams within the project area would only flow during storm events. This necessitates the need for multiple monitoring methods, such as:

- Grab sample of water or pool or sub-surface flow in river / stream bed
- Visual reporting of status of any flows – dry river / stream bed.

The water quality monitoring sites defined for Phase 2D is listed in **Table** 14-5 and **Table** 14-6. If water is present, sampling of water is to be taken 50 m upstream and 50 m downstream of each stream crossing. Water samples are therefore to be taken upstream and downstream of the following sites:

Table 14-5: Major stream crossings water monitoring points.

Monitoring Point	Crossing No	Co-ordinates	
		South	East
Major Stream crossing			
2D- Mp 32	Upstream Moopetsi	24° 37' 52.18"	30° 10' 18.471"
2D- Mp 33	Downstream Moopesti	24° 37' 52.18"	30° 10' 18.471"

Table 14-6: Dry Crossings Water monitoring points.

Monitoring Point	Crossing No	Co-ordinates	
		South	East
Dry Crossings Monitoring			
2D- Mp1	RC-D01	24° 41' 52.278"	30° 12' 25.555"
2D- Mp2	RC-D02	24° 41' 36.769"	30° 12' 30.414"
2D- Mp3	RC-D03 A	24° 41' 28.213"	30° 12' 32.255"
2D- Mp4	RC-D03 B	24° 41' 26.986"	30° 12' 32.206"
2D- Mp5	RC-D03 C	24° 38' 6.441"	30° 10' 31.011"
2D- Mp6	RC-D11	24° 38' 9.193"	30° 10' 32.88"
2D- Mp7	RC-D05	24° 36' 12.96"	30° 9' 32.331"
2D- Mp8	RC-D13	24° 35' 17.553"	30° 9' 24.223"
2D- Mp9	RC-D06	24° 35' 13.642"	30° 9' 17.755"
2D- Mp10	RC-D07	24° 34' 54.552"	30° 9' 16.48"
2D- Mp11	RC-D08	24° 32' 44.915"	30° 8' 40.23"
2D- Mp12	RC-D12	24° 37' 30.928"	30° 9' 56.145"
2D- Mp13	RC-D14	24° 37' 52.18"	30° 10' 18.471"

Instream water quality monitoring shall be undertaken whenever there is a disturbance to any Watercourse or Waterbody caused by construction within or adjacent to the said Watercourse or Waterbody. Sampling and monitoring shall take place 50m upstream and 50m downstream of the area where disturbance to the Water course or Waterbody has occurred, and shall comprise a composite water sample collected from 4 points equidistant across the Water course or Waterbody at each location.

14.2.2 VARIABLES

The variables and parameters listed below in **Table 14-7** must be monitored every second month for the duration of the construction phase to determine whether construction activities are having an impact on water sources. In cases where a difference in values of water quality variables exists, the difference may not be exceeded by more than 10%. When the downstream measured value exceeds the upstream value by more than this, the reason for the exceedance should be investigated and corrective action taken immediately. The site activities at the stream crossing in question may need to be temporarily ceased at the discretion of the Engineer.

Table 14-7: Water quality variables to be tested every second month.

Variables
Calcium (mg/l)
Chloride (mg/l)
Total Dissolved Salts (mg/l)
Electrical Conductivity (mS/m @ 25 °C)
Potassium (mg/l)
Sodium (mg/l)

pH (pH Units @ 25 °C)
Suspended Solids (mg/l)
Total Alkalinity as CaCO ₃ (mg/l)
Colour (Cobalt-Platinum Units)
Dissolved Oxygen (mg/l O ₂)
Faecal Coli (CFU/100ml)
Temperature (°C)
Chemical Oxygen Demand (mg/l)
Soap, oil, grease (mg/l)
Residual chlorine (mg/l) Cl
Free and saline ammonia (mg/l) N
Orthophosphate (mg/l) PO ₄
Nitrate (Nitrogen) (mg/l) NO ₃
Chromium (Cr) (mg/l)
Chrome (VI) (Cr ⁶⁺) (mg/l)
Copper (Cu) (mg/l)
Iron (Fe) (mg/l)
Zinc (Zn) (mg/l)
Antimony

The variables listed in **Table 14-7** should be tested once during the wet season and once in the dry season for the duration of the construction in the identified area. When the measured value exceeds the baseline, then the reason for the exceedance should be investigated and corrective action taken.

The following physio-chemical parameters must be measured in situ using a multi-parameter water test instrument. The following measurements should be taken in the flowing part of the stream:

- pH (pH units)
- Temperature (°C)
- Electrical conductivity (EC) (mS/m)
- Dissolved Oxygen (mg/l and % saturation)

Results received from monitoring must be compared to the baseline levels established from the baseline studies as well as any further requirements of the WUL issued by the Department of Water and Sanitation. In cases where baseline levels and WUL requirements differ, the more stringent of the two must be adhered to.

14.3 RELEASES / EFFLUENT DISCHARGES AND DEWATERING OF TRENCHES

During construction, the bulk supply pipelines need to be tested and emptied. In order to empty the pipeline, a section of the pipeline is isolated, and the water within the isolated section is released at installed drain points (scour points). These drain points (scour points) consist of scour valve assemblies housed in a reinforced concrete chamber and are located at predetermined positions along the length of the pipeline, usually where the pipeline's vertical alignment has low points. Scour water is then released into nearby water courses. Water is also released from the pump shafts. These discharges are not necessarily wastewater, as no additions and/or changes occurred from the source (Flag Boshielo Dam) to the eventual discharge via the scour valve. Notwithstanding this, it is proposed that these discharges be monitored during the discharge activity to confirm that the quality complies with the General Limit as per **Table 14-14-9**, and that excessive/high velocity discharges that may cause river /stream bank erosion be avoided.

The number of scour valves and pump shaft assemblies and intervals between these assemblies are dictated by the length of pipeline that can be isolated and requires draining.

For this project, and in particular Phase 2D, a total of 25 scour points have to be provided. The table below lists the scour locations:

Table 14-8: Scour positions along Phase 2D.

Crossing No	Scour Volume (m ³)	Co-ordinates	
		Longitude	Latitude
SV-01	419.7	30°11'58.86"E	24°42'55.63"S
SV-02	181.0	30°12'9.28"E	24°42'34.95"S
SV-03	181.5	30°12'13.23"E	24°42'29.37"S
SV-04	381.2	30°12'20.05"E	24°42'9.86"S
SV-05	195.2	30°12'25.76"E	24°41'51.55"S
SV-06	94.6	30°12'30.38"E	24°41'36.79"S
SV-07	90.0	30°12'28.72"E	24°41'11.85"S
SV-08	27.4	30°12'24.70"E	24°40'56.02"S
SV-09	5.7	30°12'12.87"E	24°40'44.01"S
SV-10	68.1	30°11'40.68"E	24°40'26.65"S
SV-11	39.4	30°11'29.01"E	24°40'11.12"S
SV-12	462.1	30°10'57.82"E	24°39'11.86"S
SV-13	313.5	30°10'36.63"E	24°38'18.59"S
SV-14	691.5	30°10'33.34"E	24°38'10.36"S
SV-15	890.7	30°10'18.82"E	24°37'52.59"S
SV-16	209.5	30° 9'55.42"E	24°37'26.00"S
SV-17	64.8	30° 9'26.46"E	24°36'20.63"S
SV-18	12.3	30° 9'25.88"E	24°35'42.75"S
SV-19	36.8	30° 9'25.70"E	24°35'37.98"S
SV-20	69.5	30° 9'21.61"E	24°34'59.29"S
SV-21	1161.1	30° 9'18.69"E	24°34'52.72"S
SV-22	75.7	30° 9'18.53"E	24°33'3.57"S
SV-23	368.0	30° 9'17.86"E	24°32'31.73"S
SV-24	49.4	30° 9'33.71"E	24°32'20.51"S
SV-25	102.9	30° 9'20.95"E	24°33'9.26"S

The water quality of scour and pump releases will always comply with the water quality requirements listed in **Table 14-14-9**:

Table 14-14-9: Water quality parameters for discharge and dewatering.

Substance/Parameter	General Limit
Faecal Coliforms (per 100 ml)	1 000
Chemical Oxygen Demand (mg/l)	75*
pH	5,5-9,5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	3
Nitrate/Nitrite as Nitrogen (mg/l)	15
Chlorine as Free Chlorine (mg/l)	0,25
Suspended Solids (mg/l)	25
Electrical Conductivity (mS/m)	70 mS/m above intake to a maximum of 150 mS/m
Ortho-Phosphate as phosphorous (mg/l)	10

Substance/Parameter	General Limit
Fluoride (mg/l)	1
Soap, oil or grease (mg/l)	2,5
Dissolved Arsenic (mg/l)	0,02
Dissolved Cadmium(mg/l)	0,005
Dissolved Chromium (VI) (mg/l)	0,05
Dissolved Copper (mg/l)	0,01
Dissolved Cyanide (mg/l)	0,02
Dissolved Iron (mg/l)	0,3
Dissolved Lead (mg/l)	0,01
Dissolved Manganese (mg/l)	0,1
Mercury and its compounds (mg/l)	0,005
Dissolved Selenium (mg/l)	0,02
Dissolved Zinc (mg/l)	0,1
Boron (mg/l)	1

One grab sample at the start of the release, during the release and at the end of the release will be taken for compliance measurement.

14.4 NOISE

For consistency, sites used for baseline monitoring should continue to be used during construction. Additional monitoring points must be added to these, if necessary.

Monitoring should take place at both the noise point source and noise-sensitive receptors.

Daytime monitoring should take place as standard operating practice, while additional night-time monitoring should be conducted in areas where construction takes place at night.

14.4.1 MONITORING SITES

As mentioned above, the sites to be monitored during the construction phase of the project are the same as those of the baseline studies and their positions are depicted in **Table 14-10** below:

Table 14-10: Noise Monitoring Sites.

Site	Description	Longitude/ Latitude
ID001	In Steelpoort Town at a T-junction along the R555, Steelpoort rail siding ~200 m to the ESE.	30.20914 -24.7311
ID005	Along R37 at T-junction within Driekop settlement.	30.16091 -24.5926
ID008	Along R37 at T-junction within Ga-Manyaka settlement.	30.11576 -24.4751
ID010	Along D4220 between Ditobelang and Leao settlements.	30.05563 -24.4519
ID011	Along road between Manotwane and Ga-Selepe settlements.	29.96848 -24.3582

14.4.2 VARIABLES

For each measurement the following data is to be recorded:

- Description of the site.
- Date, time and duration of measurement.
- GPS coordinates and altitude.
- Meteorological data (wind speed and direction, ambient temperature, cloud cover, humidity, barometric pressure).
- Sound pressure level data.
 - Equivalent continuous sound pressure level.
 - Maximum sound pressure level during measurement period.
 - Minimum sound pressure level during measurement period.
- Notes on incidents influencing the noise measurement during the measurement period.
- Reference to photographs taken (at least one photograph of each site is to be taken).

14.4.3 FREQUENCY

The frequency of monitoring measurements is dependent on the construction operations, but as a general guideline, measurements should be taken at least once weekly in areas where construction is taking place.

14.5 HERITAGE & ARCHAEOLOGY

A suitable accredited archaeologist should be present during construction on a watching brief to monitor construction activities, specifically at the two possible grave sites identified along the proposed alignment. The location of affected heritage resources can be seen below:

Table 14-11: Location of affected heritage resources.

Site designation	Farm	Co-ordinates
2D SSD1 C42	Doornbosh 294/6	S24° 40' 48.2" E30° 12' 13.1"
2D Site 1	Mooihoek 252/2	S24° 36' 17.2" E30° 08' 28.1"
2D Site 2	Mooihoek 252/2	S24° 36' 21.9" E30° 08' 20.3"
2D Site 3	Hendriksplaats 28/10	S24° 38' 46.1" E30° 10' 51.2"
2D Site 5	Hendriksplaats 28/10	S24° 38' 35.4" E30° 10' 40.1"
2D Site 6	Hendriksplaats 28/10	S24° 37' 46.3" E30° 10' 22.5"
2D-Ga-Mathipa C02	Mooihoek-255/4	S24° 32' 44.4" E30° 08' 42.1"
2D Site 4	Hendriksplaats 281/0	S24° 38' 47.0" E30° 10' 51.5"
2D-Ga- Mathipa-C01	Mooihoek-255/4	S24° 32' 46.3" E30° 08' 39.0"
2D-Ga- Mathipa-C03	Mooihoek-255/4	S24° 32' 44.0" E30° 08' 46.9"
Location of heritage resources affected, as identified in the 2024 HIA.		
Oli14	Apiesboomen 295/0	S24°39'8.60" E30°10'58.40"
Oli15	Apiesboomen 295/0	S24°39'8.60" E30°10'58.40"
Oli16	Mooihoek 255/2	S24°34'53.40" E30° 9'27.79"

Note: The sites in grey that are struck out have since been removed from the updated EMP, as they are no longer applicable to the proposed infrastructure for Phase 2D.

14.6 ASSETS & INFRASTRUCTURE

A photographic record must be recorded and retained of fixed-point monitoring to compare the state of assets and infrastructure before and after project activities. This can include, but is not limited to, informal dwellings, fences and existing boreholes.

14.6.1 VARIABLES

The following must be recorded for each identified asset and infrastructure:

- The GPS coordinates (accurate to the within 5 m) of the point from which the photograph was taken;

- The date and time of day on which the photograph was taken;
- The direction in which the photograph was taken;
- The height of the camera/ tripod from which the photograph was taken;
- Weather conditions at the time the photograph was taken, where these shall be appropriately classified (e.g. sunny, partly cloudy, overcast, etc.).

The procedure for taking photographs shall furthermore conform to the following specifications:

- Selection of points for taking photographs. Prior to commencing fieldwork, the contractor shall select an appropriate number and spacing of points from available aerial or satellite imagery to ensure that all relevant assets and infrastructure are captured photographically. During fieldwork, more points may be selected as necessary.
- Number of photographs per point. At each selected point, a sufficient number of photographs must be taken to cover a 360-degree panorama. Adjoining photographs must overlap sufficiently to ensure that the entire panorama is covered.

Failure to comply with all of the relevant legislation, conditions of the RRoD and EMPr may result in one of the following measures being taken by DFFE:

- The withdrawal of the authorisation;
- The issuing of directives to either address the non-compliances identified, including an order to cease the activity; and
- The instituting of criminal and/or civil proceedings to enforce compliance.

14.7 NON-CONFORMANCE REPORTING

It is thus important that all non-conformances be reported and recorded in order for them to formally be addressed and closed-out. Non-conformances will be recorded on a standard Non-conformance Record (NCR) developed by the Engineer's EM. NCR's may be submitted by any employee on site. NCR's are submitted to the Contractor's EO after which he/she will investigate the cause for the incident and ensure that the incident is appropriately closed-out and prevented in future.

14.8 PENALTIES

Penalties or fines must be issued at the discretion of the Engineer as per the penalty agreement between the Engineer and Contractor. The ECO is to take up any non-compliance issues that may result in a fine or penalty with the Engineer.

The Contractor must not have the misimpression that adherence to the Environmental Specifications or EMPr is optional (i.e., persistent non-compliance will not only result in the Contractor forfeiting the retention amount but will also be penalised).

All such penalty and retention funds must be used to improve environmental conditions on the site (or others) under development, either during or post-construction, and may not be used to recoup losses incurred as a result of overspent construction items.

14.8.1 RETENTION SYSTEM

For this system, a cost estimate will be determined by the Engineer. This system will entail calculating the total value of the outstanding penalties, as per the BOQ, the project specification and the penalty system. If the value exceeds 10% of the environmental items BOQ, the project retention value of 10% will be retained until the performance certificate has been issued and all the matters have been resolved.

The value of each non-compliance and penalty (according to the BOQ and the penalty system) will be added together. Once all the penalties and non-compliances have been paid or closed out (in physical remediation, project director man hours or a monetary contribution) the value of the retention will be released to be paid out once the performance certificate has been issued at the completion of the contracts defects and liability phase. If the environmental monitoring process reveals persistent and/or wilful non-compliance with any aspect of the Environmental Specifications and EMPr, then the retention associated with that particular item will be withheld permanently from the payment certificate.

The Engineer may then utilise these retained funds to rectify the problem on site making use of other resources at his disposal. The remainder of the retention funds will then be paid out to the Contractor (pending approval by the Engineer's Environmental Representatives and the ECO, confirming compliance with the relevant specifications and EMPr).

14.8.2 PENALTY SYSTEM

The penalty system will be based on two procedures, a stipulated community service task (calculated as project director man hours or days) or a monetary liquidation liability. Should the environmental monitoring process reveal acts of persistent and/or wilful non-compliance with the Environmental Specifications or EMPr, then the Contractor will be penalised according to the specified value of that item (see **Table 14-12**).

A stipulated community service task is any task in the local region that will improve the environment or prevent further environmental degradation identified by the Engineers Environmental Representative and the ECO. Examples could include repairing erosion dongas, implementing an alien invasive plants eradication program, grading rural school access roads, planting indigenous trees in the community, establishing food gardens at the local schools, planting non-invasive fruit trees in the community, installing rain water systems at the local schools, set up a recycling system in the community (where the community benefits from the program), establish waste infrastructure in the community etc.

Should the local authorities in conjunction with the Engineers Social (ES) and Environmental (EE) Representatives and the ECO, identify any practical tasks available at any point during the contract, this task will form part of the penalty system. These allocated tasks will then take precedence over the monetary liquidation liability system. Non-compliance to the Environmental Specifications and/or EMPr will accumulate project directors man hours and/or days of community service work. The final completion certificate will only be issued once the Contractor has completed these tasks to a satisfaction of the Engineer.

Should practical tasks not be available, the monetary system will apply. Time and monetary values will be, but are not necessarily limited to the following:

Table 14-12: Breakdown of environmental penalties.

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Access into designated no-go areas	4 hours; or R10 000	16 hours per subsequent offence; or R20 000 per subsequent offence
Vehicles, plant, equipment or material outside of the demarcated site	2 - 8 hours; or R10 000	16 hours per subsequent offence; or R10 000 per subsequent offence
Persistent un-repaired machinery leaks	hours; or R1 500	hours per subsequent offence; or R2 000 per subsequent offence
Litter on site	1 hour; or R500	2 hour per subsequent offence; or R800 per subsequent offence
Lighting of fires outside of designated areas	6 hours; or R2 500	8 hours per subsequent offence; or R3 500 per subsequent offence
Eating meals outside of designated areas	2 hours; or R500	2 hours per subsequent offence; or R500 per subsequent offence
Individual not making use of site ablution facilities	2 hours; or R1 000	3 hours per subsequent offence; or R1 500 per subsequent offence
Persons, vehicles, items or plant causing a public nuisance	4 hours; or R1 000	4 hours per subsequent offence; or R1 000 per subsequent offence
Erosion	Cost to repair / rehabilitate	Cost to repair / rehabilitate plus 20% per subsequent offence
Oil spills	Cost to clean plus 4 hours; or Cost to clean plus 20%	Cost to clean plus 4 hours per subsequent offence; or Cost to clean plus 20% per subsequent offence.
Unauthorised damage to the environment	Cost to rehabilitate	Cost to rehabilitate plus 20% per subsequent offence
Unauthorised damage to cultural historical sites and/or artefacts of archaeological significance	To a maximum of R120 000	R200 000.
Unauthorised damage or deformation of small trees (smaller than 75mm girth diameter @ a height of 1m)	2 hours; or R2 000 per tree, if the tree is indigenous, an additional 8 hours or R6000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act	The permits will be obtained, if needed and 3 hours per subsequent offence; or R3 000 per subsequent offence. If the tree is indigenous, an additional 10 hours or R8000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act
Unauthorised damage or deformation of medium trees (75 – 200mm girth diameter @ height of 1m)	4 hours ; or R3 500 per tree, if the tree is indigenous, an additional 10 hours or R8000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act	6 hours per subsequent offence; or R4 500 per subsequent offence. If the tree is indigenous, an additional 12 hours or R10 000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act
Unauthorised damage or deformation of large trees (larger than 200mm girth diameter @ a height of 1m)	2 days; or R10 000 per tree, if the tree is indigenous, an additional 12 hours or R10 000 will be added to the penalty. If the plant is protected the	3 days per subsequent offence ; or R20 000 per subsequent offence If the tree is indigenous, an additional 14 hours or R14 000 will be added to the penalty. If the plant is protected the relevant

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
	relevant authority is to be notified of this act	authority is to be notified of this act
Pick, cut, uproot, break, damage or destroy indigenous plants	4 hours per plant; or R1 500 per plant If the plant is protected the relevant authority is to be notified of this act	6 hours per subsequent offence; or R5 000 per subsequent offence to a maximum of R2 500 If the plant is protected the relevant authority is to be notified of this act
Pick, cut, uproot, break, damager, destroy or have in possession (and unable to give a satisfactory account of such possession) a protected plant	5 hours per plant; or R2 000 per plant	5 hours per subsequent offence; or R2 500 per subsequent offence
Kill, capture or disturb an animal or take or destroy any egg, larva or nest	2 days; or R5 000	3 days per subsequent offence; or R6 000 per subsequent offence
Setting a snare / trap or hunting / capturing any animal by means of a trap, snare or poison, or with the aid of a light, or by means of a veld fire, or from a vehicle	2 days; or R5 000	3 days per subsequent offence; or R6 000 per subsequent offence
No action within 7 working days on ECO / EM findings	Cost of the corrective action plus R2000 per non- compliance or 4 hours	4 hours for every subsequent event and Cost of the corrective action plus R4000 per subsequent offence or 4 hours
No action within delequidation liability period on NCRs issued	8 hours or R4000	16 hours per subsequent offence; or R6000 per subsequent
No storm water control measures	2 hours or R1000 per silt fence/ turbidity curtains	4 hours per subsequent offence or R2000 per silt fence/ turbidity curtains per subsequent offence.
Exceeding water quality discharge standards, air quality, noise standards, etc	16 hours/ R6000 per offence	22 hours/ R10 000 per subsequent office.
Spotting any alien plant with seeds on the servitude	4 hours/R1000 per 100 m ²	8 hours or R2000 per 100 m ² Per-subsequent offence
Mixing topsoil and subsoil	Value to replace the contaminated topsoil	Value to replace the contaminated topsoil plus 20%per subsequent offence
Mismanagement of topsoil	Value to replace the contaminated topsoil	Value to replace the contaminated topsoil plus 20% per subsequent offence
Mismanagement of toilets, breeding vectors or nauseous smell	4 hours/ R1000 per toilet	6 hours / R2000 per toilet and subsequent offences
Spill kits un-stocked	2 hours/ R500 per 5 kits	4 hours / R1000 per 5 kits for subsequent offences
Mixing of waste	2 hours/R500 per 5 bins	4 hours / R1000 per 5 bins per subsequent offences
Overflowing of waste skips	2 hours / R500 per skip	4 hours / R1000 per skip per subsequent offences

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Dust clouds	If exceedances are evident in the monitoring report it will be addressed accordingly	If exceedances are evident in the monitoring report it will be addressed accordingly plus 20% for subsequent offences
Securing the servitude	2 hours/ R500 per 50 m	4 hours/ R1000 per 50 m per subsequent offences
Water structures such as settlement ponds leaking, or causing damage to the environment	Cost to rectify	Cost to rectify plus 20% of the cost for subsequent offences
Sedimentation of water courses and abstraction from an un authorised water body	Cost to rectify	Cost to rectify plus 20% of the cost for subsequent offences
Undertaking rehabilitation out of sequence and using unauthorised materials/ fertilisers/ seeds/ composts	Cost to rectify	Cost to rectify plus 20% of the cost for subsequent offences

15. MANAGEMENT REVIEW

Management Review is the “Act” component of the Deming Cycle and therefore this EMPr rationale. Management Reviews by the DWS or the implementing agent, on behalf of the applicant, must be held at planned intervals to ensure the EMPr’s continuing suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the EMPr, including the Environmental Policy and Objectives. Records of these Management Reviews shall be retained.

15.1 MANAGEMENT REVIEWS

The Management Reviews must be held on an annual basis and shall include:

- Results of audits of the Project which would include Contractor’s internal audits by the EO and EM, external audits by the ECO and the DWS (or implementing agent);
- Communication from external I&APs which would include any possible complaints;
- The environmental performance of the Contractor;
- The extent to which Objectives have been met;
- Status of corrective and preventive actions;
- Follow-up actions from previous management reviews (where applicable);
- Changing circumstances, including developments in legal and other requirements related to its Environmental Aspects; and
- Recommendations for improvement.

The outputs from Management Reviews shall include any decisions and actions related to possible changes to Environmental Policy, Objectives and other elements of the EMP, consistent with the commitment to continual improvement.

16. REFERENCES

- Banzai Environmental. (2024). *Palaeontological Desktop Assessment for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP) – Proposed Phase 2D Pipeline Re-Alignment and Associated Infrastructure, in the Limpopo Province*. Available from: Zutari online depository - SharePoint. [25 November 2024].
- Create Landscape Architecture and Consulting. (2024). *Landscape and Visual Impact*. Available from: Zutari online depository - SharePoint. [15 November 2024].
- Department of Environmental Affairs and Development Planning (DEA&DP). (2019). *Western Cape Land Use Planning Guidelines*.
- Department of Environmental Affairs and Development Planning (DFFE). (2017). *Public Participation Guideline in Terms of NEMA EIA Regulations*. Pretoria.
- Environ Acoustic Research (EARES). (2024). *Screening Noise Report*. Available from: Zutari online depository - SharePoint. [25 November 2024].
- EHRCON. (2024). *Ambient Air Quality Impact Study*. Available from: Zutari online depository-SharePoint. [17 March 2025].
- EkolInfo CC & Associates. (2024). *Specialist Report – Terrestrial Biodiversity Update: Phase 2D Pipeline*. Available from: Zutari online depository-SharePoint. [20 December 2024].
- Fetakgomo Tubatse Local Municipality (2024). *The Final Integrated Development Plan (IDP) Budget – 2024/2025*.
- Greater Tubatse Municipality. (2007). *Spatial Development Framework for Greater Tubatse Local Municipality: Final SDF Document*.
- Limpopo Provincial Government. (2022). *Limpopo Spatial Development Framework Inception Report*.
- Sekhukhune District Municipality (SDM). (2018). *Draft Spatial Development framework*.
- Parivision. (2024). *Civil Aviation Compliance Statement*. Available from: Zutari online depository-SharePoint. [14 November 2024].
- Parivision. (2025). *Defence Compliance Statement*. Available from: Zutari online depository-SharePoint. [14 April 2025].
- PGS Heritage. (2025). *Heritage Impact Assessment for the proposed Olifants Management Model Programme Bulk Raw Water Study Phase, Phase 2D Project*. Available from: Zutari online depository-SharePoint. [7 April 2025].
- Scientific Aquatic Services (SAS). (2025). *Freshwater Ecosystem Assessment*. Available from: Zutari online depository-SharePoint. [15 April 2025].
- SoilZa. (2024). *Agricultural Compliance Statement for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP): Proposed Phase 2D Pipeline Re-alignment and Associated Infrastructure, in the Limpopo province*. Available from: Zutari online depository-SharePoint. [28 November 2024].
- Zutari (Pty) Ltd. (2025). *Hydrological Impact Assessment*. Available from: Zutari online depository-SharePoint. [15 June 2025].
- Zutari (Pty) Ltd. (2025). *Social Impact Assessment*. Available from: Zutari online depository-SharePoint. [14 April 2025].
- Zutari (Pty) Ltd. (2024). *Traffic Impact Assessment*. Available from: Zutari online depository-SharePoint. [4 April 2025].

APPENDICES

ANNEXURE A: ENVIRONMENTAL ASSESSMENT PRACTITIONER DETAILS

ANNEXURE B: AUTHORITY CORRESPONDENCES

ANNEXURE C: REVISED RECORD OF DECISION (REF: 12/12/20/553) ISSUED IN 2006

ANNEXURE E: SITE MAPS

ANNEXURE F: PROJECT SIP STATUS