



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

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr): MOKOPANE WATER TREATMENT WORKS (WTW)

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LIST OF ABBREVIATIONS

AIA	Aquatic Impact Assessment
AQIM	Air Quality Impact Assessment
AIP	Alien and Invasive Plant
BA	Basic Assessment
BAR	Basic Assessment Report
BOQ	Bill of Quantities
BPDM	Bojanala Platinum District Municipality
CAA	Civil Aviation Assessment
CARA	Conservation of Agricultural Resources Act, No. 43 of 1983
CBA	Critical Biodiversity Area
CBD	Central Business District
CoGHSTA	Cooperative Governance, Human Settlements and Traditional Affairs
DEA&DP	Department of Environmental Affairs & Development Planning
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, No. 73 of 1989
ECO	Environmental Control Officer
EDL	Episodic Drainage Line
EE	Engineers Environmental
EIA	Environmental Impact Assessment
EM	Environment Manager / Environmental Monitor
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
ES	Engineers Social
GDP	Gross Domestic Product
GG	Government Gazette
GN	Government Notice
HIA	Heritage Impact Assessment
(H)	Horizontal distance
IDP	Integrated Development Act
I&APs	Interested and Affected Parties
ISO	International Organisation for Standardisation
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LIHRA	Limpopo Heritage Resources Authority
LWUA	Lebalelo Water User Association
MLM	Mogalakwena Local Municipality
MWMP	Mogalakwena Water Master Plan
NCR	Non-Conformance Report
NDP	National Development Plan 2023
NEMA	National Environmental Management Act, No. 107 of 1998
NEM: BA	National Environmental Management: Biodiversity Act, No. 10 of 2004
NEM: WA	National Environmental Management: Waste Act, No. 59 of 2008
NEM:QA	National Environmental Management: Air Quality, No. 39 of 2004
NFA	National Forest Act, No. 84 of 1998
NHRA	National Heritage Resources Act, No. 25 of 1999
NWA	National Water Act, No. 36 of 1998
OHSA	Occupational Health and Safety Act, No. 85 of 1993
OLS	Obstacle Limitation Surface
OMMP - BRWSP	Olifants Management Model Programme Bulk Raw Water Study Phase
ORWRDP – 2	Olifants River Water Resources Development Project Phase 2
PAC	Powder Activated Carbon
PCD	Pollution Control Dam
PDCA	Plan – Do – Check – Act
PIA	Palaeontological Impact Assessment
PI	Project Implementer
PM	Particulate Matter
PPE	Personal Protective Equipment

PPP	Public Participation Process
Rhr	Randian-aged Hout River gneisses
rRoD	Revised Record of Decision
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SEIR	Scoping and Environmental Impact Reporting
SIA	Socio-economic Impact Assessment
SIP	Strategic Integrated Project
SM	Social Monitor
SMME	Small, Medium, and Micro Enterprises
SMP	Social Monitoring Plan
SO	Social Officer
SPLUMA	Spatial Planning and Land Use Management Act, No. 16 of 2013
SVcb	Species of Conservation Concern
SWMP	Stormwater Management Plan
TA	Traditional Authority
TCTA	Trans-Caledon Tunnel Authority
TIA	Terrestrial Impact Assessment
TSP	Total Suspended Particles
(V)	Vertical distance
WBPA	Waterberg–Bojanala Priority Area
WDM	Waterberg District Municipality
WML	Waste Management License
WMP	Waste Management Plan
WSA	Water Services Authority
WSDP	Water Services Development Plan
WTR	Water Treatment Residue
WTW	Water Treatment Works
WUA	Water Use Authorisation
WUL	Water Use Licence
ZNJV	Zutari Ndodana Joint Venture

REQUIREMENTS OF ENVIRONMENTAL MANAGEMENT PROGRAMMES

Appendix 4 of the National Environmental Management Act (Act No 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations 2014 (as amended) 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 (as amended).

Requirement	Reference
1(a)	
(i) details of the EAP who prepared the EMPr; and	Section 1.4 and Appendix A
(ii) details of the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Section 1.4 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;	Section 1.3 and Section 3
1(c)	
a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitives 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 -	Section 5 through to Section 16
(i) planning and design;	Section 13
(ii) pre-construction activities;	Section 12
(iii) construction activities;	Section 12 and Section 13
(iv) rehabilitation of the environment after construction and where applicable post closure;	Section 12 through to Section 16
(v) where relevant, operation activities;	Section 12, 13 and 14
1(e)	
a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d)	Section 5, 6, 8 & 9
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 -	Section 12 through to Section 16
(i) (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 12 through to Section 16
(ii) (ii) comply with any prescribed environmental management standards or practices;	Section 2 through to Section 16
(iii) (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	Section 12 through to Section 16
(iv) (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);	Section 5 through to Section 11
1(h)	
the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f)	Section 13
1(i)	
an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5 and 6, and Section 13
1(j)	
the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 12 through to Section 16
1(k)	
the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 8 and Section 12 through to Section 16
1(l)	
a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 5, 6 and Section 8
1(m)	
an environmental awareness plan describing the manner in which -	Section 7
(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 7
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 5 through to Section 11 and Section 12 through to Section 16
1(n)	
any specific information that may be required by the Competent Authority.	None to date.

1 OVERVIEW

This chapter provides a general overview of this Environmental Management Programme (EMPr) and a summary of the purpose of the document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

1.1 PURPOSE OF THIS EMPr

The purpose of this document is to provide environmental management practices and recommendations to ensure that the known and possible impacts associated with the proposed Mokopane WTW facility, 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 Environmental Authorisation (EA) that contradict the recommendations made in this EMPr, supersedes the recommendations of this document.

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.

1.2 LEGAL REQUIREMENTS OF AN EMPR

The content of EMPRs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014. Appendix 4 of the EIA regulations specify the required contents of an EMPr.

The Department of Environmental Affairs & Development Planning (DEA&DP)'s¹ Guideline for Environmental Management Plans (2005) aims to inform and guide the preparation and implementation of EMPRs. The conditions of the guideline and requirements specified in Appendix 4 of the EIA Regulations 2014 (as amended) have been considered in compiling this document. The DEA&DP guideline defines an EMPr as:

“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle, including an assessment of the effectiveness of monitoring and management arrangements after implementation. EMPRs must be submitted together with the Environmental Impact Report (EIR) so that they can be considered simultaneously.

Section 24N (2) and (3) of the NEMA lists the requirements of an EMPr presented in **Table 1-1**.

Table 1-1: Requirements of an EMPr according to Section 24N (2) and (3) of the NEMA

- 24N. (2) the environmental management programme must contain-**
- (a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –**
 - i) planning and design.**
 - ii) pre-construction and construction activities.**
 - iii) the operation or undertaking of the activity in question.**
 - the rehabilitation of the environment; and**
 - closure, where relevant.**
 - (b) details of –**
 - (i) the person who prepared the environmental management programme; and**
 - (ii) the expertise of that person to prepare an environmental management programme**
 - (c) a detailed description of the aspects of the activity that are covered by the draft environmental management plan.**
 - (d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a).**
 - (e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on compliance.**
 - (f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and**
 - (g) a description of the manner in which it intends to-**
 - (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation.**

¹ The DEA&DP's guideline is used even though the proposed project is based in the Limpopo Province, as there is no national EMPr guideline.

- (ii) remedy the cause of pollution or degradation and mitigation of pollutants; and*
- (iii) comply with any prescribed environmental management standards or practices.*
- (3) the environmental management programme must, where appropriate-**
 - (a) set out time periods within which the measures contemplated in the environmental management programme must be implemented.**
 - (b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and**
 - (c) develop 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*
 - (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.*

1.3 STRUCTURE OF THE EMPR

The EMPr has been structured to include the following sections to address environmental management throughout the project life cycle:

- **Chapter 1:** Overview of the Project
- **Chapter 2:** Introduction to the Project
- **Chapter 3:** Project Description
- **Chapter 4:** Legal Framework
- **Chapter 5:** Environmental Management Approach and Policy
- **Chapter 6:** Resources, Roles, Responsibilities and Authorities
- **Chapter 7:** Competence, Training and Awareness
- **Chapter 8:** Communication Procedures on site
- **Chapter 9:** Operational Control
- **Chapter 10:** Emergency Preparedness
- **Chapter 11:** Non-conformity, Corrective Action and Preventive Action
- **Chapter 12:** Environmental Aspects
- **Chapter 13:** Summary of Impacts and Associated Mitigation Measures
- **Chapter 14:** Operational Phase
- **Chapter 15:** Rehabilitation
- **Chapter 16:** Decommissioning Phase
- **Chapter 17:** EAP concluding statement

1.4 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The compilation of this Environmental Management Programme (EMPr) was prepared by Mr. Siphamandla Mzolo and reviewed by Mr. Deon Esterhuizen and Mrs. Natanya Whitehorn of Zutari Ndodana Joint Venture (ZNJV). For a detailed description of 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).

1.5 PROJECT PHASING

1.5.1 PLANNING AND DESIGN PHASE

This phase includes applications for environmental, town planning and other relevant authorisations. The planning and design phase investigate the possible impact of the proposed development on the

receiving environment and recommend mitigation measures. This phase would have been concluded once the contractor views this document.

1.5.2 PRE-CONSTRUCTION PHASE/ACTIVITIES

The pre-construction phase includes activities such as appointment of an Environmental Control Officer (ECO), pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant and animal rescue. Specifications for these activities are included in this EMP. This phase also includes the application processes to obtain permits for e.g., permits required to remove any protected tree(s) or plant/animal species of conservation concern.

1.5.3 CONSTRUCTION PHASE

The construction phase commences with earthworks and all activities relating to the construction of the proposed Mokopane Water Treatment Works (WTW) ('the project area') e.g., installation of services, construction of the WTW facility, water storage structures, parking area, administration buildings, sludge lagoons as well as associated auxiliary infrastructure.

1.5.4 OPERATIONAL PHASE

The operational phase commences when the proposed development is being used for its intended purpose i.e., WTW facility. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring, and maintenance of the WTW facility, and continuing environmental management requirements (e.g., removal of alien and invasive plant species).

1.5.5 DECOMMISSIONING PHASE

The decommissioning phase refers to the discontinuation of the WTW facility and the removal of all associated infrastructure. This would entail dismantling the internal roads, stormwater network, and all associated infrastructure. Rehabilitation of the site to a suitable end use would also form part of the decommissioning phase leading to closure. It is highly unlikely that the proposed WTW would be demolished. The intention is to continue with the project for as long as it is sustainable, and it is not anticipated that decommissioning will occur in the foreseeable future.

A Closure Plan is not applicable to this project as it is not anticipated that the proposed project will be closed. In case that there is a need to close the WTW, a closure plan should be developed at the time of closure. This would likely take place prior to the closure of the entire WTW footprint, comprising of all infrastructure. In the event that closure is required, all the relevant authorisations relating to closure should be granted before the closure activities commences.

2 INTRODUCTION

Zutari Ndodana Joint Venture (ZNJV) was appointed by the Lebalelo Water User Association (LWUA), for the provision of professional services for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP – BRWSP)². LWUA was established in terms of Section 92(1)(a) of the National Water Act (NWA), No. 36 of 1998, in terms of a notice published in Government Gazette (GG) No. 89/23053, and for the purposes of this Agreement, acting on behalf of the still to be established Olifants Management Model, being a fully transformed entity.

2.1 PROJECT BACKGROUND

The Zutari Ndodana Joint Venture (ZNJV)³ was previously appointed by the Trans-Caledon Tunnel Authority (TCTA), on behalf of the Department of Water and Sanitation (DWS) for the provision of professional services for the Olifants River Water Resources Development Project – Phase 2 (ORWRDP-2). Initially the Project comprised of the following phases (refer to **Figure 2-1**):

- ▶ **Phase 2A:** Construction of De Hoop Dam
- ▶ **Phase 2B:** Pipeline from Flag Boshielo Dam to Pruisen near Mokopane (72km)
- ▶ **Phase 2B+:** New pipe for 2B extension, where existing raw water pipeline to Sekuruwe commences
- ▶ **Phase 2C:** Pipeline from De Hoop Dam to Mooihoek
- ▶ **Phase 2D:** Pipeline from Steelpoort to Mooihoek (24km)
- ▶ **Phase 2E:** Pipeline from Mooihoek to Havercroft Junction (14km)
- ▶ **Phase 2F:** Pipeline from Havercroft Junction to Olifantspoort (44km)
- ▶ **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 (this Phase has been cancelled).

The ORWRDP-2 has since been reconstituted to become the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP–BRWSP) in recent years, with the Lebalelo Water User Association (LWUA) acting as the implementing agent for the following portions of the project:

- Phase 2B
- Phase 2B+; and
- Phase 2F

² Previously referred to as Olifants River Water Resources Development Project – Phase 2 (ORWRDP-2)

³ Previously referred to as Aurecon

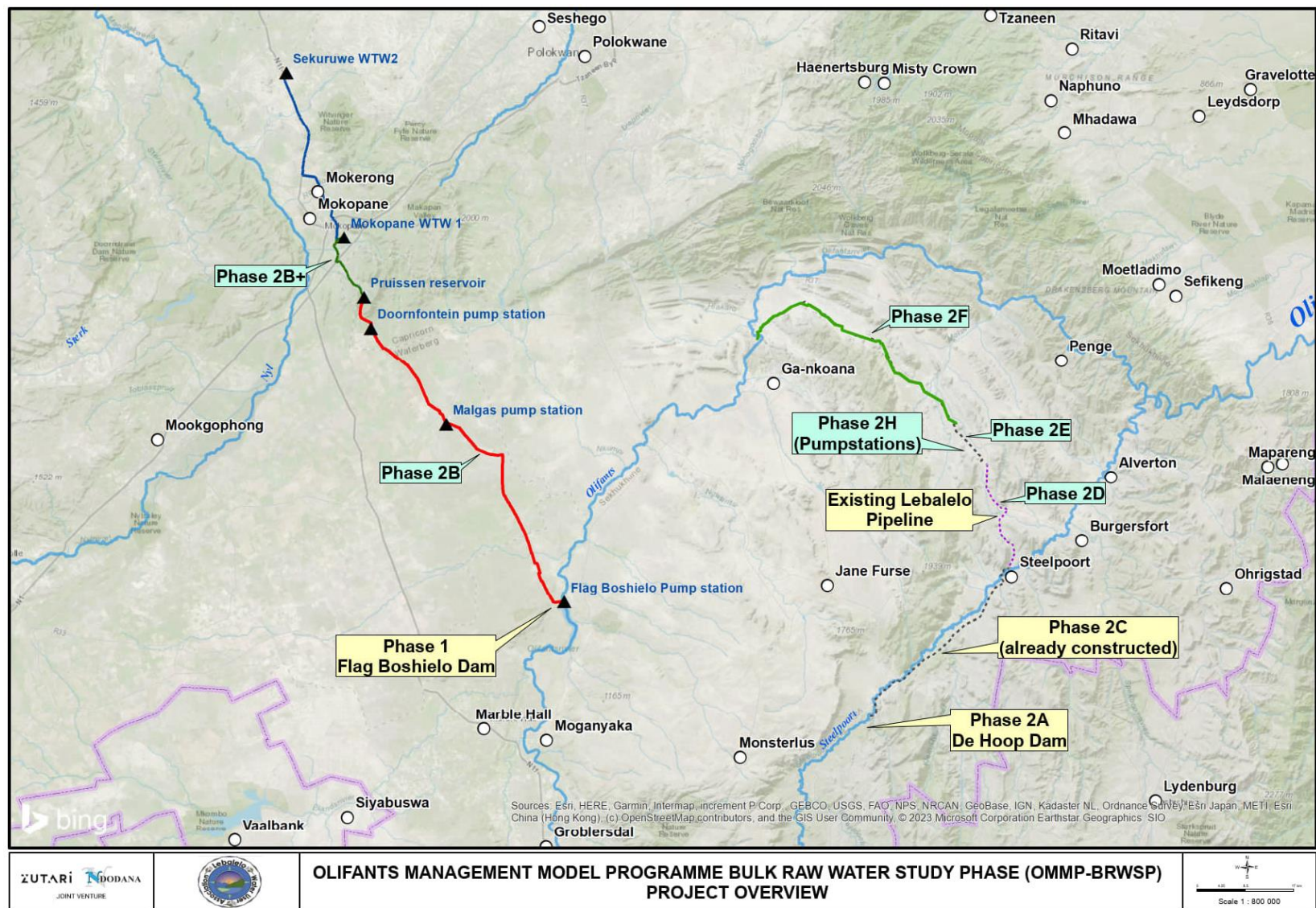


Figure 2-1: Map indicating the alignment of the different pipelines for the various Phases. The Northern Limb includes Phases 2B and 2B+ while the Eastern Limb consists of the phases in the east section of the project (i.e., Phases 2H, 2F, 2E and 2D).

LWUA, has appointed the ZNJV for the provision of professional services for the OMMP-BRWSP. The OMMP-BRWSP bulk infrastructure plan makes provision for the construction of raw water pipeline systems to the identified target areas. These bulk pipeline systems are now identified by their respective "Phase" number. The relevant bulk pipe that would augment raw water to the Mogalakwena system (i.e., for domestic and mine use) is the proposed Phase 2B pipeline. Phase 2B has been authorised by a revised Record of Decision (rRoD) (Ref: **12/12/20/553**) issued in 2006 in terms of the Environmental Conservation Act, (No. 73 of 1989) (ECA). The proposed Water Treatment Works (WTW) are located in two locations along the alignment of Phase 2B+. This phase is an extension of Phase 2B and spans from Pruissen reservoir to Piet-se-Kop. The gravity pipeline has been authorised by EA (**12/1/9/1-W120**) and EA (**12/19/1-W131**). The OMMP-BRWSP bulk infrastructure plan makes provision for the construction of raw water pipeline systems to the identified target areas.

The Mogalakwena Local Municipality (MLM) is a Water Services Authority (WSA) as contemplated in the Water Services Act (No. 108 of 1997). Therefore, the municipality is responsible for the realisation of the right to access to basic water services: ensuring progressive realisation of the right to basic water services, subject to available resources (that is, extension of services), the provision of effective and efficient ongoing services (performance management, by laws) and sustainability (financial planning, tariffs, service level choices, environmental monitoring). The WSA has developed a Water Services Development Plan (WSDP) in conjunction with master plans for water and sanitation.

The planning for water and wastewater services in Mogalakwena culminated in the Mogalakwena Water Master Plan (MWMP). As part of the MWMP, two new WTWs are to be provided, namely a works serving the Mokopane Town with an ultimate capacity of 28 MI/d and another servicing the areas north of Mokopane located near Sekuruwe Township with an ultimate design capacity of 21MI/d (refer to Error! Reference source not found.).

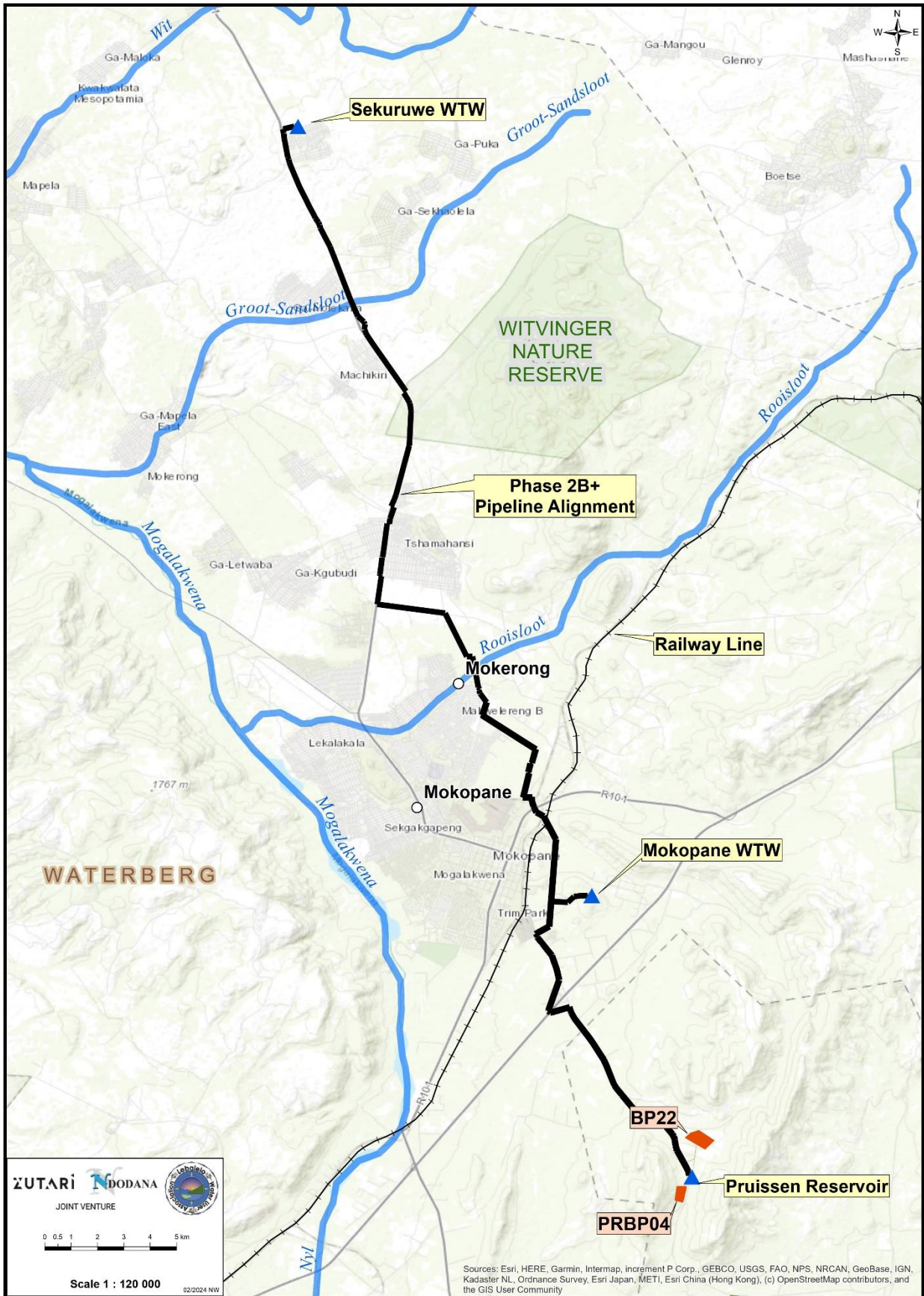


Figure 2-2-2: Map indicating the location of the proposed WTWs with respect to the alignment of Phase 2B+

The technical features of the scheme proposed in the MWMP (for the ultimate scheme) include the following:

- A raw water pipe from the farm Pruisen (where it connects to the bulk water pipeline from Flag Boshielo Dam) to a new WTW (the Mokopane WTW). This works will supply potable water to Mokopane Central Business District (CBD) and town areas.
- The raw water pipe will continue from the WTW at Mokopane, northwards to the rural town area of Sekuruwe. At this point a second WTW (the Sekuruwe WTW) will be constructed. This WTW will be able to provide potable water to mining clients and residents for various rural villages.
- Mining water users will also be able to draw water from the raw water line at various points towards Sekuruwe. This will be handled by means of offtake agreements.

This EMPr is compiled to support the Basic Assessment Report (BAR) for the Mokopane WTW, which is situated along the Phase 2B+ pipeline alignment. LWUA is proposing to construct the Mokopane WTW and associated infrastructure located east of Mokopane Town, in the MLM. The overall objective of the proposed development is to supply potable water for commercial and residential purposes. A separate application for EA for the proposed Sekuruwe WTW will be submitted for evaluation and approval, as discussed, and agreed during the Pre-Application meeting held on 16 August 2023, and the minutes thereof attached as **Appendix B**.

2.2 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, as well as allowing the respective 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 MWMP for the MLM (as mentioned previously, also a WSA) recognised the need for two separate WTWs. One of the required WTW is the proposed Mokopane WTW, which will treat raw water from the Flag Boshielo Dam and supply potable water for residential and commercial users.

The revised scope of the project will prioritise the following key aspects (of the OMMP-BRWSP):

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

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

Further, 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) (refer to **Appendix F**). As such, it is critical that the project must be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act (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.

Importantly, the WSAs have been unable to realise the ambitions (i.e. to reduce water demands on the Flag Boshielo Dam, meet the increasing water demands of the City of Polokwane, and allowing the respective Water Service Authorities (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 expectations in the region.

In addition, delays in implementing the scheme, currently only partially implemented and not operational, have led to water infrastructure being vandalised, specifically the existing underground pipeline in Phase 2B+, authorised by EA (**12/19/1-W131**). It is thus critical for the project to proceed urgently to stabilise the region. Moreover, the need for clean drinking water is well documented and reasons for access to potable water include, and not limited to:

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

2.3 PROJECT LOCATION

The Mokopane WTW is situated approximately 2.5 km southeast of Mokopane Town, near Mogalakwena Landfill, within the jurisdiction of Mogalakwena Local Municipality, of the greater Waterberg District Municipality, in the Limpopo Province. The ultimate capacity of WTW is proposed to be 28MI/d. The preferred site (indicated in green in Figure 2-3) is located on Portion 80 of the Farm Piet Potgietersrust Town and Townlands 44 KS, and the property is owned by Mogalakwena Local Municipality. Whereas the alternative site (indicated in red in Figure 2-3) is situated on Portion 80 of the Farm Piet Potgietersrust Town and Townlands 44 KS, and Portion 69 of the Farm Maribashhoek 50 KS. The development site appears to be in an undeveloped vacant land (which appears to be a greenfield site), surrounded by farmhouses on the west and south area. Agricultural fields are roughly 1 500 km southwest of the site, and a light industrial area is approximately 500 m west of the project site. Other surrounding land uses include residential (town) and agricultural dwellings.

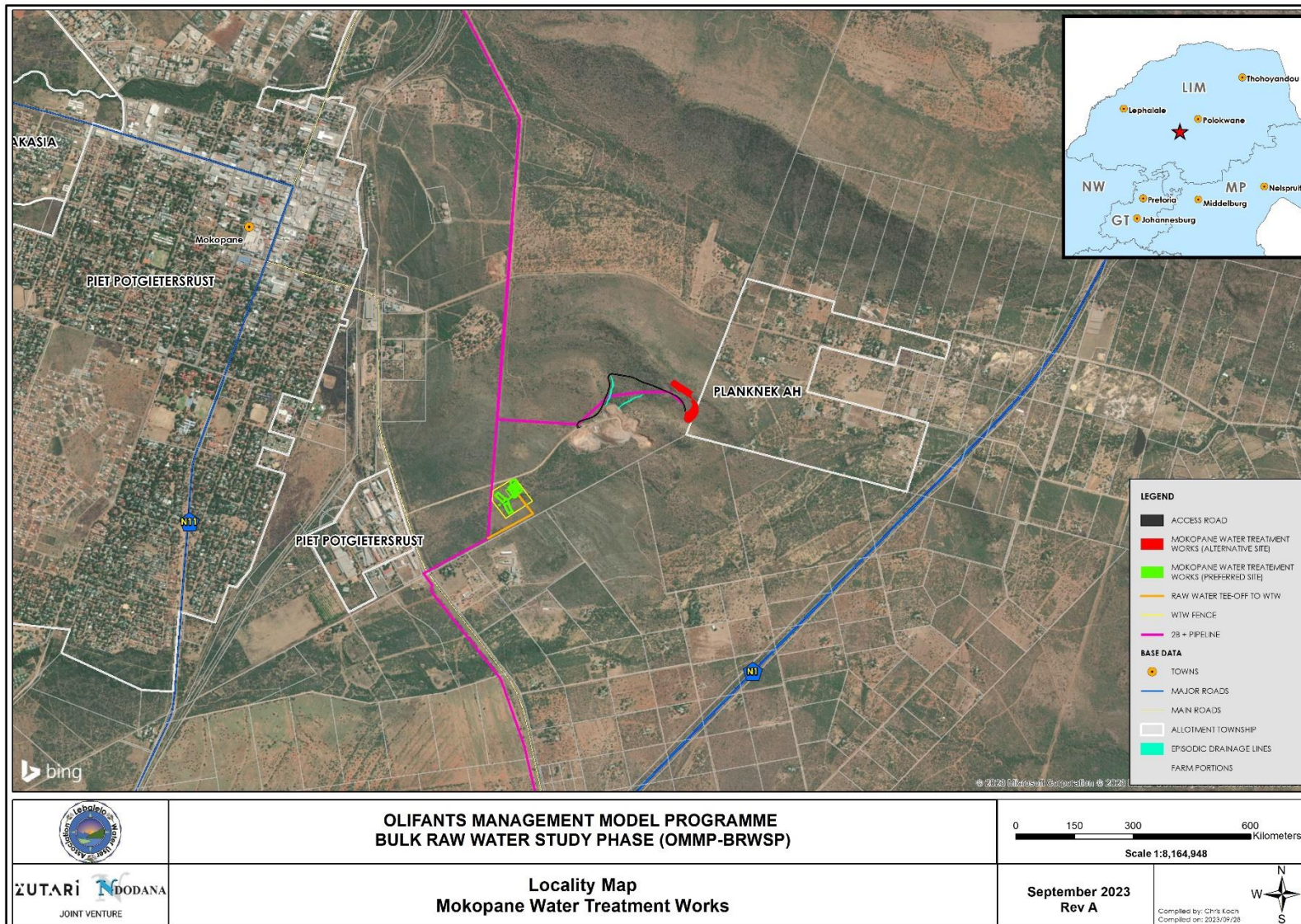


Figure 2-3: Locality Map of the proposed Mokopane WTW

2.4 DESCRIPTION OF THE AFFECTED AREA

The comprehensive description of the project site baseline environment is included in Appendix D of the Basic Assessment Report (BAR). Below is the summary of the baseline information for the project as detailed in the specialists reports, which can be found in Appendix D of the BAR.

2.4.1 SOCIAL BASELINE

The Mokopane WTW is proposed in the MLM, which is part of the Waterberg District Municipality (WDM) in Limpopo Province. Limpopo is South Africa's northernmost province, covering 125,754 km² and sharing international borders with Mozambique, Zimbabwe, and Botswana, as well as borders with Gauteng, Mpumalanga, and Northwest Provinces.

WDM is located in the western part of Limpopo Province, covering 44,913 km² and sharing borders with Northwest and Gauteng Provinces. It's the largest district in the province, with five border control points with Botswana. Key towns in the area include Amandelbult Mine Town, Bela-Bela, Lephalale, Modimolle, Mokopane, Mookgophong, Pienaarsrivier, Thabazimbi, and Vaalwater.

MLM covers 6,156 km² and was established on 05 December 2000, through the amalgamation of Greater Potgietersrus, Bakenberg, and Koedoesrand/Rebone local authorities.

2.4.2 BIODIVERSITY

The focus area is in the Central Bushveld Bioregion, which is situated within the Savanna Biome. The associated vegetation type is the Polokwane Plateau Bushveld (as per the 2018 Vegetation Map Project (VegMAP)). The 2022 Red List of Ecosystems (RLE) database replaces the 2018 National Biodiversity Assessment (NBA) database and, according to the 2022 RLE, the focus area is located within a Least Concern (LC) ecosystem.

According to the South African Protected Areas Database (SAPAD) (2023, Q1), the focus area is located directly within a protected area, namely the Fossil Hominid Sites of South Africa (SA), also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO).

The entire focus area is located within a Category 1 Critical Biodiversity Area (CBA), i.e., these are Irreplaceable Sites required to meet biodiversity pattern and / or ecological processes targets.

Three broad habitats were delineated during the site assessment, namely the (1) Mountain Bushveld and associated Episodic Drainage Line (EDL), (2) the Plateau Bushveld, and (3) Transformed Habitat.

A total of 94 plant taxa were recorded across the focus area, 61% of which were represented by woody species, 12% by forbs (under-represented due to season of assessment), 7% by succulents, and 20% by graminoid species.

While conducting the site assessment, it became clear that the focus area is still effectively utilised by various faunal species, including two confirmed and 14 potential species of conservation concern (SCC). Smaller species like reptiles, small mammals, and invertebrates have limited ranges in which they move and are probably permanent residents of the focus area and habitats within. On the other hand, larger mammals, and avifauna, which are more mobile, are likely to use the focus area in combination with the surrounding natural vegetation. These species are expected to have home and foraging ranges that extend beyond the focus area and are not entirely dependent on it for their survival.

2.4.3 AIR QUALITY

The Mokopane WTW is within the Waterberg–Bojanala Priority Area (WBPA). The Minister declared the WBPA on 15 June 2012 as the third National Priority Area, crossing the Northwest and Limpopo provincial borders. The WBPA covers an area of 67 837 km², bordering with Botswana.

It includes the WDM in the Limpopo Province and parts of the Bojanala Platinum District Municipality (BPDM) in the Northwest Province, with nine Local Municipalities.

2.4.4 SITE GEOLOGY

The geological setting of the proposed preferred and alternative Mokopane water treatment works sites is shown in the extract of the 1:50 000 geological sheet 2429AA Mokopane in Figure 2. According to the 1:50 000 geological sheet, the preferred site is situated on Quaternary-aged soils (Q-r), in close vicinity to basaltic volcanoclastic rocks (Vmc) of the Silverton Formation. The alternative site is underlain by formations of the Vaalian age, all of which fall under the Transvaal Supergroup, Pretoria Group. The formations in the vicinity of the alternative site are listed below, noting that the footprint of the site is situated on Vdw, Vst and Vti1 according to the map:

- ▶ Q-r: Soil.
- ▶ Vmc: Basaltic volcanoclastic rocks.
- ▶ Vbn: Andalusite-biotite schist of the Silverton Formation.
- ▶ Vdp: Quartzite of the Daspoort Formation.
- ▶ Vst: Biotite schist of the Strubenkop Formation.
- ▶ Vdw: Greyish white quartzite with basal pebbly conglomerate of the Daalheuwel Formation.
- ▶ Vti1: Basal carbonaceous shale, andalusite-staurolite fels, pelites of the Timeball Hill Formation.

A prominent fault line is located approximately 1.0 to 1.5km west of the preferred and alternative sites. The fault strikes in the north-northeast to south-southwest direction. Towards the east, an inferred fault line strikes in the northeast to southwest direction. No prominent regional-scale fault lines are present within the sites themselves.

The sites are not underlain by potentially soluble rock such as dolomite. However, for reference, as shown in Figure 3, the Council for Geoscience (2023) indicates that there is probable dolomitic rock located approximately 5 km to 7 km northeast of the alternative site. It is likely that the probable dolomitic land refers to the Malmani dolomites of the Chuniespoort Group approximately 7 km northeast of the alternative site (Figure 2). Notwithstanding, the dolomite is a considerable distance away from the sites and is not considered a risk for the current sites.

2.4.5 CLIMATE

The Weinert N-value (Weinert, 1980) is an index used to estimate the effect of climate on the rock weathering process. In general, where the N-value is more than 5, disintegration (mechanical weathering) is the dominant form of weathering, and the residual soils are typically only thinly developed. Conversely, where the N-value is less than 5, there is a water surplus and decomposition (chemical weathering) is dominant, typically creating conditions that are favourable for the development of deeper residual soil profiles.

The site is situated in an area with a Weinert N-value in the order of N=3.3 (Weinert, 1980). Decomposition (chemical weathering) is therefore the expected mode of weathering at the site, and deeper residual profiles may have resulted over time.

2.4.6 SEISMICITY

The South African loading code, SANS 10160-4:2011 (SABS, 2011), suggests that the site is not located in a highly seismic hazard zone (Figure 5). However, as indicated in Figure 5, the site may nonetheless experience a peak ground acceleration in the order of 0.05g to 0.075g. The probability of exceedance of this peak ground acceleration is 10% in a 50-year period.

2.4.7 SOIL PROFILE

The ground profile from the twelve (12 no.) water plant test pits is summarised in the Geotechnical Desktop Study (can be found in Appendix D). The test pits were hand-excavated and limited to a maximum depth of 1.2 m. From surface, a small depth of clayey silty sands was encountered, from 0.1 m to 0.7 m. This material was described as topsoil, colluvium, reworked colluvium, or material of mixed origin, with overall consistency of medium dense to dense, and with an open soil structure. The open soil structure is indicative of potentially collapsible soil in its natural state, however the soil thickness at the site appears to be thin.

2.4.8 GROUNDWATER

In the WSM Leshika Consulting (2016) geotechnical investigation, no groundwater was encountered in any of the test pits (investigation conducted in April during the area's dry season). However, it must be noted that the test pits were relatively shallow, with a maximum depth of 1.20 m. Furthermore, the water plant test pits were excavated on a ridge with a higher elevation than the surrounding area, and therefore the presence of groundwater is considered unlikely at the higher elevations where the alternative site is situated. Notwithstanding, temporary seepage conditions may occur on the ridge during and after rainfall.

No groundwater information was available at the preferred site location. However, considering the flatter topography of the preferred site, there is a higher chance of groundwater being present at the preferred site than the alternative site.

2.4.9 FRESHWATER AQUATIC ECOSYSTEM

Two freshwater ecosystems were confirmed to occur in the investigation area and as crossed by the proposed alternative site access road. No freshwater ecosystems are located within the footprint of either of the WTW development alternatives sites, but one of the EDLs would be crossed by the alternative site access road.

The two EDLs are highly impacted, primarily by the historical loss of the majority of their original extent due to the development of the Mokopane Landfill which was developed over their historical course and accordingly these drainage lines have been hydrologically isolated and are no longer connected to any larger downstream drainage network. Accordingly, these two episodic first order drainage lines are not considered to be sensitive and the proposed development would be highly unlikely to pose a high risk to the regional aquatic biodiversity or freshwater ecosystems in the area.

3 PROJECT DESCRIPTION

3.1 A DETAILED VIEW OF THE PROJECT WORKS

This application involves the following components, including but not limited to, within the footprint applied for:

- ▶ **Guard house/ Access Control** for security purposes and for access control. The guardhouse is developed to accommodate guards who will be protecting the water service infrastructure and for controlling the access to both the reservoirs and the WTW;
- ▶ **Main administration building** which includes a control room, the laboratory and the main administration areas (i.e., ablutions, workshop and store room);
- ▶ **Sludge lagoons** to dry the sludge produced from the WTW;
- ▶ **Machine Room**;
- ▶ **Conservancy tanks** to be used for handling sewage during operation of the WTW;
- ▶ A **Chemical Storage Area** for the safe handling and storage of chemicals delivered to and stored on site; and
- ▶ **Access and Internal Roads**.

3.2 OVERVIEW OF THE WTW PROCESS

The Mogalakwena Bulk Water Master Plan incorporates two new WTW (Mokopane and Sekuruwe), treating raw water transferred in a pipeline from the Flag Boshielo Dam. This EMP is compiled for the Mokopane WTW. The treatment process selected includes the following stages (refer to BAR Appendix D for a process flow diagram):

- ▶ Coagulation and Flocculation
- ▶ Dissolved air flotation
- ▶ Direct filtration
- ▶ Disinfection
- ▶ Stabilisation

The processes above are augmented or facilitated by the addition of chemicals to the process. These chemicals will include powder activated carbon (PAC) for taste and odour, Sodium Hydroxide (NaOH) and Sulfuric Acid (H₂SO₄) for pH control, Aluminium sulphate for coagulation, an organic polyelectrolyte to aid flocculation and chlorine for disinfection. The process will result in a waste stream (or 'treatment residue') to be stored on site in sludge lagoons and periodically removed from the site for ultimate disposal or re-use.

Since the proposed treatment works at Mokopane is now only in the design stage, there is no information on the quality and characteristics of water treatment residue (sludge) to be managed. A Water Treatment Residue (WTR) sample from an existing WTW (the Flag Boshielo WTW), that treats water from the same source as the proposed scheme (Flag Boshielo Dam), was therefore collected and analysed to serve as a proxy to guide the residue management plans. It is expected that, regardless of treatment processes adopted for the proposed works, the treatment residues will be similar in nature (containing coagulant precipitates and inert solids).

The analysis of the laboratory results of the WTR from the Flag Boshielo WTW in terms of current regulation in South Africa indicates that the WTR is classified as non-hazardous waste according to SANS 10234 and assessed to be Waste Type 3 which is suitable for disposal in a Class C landfill, an activity which requires a Waste Management License (WML). In the interest of sustainability, recycling and reuse of waste is preferable to its disposal. The laboratory results also indicate that the WTR is suitable for land application.

Following the above-discussed sludge assessment results from samples collected from the WTR lagoons of the Flag Boshielo WTW on 11 October 2016, an updated waste assessment of sludge in its aqueous state and water from Flag Boshielo Dam was undertaken by the waste specialists from Zutari, and a sample was taken on 15 September 2023. The analytical results for the sample of water and sludge are shown in Table 2.

Table 2: Concentrations of constituents compared to LCT levels.

Constituents	LCT0	LCT1	LCT2	LCT3	Sludge (mg/liter)	Raw water (mg/liter)
As	0.01	0.5	1	4	< 0.01	< 0.01
B	0.5	25	50	200	< 0.5	< 0.5
Ba	0.7	35	70	280	0.87	0.06
Cd	0.003	0.15	0.3	1.2	< 0.003	< 0.003
Co	0.5	25	50	200	< 0.05	< 0.05
Cr	0.1	5	10	40	< 0.05	< 0.05
Cr(VI)	0.05	2.5	5	20	< 0.05	< 0.05
Cu	2.0	100	200	800	0.26	0.012
Hg	0.006	0.3	0.6	2.4	< 0.005	< 0.005
Mn	0.5	25	50	200	2.09	< 0.05
Mo	0.07	3.5	7	28	< 0.05	< 0.05
Ni	0.07	3.5	7	28	< 0.05	< 0.05
Pb	0.01	0.5	1	4	0.15	< 0.01
Sb	0.02	1.0	2	8	< 0.01	< 0.01
Se	0.01	0.5	1	4	< 0.01	< 0.01
V	0.2	10	20	80	< 0.05	< 0.05
Zn	5.0	250	500	2000	0.15	< 0.05
TDS	1000	12 500	25 000	100 000	324	258
Cl	300	15 000	30 000	120 000	21.54	19.68
SO ₄	250	12 500	25 000	100 000	108.5	117.2
NO ₃ -N	11	550	1100	4400	< 0.5	< 0.5
F	1.5	75	150	600	0.37	0.41
CN	0.07	3.5	7	28	< 0.07	< 0.07
pH					7.61	7.65
Formaldehyde					<0.1	<0.1
TOC					<20	<20

Based on the requirements of GN R635, the total concentrations of the constituents for the raw water fall into a Type 4 category, however the sample containing sludge falls into Type 3 category. This is due to the following constituents in the sludge sample:

- Barium – 0.87 mg/l
- Manganese – 2.09 mg/l
- Lead – 0.15 mg/l

For the organic analysis only formaldehyde and Total Organic Carbon (TOC) was included, and these fall below the limit of detection. Thus the analytical results indicate that the sludge is likely to be a Type 3, and can be disposed on a class C or G:L:B+ disposal facility. This is in agreement with the waste assessment results of 2016. The type of landfill liner is shown below.

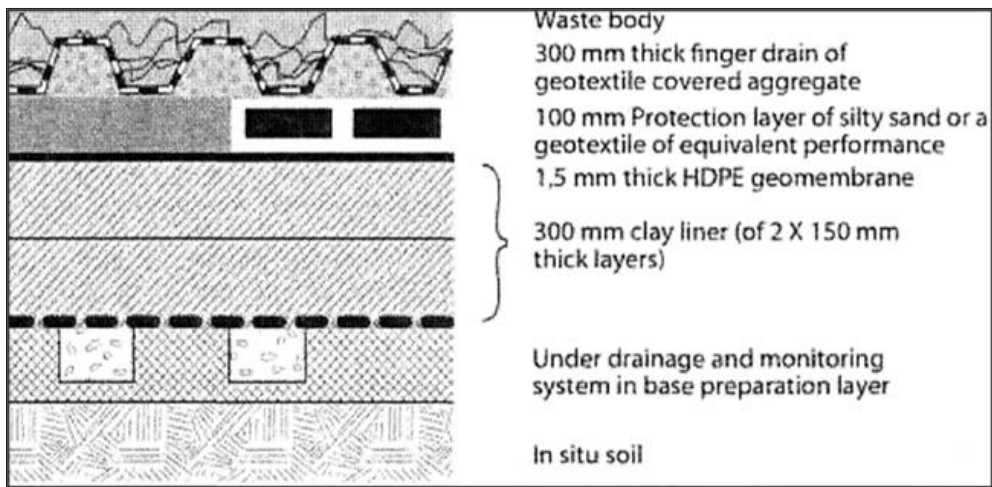


Figure 3-1: Class C Landfill liner (GN R636, 23 August 2013)

Furthermore, the laboratory provided the list of analytes that were included in their analysis and found no constituents that would indicate that the sludge should be considered as hazardous waste. The most contaminated metal was Ca with a concentration of > 0.004%. Therefore, the likely conclusion is that the waste can be considered non-hazardous. The waste specialist further noted that bacteriological analysis was not included, however it is unlikely this will exceed the threshold as the waste is not from wastewater.

To conclude the waste assessment memorandum, the following is to:

- Should the sludge be disposed to landfill or other permanent storage facility, it will need to be disposed in a facility with a Class C liner as shown in Figure 3-1.
- Should beneficial use be considered for the sludge, such as land application for agricultural use, a representative sample of the sludge should be obtained to conduct the outstanding analysis. This analysis can be conducted by ERWAT Laboratory, and they would compile the assessment and determine the applicable class for land application, as well as any pre-treatment required, if it found to be suitable for beneficial use.

4 LEGAL FRAMEWORK

Legal and policy requirements applicable to the project are discussed in the sections below.

4.1 RELEVANT LEGISLATION

An overview of the relevant legislation is provided below in Table 4-1.

Table 4-1: 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 (Act No. 108 of 1996) (“the Constitution”)	Parliament	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 Environmental Management Act (Act No. 107 of 1998) (NEMA)	Competent Authority (CA) (LEDET)	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. Furthermore, 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. The applicant has the responsibility to ensure that the proposed activity and EIA process conform to the principles of NEMA. In developing the EIA process, Zutari has taken cognisance of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations ⁴ . Several listed activities in these regulations are triggered, as indicated in the application for EA form.
National Water Act (Act No. 36 of 1998) (NWA)	Department of Water and Sanitation (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. LWUA is currently applying for Water Use Licenses (WULs) required in terms of Section 21 of the NWA.
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	South African Heritage Resources Agency (SAHRA) and/or Limpopo Heritage Resources Authority (LIHRA)	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 10,000 m ² in extent...” must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency, in this case the LIHRA. These agencies will thereafter review the findings of a Phase 1 Heritage Impact Assessment (HIA) that would be undertaken by the specialist. 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. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the LIHRA, will review the heritage assessments and provide comments to the LEDET, which would consider these comments in their final decision. However, should a

⁴GN No. R 982, 983, 984, and 985 in Government Gazette No.38282 of 4 December 2014.

		<p>permit be required for the damaging or removal of specific heritage resources such as Palaeontological or archaeological objects, a separate application for such destruction would need to be submitted to the SAHRA and/or LIHRA for approval.</p>
<p>Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)</p>	<p>Department of Agriculture</p>	<p>The CARA provides for the conservation of agricultural resources through limiting the sub-division of agricultural land, 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 EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land (if possible).</p>
<p>National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA)</p>	<p>Department of Forestry, Fisheries and the Environment (DFFE) and LEDET</p>	<p>The NEM:BA aims to conserve and manage the country's biodiversity through the protection of species and ecosystems, specifically those which are threatened or considered to be critically endangered. It also serves to regulate the management of alien vegetation. In terms of NEM:BA a list of endangered, critically endangered, vulnerable, and protected species has been promulgated (Section 6, Table 3 of the Act), which calls for an EIA process, should any of the listed species be identified on the site and need to be removed. An ecological impact assessment, comprising a wetland assessment, floral assessment, and faunal assessment, has been undertaken to determine if any listed species are located on the proposed site.</p>
<p>National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM: AQA)</p>	<p>Mogalakwena Local Municipality</p>	<p>The proposed WTW is within the Air Quality-Waterberg Bojanala Priority Area. This is a designated region in South Africa that has been identified as an area of particular concern regarding air quality and pollution. It is part of the South African government's efforts to manage and improve air quality in specific regions where pollution and air quality degradation pose significant environmental and health risks. Air quality management and improvement efforts are prioritized due to identified air quality challenges and their associated impacts on the environment, health, and local communities.</p> <p>During construction, the contractor must ensure that dust construction activities (i.e., excavators, TLB's and heavy vehicles (e.g., trucks) moving in and out of the construction area) comply with the prescribed standards of the NEM:AQA. Furthermore, the Act mandates measures for controlling dust emissions from construction sites. This may include the use of water sprays, dust screens, and other techniques to minimise dust pollution.</p> <p>In summary, the NEM:AQA in South Africa is relevant to construction projects as it governs emissions, dust control, and environmental authorisation requirements. Compliance with this legislation is essential to ensure that construction activities do not adversely impact air quality and to avoid potential legal consequences.</p>
<p>National Development Plan: A Vision for 2030</p>	<p>National Government</p>	<p>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:</p>

		<ol style="list-style-type: none"> 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. <p>Important, one of the enabling milestones is to ensure that all South Africans have access to clean running water in their homes by 2023. One of the proposed critical actions is public infrastructure investment at 10% of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans focus on transport, energy and water.</p>
Mogalakwena Local Municipality: Integrated Development Plan (IDP), Final 2023/2024	Mogalakwena Local Municipality	The integrated development plan contains the strategies and goals for future development in the Mogalakwena Local Municipality. In terms of the District Development Model Waterberg District One Plan, the project is in line with the provision of <u>bulk basic services such as</u> renewable energy, and <u>water supply</u> . With regards to economic development, the project aligns with the strategy to strengthen and invest more in the <u>development and maintenance of water</u> , sanitation, electricity, and road infrastructure.
Spatial Planning and Land Use Management Act, 2013 (SPLUMA)	Mogalakwena Local Municipality	The land parcels on which the proposed Mokopane WTW 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 WTW.
National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA)	CA (LEDET)	<p>The raw water treatment process will continuously produce a "treatment residue" (i.e., dry sludge from the sludge lagoons), which will be stored on site and periodically removed for disposal or reuse. This activity will require authorisation through a Waste Management Licence (WML). This treatment residue or dry sludge will be disposed of at a licensed landfill, and there is also an option to use the dry sludge for land application.</p> <p>It is worth mentioning that at an existing Flag Boshielo WTW, a treatment residue sample was collected, analysed and the results classified the treatment residue as non-hazardous waste according to SANS 10234 and assessed to be Waste Type 3 which is suitable for disposal in a Class C landfill, an activity which requires a WML. The proposed Mokopane WTW will treat water from the same source as Flag Boshielo WTW. It is expected that, regardless of treatment processes adopted for the proposed Mokopane WTW, the treatment residue will be similar in nature (containing coagulant precipitates and inert solids) as the sample collected at Flag Boshielo WTW.</p>
National Forest Act (Act No. 84 of 1998) (NFA)	DFFE	<p>The National Forests Act provides protection for forests, woodlands and several specified species of trees, which are protected across South Africa. The latest list of protected trees, dating from 2014, contains a total of 47 species, specimens of which may not be cut or damaged without a permit.</p> <p>Where protected species are encountered within the footprint areas, permits from the LEDET and/or DFFE must be obtained for their removal and/or destruction prior to construction activities commencing.</p>

<p>The National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA);</p>	<p>DFFE</p>	<p>The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas.</p> <p>The Fossil Hominid Sites of SA are also considered a UNESCO World Heritage Site. As stipulated by Section 50 (5) of the NEMPAA: “No development, construction, or farming may be permitted in a nature reserve or world heritage site without the prior written permission of the management authority”. Although the Fossil Hominid Site was gazetted without a buffer zone, liaison with the relevant authorities may be required to establish if 1) the proposed development is viable within the UNESCO World Heritage Site, and 2) if any buffers are relevant.</p> <p>Additionally, the focus area is located within 10 km of an additional protected area, namely the Glenesk Private Nature Reserve (~ 6 km northeast of the focus area).</p>
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Other relevant South African legislation must be adhered to during all life cycles of the Mokopane WTW project, including Provincial Legislation and Local By-laws applicable to this project.

4.2 LISTED ACTIVITIES IN TERMS OF NEMA

The NEMA provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing 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 Environmental Impact Assessment (EIA) through a Basic Assessment (BA) process or Scoping and Environmental Impact Reporting (SEIR) in terms of the EIA Regulations (GN R982, as amended).

The following listed activities, as shown in Table 4-2 and Table 4-3, have been identified as being applicable to this proposed project:

Table 4-2: Applicable listed activities in terms of GN No. 983 of 2014 (Listing Notice 1)

Act No.	Listed activity	Relevance of the activity
GN R983 of 2014 (Basic Assessment)		
12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The desktop and site assessment confirmed the presence of two freshwater ecosystems associated with the investigation area. Both freshwater ecosystems are episodic drainage lines (EDLs). The proposed access road leading to the alternative site is proposed to cross one of the EDLs and would be situated within the 32m buffer.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The footprint of the proposed WTW is anticipated to be more than 1 hectares, therefore triggering this activity. The preferred site would be approximately 5.14ha. While the alternative site would be approximately 2.94ha (including access road). The terrestrial biodiversity compliance statement confirmed that there is a presence of Indigenous Vegetation ⁵ in the focus area ⁶ .

Table 4-3: Applicable listed activities in terms of GN No. 985 of 2014 (Listing Notice 3)

Act No.	Listed activity	Relevance of the activity
GN R985 of 2014 (Provincial Basic Assessment activities)		
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. e. In Limpopo i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies. (ee) CBA or ecosystems service area as identified in systematic biodiversity plans adopted by the competent authority.	The access road (gravel or dirt) leading to the alternative may be wider than 4 metres. The biodiversity compliance statement confirmed that the entire focus area is located within a Category 1 Critical Biodiversity Area (CBA) and located directly within the protected area (i.e Fossil Hominid Sites of South Africa, also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO))
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. In Limpopo: (ii) Within critical biodiversity areas identified in bioregional plans.	The biodiversity compliance statement confirmed that there is a presence of Indigenous Vegetation in the focus area. The biodiversity compliance statement confirmed that the entire focus area is located within a Category 1 Critical Biodiversity Area (CBA).

⁵ Indigenous vegetation (As per the definition in NEMA): Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

⁶ Encompasses two sites, namely 1) the alternative site and associated access road, and 2) the preferred site (where no access road will be required as there is existing access).

14	<p>The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse</p> <p>In Limpopo (i) Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies. (cc) World Heritage Sites (ff) CBA or ecosystems service area as identified in systematic biodiversity plans adopted by the competent authority</p>	<p>The proposed access road (gravel or dirt) leading to the alternative site is proposed to cross one of the EDLs.</p> <p>The biodiversity compliance statement confirmed that the entire focus area is located within a Category 1 Critical Biodiversity Area (CBA) and located directly within the protected area (i.e Fossil Hominid Sites of South Africa, also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO) World Heritage Site)</p>
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4.3 NEW WATER USES TO BE AUTHORISED

A water use licence application is being undertaken to authorise the water uses triggered by the overall OMMP-BRWSP project. It is expected that there will be storage of treatment residue within the sludge lagoons (forming part of the treatment process at the WTW facility), and this storage would require authorisation. A permanent access road would be required to gain access to the alternative site. This access road would cross one of the identified EDLs.

All water uses to be applied for are new water uses, and therefore require authorisation. No general authorisations are applicable to the project. No exemptions are applied for as all the proposed water uses require authorisation.

The identified water uses in terms of Section 21 of the NWA are presented in Table 4-4 below:

Table 4-4: Triggered water uses in terms of Section 21 of the NWA

Purpose	Activity Description
Section 21 (c & i): Impeding or diverting the flow of water in a watercourse Altering the bed, banks, course or characteristics of a watercourse	
Infrastructure crossing the drainage line	A permanent access road (gravel or dirt) leading to the alternative site would cross one of the EDLs.
Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource.	
Disposing of water containing waste within a watercourse	This will be triggered by the presence of sludge lagoons at the WTW facility.

4.4 LISTED ACTIVITIES IN TERMS OF NEM:WA

The raw water treatment process will continuously produce a “treatment residue” (i.e., dry sludge from the sludge lagoons), which will be stored on site and periodically removed for disposal or reuse. This activity will require authorisation through a WML. This treatment residue or dry sludge will be disposed of at a licensed landfill, and there is also an option to use the dry sludge for land application.

It is worth mentioning that at an existing Flag Boshielo WTW, a treatment residue sample was collected, analysed and the results classified the treatment residue as non-hazardous waste according to SANS 10234 and assessed to be Waste Type 3 which is suitable for disposal in a Class C landfill, an activity which requires a WML. The proposed Mokopane WTW will treat water from the same source as Flag Boshielo WTW. It is expected that, regardless of treatment processes adopted for the proposed Mokopane WTW, the treatment residue will be similar in nature (containing coagulant precipitates and inert solids) as the sample collected at Flag Boshielo WTW.

5 ENVIRONMENTAL MANAGEMENT APPROACH AND POLICY

5.1 ENVIRONMENTAL MANAGEMENT APPROACH

The environmental management approach is based on the Deming Cycle rationale (**Figure 5-1**) 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.

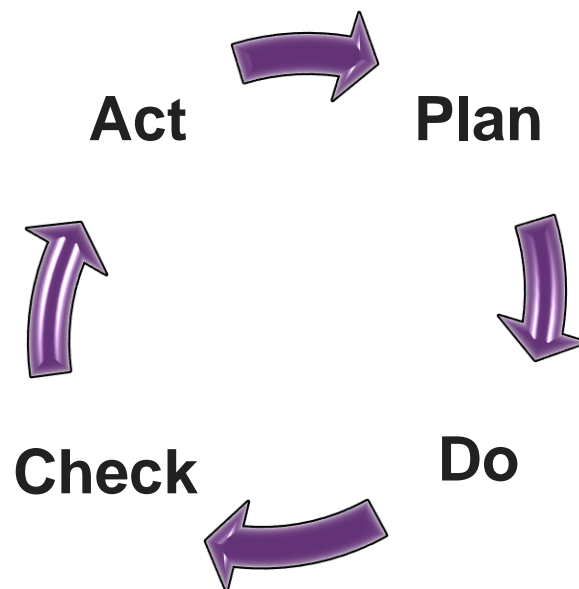


Figure 5-1: The Deming Cycle

By basing the Environmental Management approach on the PDCA rationale, the EMPr in essence adopts the approach of the internationally recognised 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 5-2**). Continual improvement is achieved by periodic monitoring and review of the EMPr and the subsequent implementation of corrective actions when required. **Figure 5-3** illustrates the various components of the approach and directs the reader to the relevant chapters of the EMPr that addresses each component. This EMPr is therefore a living document which should be continuously updated and possibly improved.

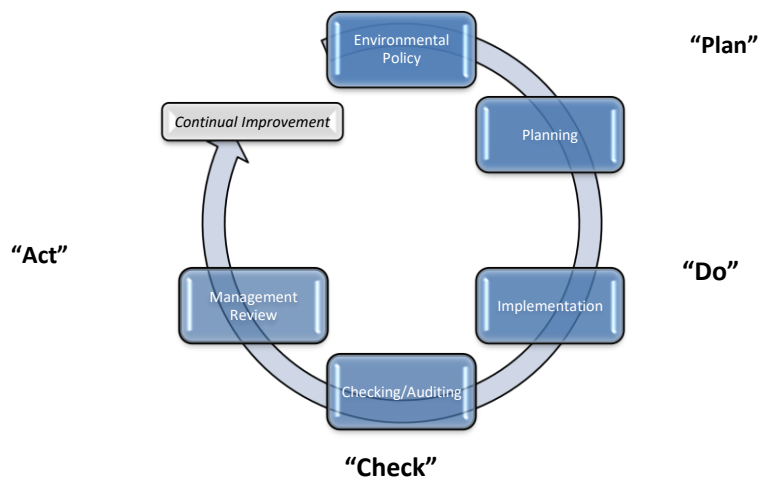


Figure 5-2: The Basic EMPr rationale based on the Deming Cycle

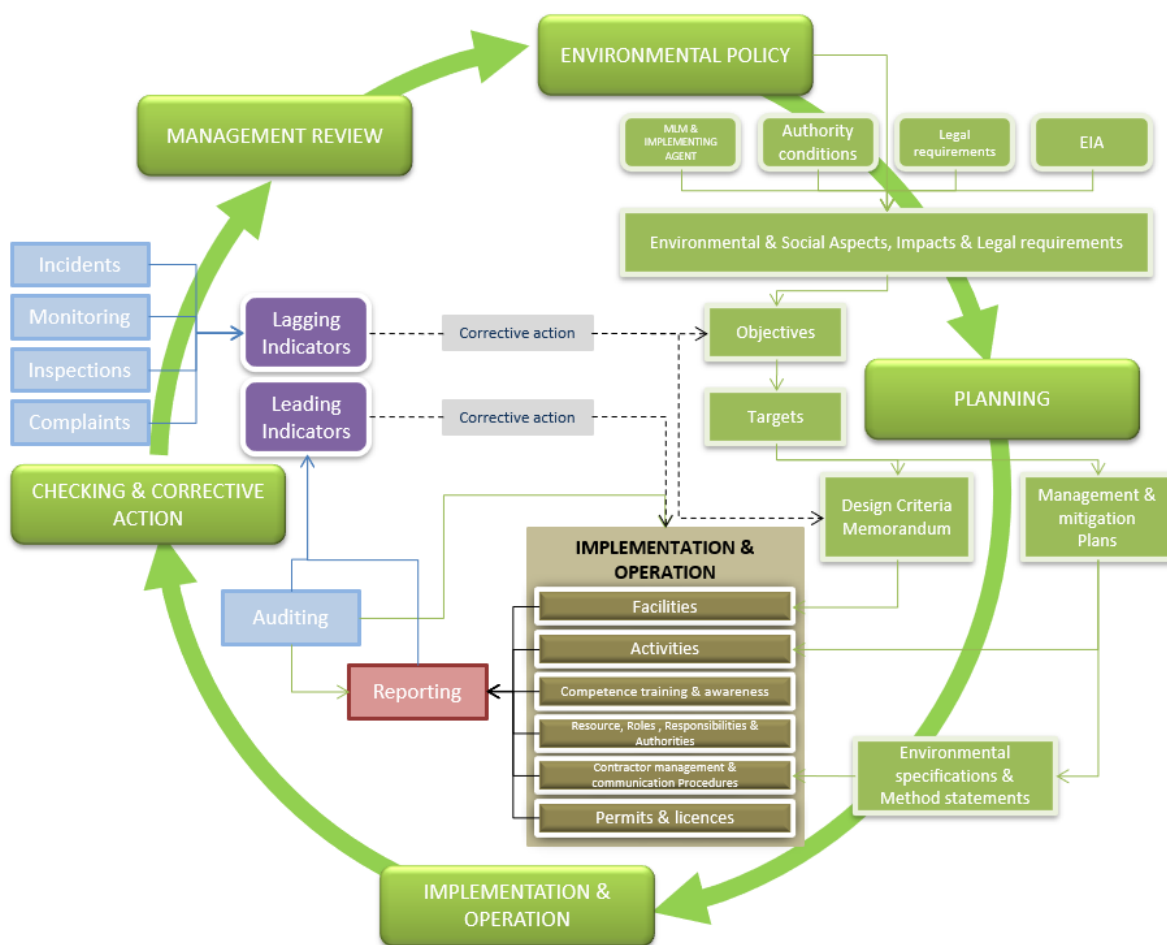


Figure 5-3: The Specific EMPr rationale based on the Deming Cycle

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

5.1.1 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 bases 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.

5.1.2 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 4**. Another important requirement of the planning component is the establishment of objectives and targets taking into account the policy, legal requirements and the principal objective of continual improvement. These objectives and targets should be specified in an EMPr.

Section 13 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 12 and 13**.

5.1.3 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– 10**.

5.1.4 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 9 and 11**.

Checking and corrective action forms the fourth component of the EMPr and serves 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 includes 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 is supplemented by an auditing regime that serves to verify the validity of that reporting.

5.1.5 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.

6 RESOURCES, ROLES, RESPONSIBILITIES AND AUTHORITIES

A project the magnitude and intricacy of the OMMP–BRWSP, which includes the development of the proposed Mokopane WTW, 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 6-1).

The Section below, as well as Sections 7 – 10 is the “Do” component of the Deming Cycle and therefore this EMPr.

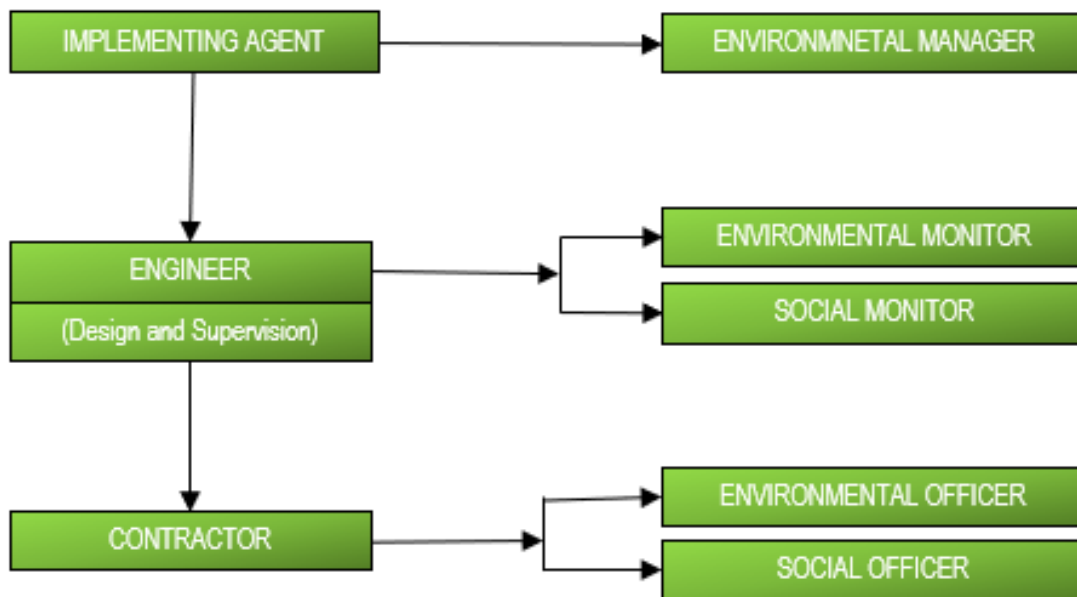


Figure 6-1: Staffing arrangements

6.1 PROJECT PROPONENT

MLM will be the Project Proponent for the proposed Mokopane WTW, an Implementing Agent is appointed to implement the development of the Mokopane WTW. 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.

6.2 CLIENT

The Implementing Agent acting on behalf of MLM has been appointed to implement the Project. As Implementer, part of their responsibilities is to oversee the overall implementation of the construction of the Mokopane WTW as well as the compliance to the applicable legislation, the authorised EA and approved EMPr.

6.3 ENGINEER

The Zutari Ndodana Joint Venture (ZNJV) is the appointed Engineer responsible for the design of the feasibility level layout of the Mokopane WTW and associated infrastructure for permitting purposes. LWUA has considered implementing a New Engineering Contract (NEC) model, whereby they appoint both a design engineer and contractor who assume full responsibility for implementation. Despite this

arrangement, LWUA retains accountability for all environmental compliance measures. To manage these responsibilities effectively, LWUA intends to appoint a management consultant.

6.4 ENVIRONMENTAL MONITOR

The Environmental Monitor (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.

6.5 SOCIAL MONITOR

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

- ▶ Resolve conflicts.
- ▶ Ensure the implementation of the Social Monitoring Plan (SMP) as well as social-related requirements in the EMPr.
- ▶ Monitor the progress, impact and sustainability of the project.
- ▶ Ensure that all community and land owner complaints are reported to the Engineer and Project Implementor, recorded and dealt with in a timeous manner.

6.6 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 Sub-contractors 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 Sub-contractors 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.

6.7 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 Environmental Officer (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 environmental management system.

6.8 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,
- ▶ 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.

6.9 ENVIRONMENTAL CONTROL OFFICER

The Project Implementor must appoint a suitably qualified and experienced independent Environmental Control Officer (ECO) who will be responsible for the monthly monitoring of the project compliance to 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 Implementor to MLM 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 LEDET 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 6 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 effectiveness of 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.

6.10 ENVIRONMENTAL MONITORING COMMITTEE

According to the Revised RoD issued on 13 October 2006 it is the responsibility of the DWS (and ultimately that of the Project Implementor) to establish an Environmental Monitoring Committee (EMC), for the overall OMMP-BRWSP project, before the commencement of any construction activities, which will meet on a bi-monthly basis (every second month). The Mokopane WTW is a component of the larger OMMP-BRWSP project, so the applicant should be one of the representatives on this EMC. It should be noted that this EMPr does not require a separate EMC since it is a subcomponent of the overarching OMMP-BRWSP.

6.11 AUTHORITIES CO-ORDINATING COMMITTEE

The DWS is also responsible for assembling the Authorities Coordinating Committee (ACC) for the overall OMMP-BRWSP project. This committee will meet at least four times a year from the date of commencement of the Pre-construction activities. Similar to the above, this component of the OMMP-BRWSP does not require a separate ACC.

7 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 EMPr. This training and awareness will be achieved in the following ways:

7.1 INDUCTION TRAINING

Environmental induction training must be presented to all persons who are to work on the WTW project – 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 EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do's 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.

7.2 ENVIRONMENTAL AWARENESS TRAINING

Environmental Awareness Training will take the form of an 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.

7.3 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.

8 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.

8.1 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.

8.2 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.

8.3 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;
- ▶ discuss and resolve non-conformance to environmental legislation / policies or the EMPr;
- ▶ assess the general state of the environment on site and discuss any environmental problems which may have arisen;
- ▶ act as a forum for input into the nature and environmental performance of the construction works;
- ▶ accommodate all stakeholders in the decision-making process regarding social and environmental issues on site.

8.4 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.

9 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.

9.1 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.

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.

10 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.

10.1 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

10.2 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.

10.3 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.

11 NON-CONFORMITY, CORRECTIVE ACTION AND PREVENTIVE ACTION

Failure to comply with all of the relevant legislation, conditions of the EA (the one that we are currently applying for) and EMPr may result in one of the following measures being taken by LEDET, the CA:

- ▶ The withdrawing 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.

11.1 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.

11.2 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 he 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.

11.2.1 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 bill of quantities 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 contract's 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 Environmental Control Officer, confirming compliance with the relevant specifications and EMPr).

11.2.2 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 11-1**).

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 rainwater 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 11-1: 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	3 days per subsequent offence ; or R20 000 per subsequent offence

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))
	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 relevant authority is to be notified of this act	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 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 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

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))
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
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 unauthorised 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

12 ENVIRONMENTAL ASPECTS

During the BA process, the following specialist studies were undertaken:

- ▶ Agriculture (compliance report)
- ▶ Aquatic Impact Assessment (compliance report)
- ▶ Air Quality Impact Assessment
- ▶ Obstacle Limitation Surface (OLS) and Civil Aviation Impact Assessment (CAA) (compliance report)
- ▶ Defense Impact Assessment (compliance report)
- ▶ Geotechnical Investigations (compliance report)
- ▶ Heritage Impact Assessment
- ▶ Palaeontological Impact Assessment
- ▶ Hydrology Impact Assessment
- ▶ Socio-economic Impact Assessment (including a section of health Impact Assessment)
- ▶ Terrestrial Impact Assessment (compliance report)
- ▶ Visual and Landscape Impact Assessment (compliance report)

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.

The following tables provide a summary of the pre-and post-mitigation impact and risk significance ratings (detailed impact ratings are appended to **Appendix G**). Significance ratings are ranked from very high (+) through to very high (-) in the tables and are identified in accordance with the following legend.

Legend:

Significance:	Negative (-)	Positive (+)
Very high		
High		
Moderate		
Low		
Very low		

Table 12-1: Summary of the **Construction** phase impacts.

FIELD	IMPACT	PRE-MITIGATION:	POST-MITIGATION:
		SIGNIFICANCE	SIGNIFICANCE
AIR QUALITY	TSP, PM10, PM2.5 and Gaseous Emissions.	Low - negative	Very low
AQUATICS	Potential sedimentation of drainage line due to site clearing and poor stormwater management.	Very low	Very low
AQUATICS	Potential pollution of the adjacent drainage line due to poor management of hazardous materials such as paint and hydrocarbons.	Very low	Very low
AQUATICS	Potential pollution of the adjacent drainage line due to poorly controlled cement mixing / batching.	Very low	Very low
AQUATICS	Indiscriminate movement of vehicles and personnel in the adjacent drainage line and potential dumping of construction material / construction waste in the adjacent drainage line.	Very low	Very low
AQUATICS	Potential pollution of down gradient drainage lines by sediment and other pollutants such as paint / bitumen resulting from road upgrading activities.	Very low	Very low
HERITAGE AND PALAEOLOGY	Destruction of presently unknown Heritage Resources.	Very low	Very low
SOCIAL	Income for farm owners (Land access).	High - positive	High - positive
SOCIAL	Procurement of goods and services.	Moderate - positive	High - positive
SOCIAL	Employment opportunities.	Moderate - positive	High - positive
SOCIAL	Community expectations.	High - negative	Low - negative
SOCIAL	Health, safety and security.	Moderate - negative	Very low
SOCIAL	Traffic and damage to local and access road	Moderate - negative	Very low

Table 12-2: Summary of the **operational** phase impacts & risks.

FIELD	IMPACT	PRE-MITIGATION:	POST-MITIGATION:
		SIGNIFICANCE	SIGNIFICANCE
AIR QUALITY	TSP, PM10, and PM2.5	Low - negative	Very low
AIR QUALITY	Gaseous Emissions	Low - negative	Very low
AQUATICS	Alteration of hydrology and geomorphology of adjacent drainage line due to poor operational stormwater management at the WTW.	Low - negative	Very low
AQUATICS	Alteration of hydrology, geomorphology and water quality of adjacent quality of adjacent drainage line due to leakage or accidental discharge of untreated raw water into the adjacent drainage line.	Low - negative	Very low
AQUATICS	Potential discharge of treatment residue into the adjacent drainage line (as one of the potential options for handling residue / waste from the water treatment process); that could permanently alter the hydrological characteristics and water quality of receiving EDL.	Moderate - negative	Low - negative
SOCIAL	Employment opportunities	High - positive	Very high - positive
SOCIAL	Access to potable water for selected communities in the Northern limb	High - positive	Very high - positive
SOCIAL	Community expectations	High - negative	Low - negative
SOCIAL	Health and safety	High - negative	Low - negative

Table 12-3: Summary of the **Decommissioning** phase impacts.

FIELD	IMPACT	PRE-MITIGATION:	POST-MITIGATION:
		SIGNIFICANCE	SIGNIFICANCE
SOCIAL	Employment and business opportunities	Moderate - positive	High - positive
SOCIAL	Health and safety	Low - negative	Very low
SOCIAL	No access to potable water	Very high - negative	Moderate - negative
SOCIAL	Loss of employment and business opportunities	Very high - negative	Low - negative

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.

12.1 AGRICULTURAL COMPLIANCE STATEMENT

The site is classified as low to medium agricultural sensitivity by the screening tool. This has been confirmed by this assessment, because of the agricultural production potential and current agricultural land use.

The sites are located in an area where there is no crop production. On the preferred site, cropping potential is limited by a combination of climate, terrain, and soil constraints. The climate is classified as arid and therefore is limiting to rain-fed cropping. Soils are constrained by very limited depth above the underlying rock. The steep terrain is limiting. As a result of these constraints the preferred site is totally unsuitable for rain-fed crop production and its agricultural potential is limited to being suitable only for grazing. Although the alternative site is on a different land type on much less steep land, the climate and other constraints still limit its agricultural potential to being suitable only for grazing.

An agricultural impact is a change to the future agricultural production potential of land. This is primarily caused by the exclusion of agriculture from the footprint of a development. In this case, the total footprint of land from which potential future agriculture will be excluded, is only approximately 2.2 hectares and it is not viable cropland. The loss of this amount of grazing land, of which there is no particular scarcity in the country, will result in negligible loss of agricultural production potential in terms of national food security. The agricultural impact of the proposed development is therefore assessed as being of very low significance and acceptable.

12.2 AIR QUALITY IMPACTS

The subsequent subsections below summarise the potential impacts and mitigation measures that are anticipated to arise during the construction/rehabilitation phase and the operation phase of the project.

12.2.1 CONSTRUCTION PHASE IMPACTS

Predicted incremental dust deposition rates during construction/rehabilitation is expected to remain at current levels. Maximum onsite deposition rates are expected to be 842mg/m²/day. Incremental daily and annual average PM_{10/2.5} concentrations as a result of construction/rehabilitation will probably remain below 10% of the relevant standards at the closest sensitive receivers.

- a. **Impact:** TSP, PM₁₀, PM_{2.5} and Gaseous Emissions

Mitigation: Mitigation through administrative control and best industry practice.

12.2.2 OPERATION PHASE IMPACTS

Predicted incremental annual average chlorine concentrations will probably exceed 25% of the adopted guideline at the nearest receivers south of the site. The disinfection process, utilising chlorine gas, will most likely be the largest source of ambient pollution (67.1%), followed by vehicle transport emissions and material handling (30.9%). Incremental daily and annual average total suspended particulates and PM_{10/2.5} concentrations during normal operations will probably remain below 10% of the relevant standards at the closest sensitive receivers.

a. Impact: TSP, PM₁₀, and PM_{2.5} During Operations

▶ **Mitigation Measures:**

- Mitigation through administrative control and best industry practice

b. Impact: Gaseous Emissions During Operations

▶ **Mitigation Measures:**

- Mitigation through administrative control, best industry practice and supplemented with engineering control measures.

12.3 FRESHWATER AQUATIC ECOSYSTEM COMPLIANCE STATEMENT

There are four key ecological impacts on the wetlands that are anticipated to occur namely:

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

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

The subsections below summarise the **construction and operation** phase impacts and recommended mitigation measures.

12.3.1 CONSTRUCTION PHASE IMPACTS AND MITIGATION MEASURES: ALTERNATIVE SITE (WTW)

a. Impact: Potential sedimentation of downgradient drainage lines due to site clearing and poor stormwater management.

▶ **Mitigation Measures:**

- 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 WTW;
- Limiting of clearing of natural vegetation in non-developed parts of the development site footprint.

c. Impact: Potential pollution of downgradient drainage lines due to poor management of hazardous materials such as paint, hydrocarbons.

▶ **Mitigation Measures:**

- Storage of hazardous materials in a bunded contained space;
- Immediate remediation of hazardous material spills.

d. Impact: Potential pollution of downgradient drainage lines due to poor cement mixing / batching

▶ **Mitigation Measures:**

- 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;
- 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.

e. Impact: Access Road construction - potential slumping of / dumping of construction waste and excavated material into the downgradient ED.

▶ **Mitigation Measures:**

- 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;
- 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;
- Establish a formal construction waste control system that is properly controlled and enforced.

f. Impact: Access Road construction - potential pollution of the downgradient drainage line by sediment and other pollutants such as paint / bitumen and cement.

▶ **Mitigation Measures:**

- Stormwater controls are very important in the context of the steeply sloping terrain. Stormwater controls such as berms and silt fences must be established and are particularly important in the part of the road alignment falling with the GN509 regulated area;
- Immediate remediation of hazardous material spills;
- Establish a formal construction waste control system that is properly controlled and enforced;
- An Environmental Control Officer (ECO) must be appointed in order to ensure all water related aspects are adequately mitigated for the construction phase of the proposed development; and
- Refer to above rows for cement-related mitigation measures.

g. Impact: Access Road Construction -transformation of riparian habitat and potential alteration of habitat due to access road crossing structure construction

▶ **Mitigation Measures:**

- The design of a crossing structure must ensure that the structure does not act as an impoundment and that sufficient culverts are installed to let flows bypass the structure and to allow biota to move under the structure;
- If the crossing is designed as a drift-type concrete structure the level of the drift must not be higher than the substrate in the channel bed to ensure that scour does not develop during flows and to allow biota to move across the drift;
- Slopes and embankments at the crossing structure must be adequately stabilised with geotextile (or other similar material) and revegetated to ensure the long term term stability and to prevent erosion;
- See row above for demarcation of a construction right of way and road-related stormwater control measures; and
- See rows above for cement mixing / batching-related control measures.

12.3.2 OPERATION PHASE IMPACTS AND MITIGATION: ALTERNATIVE SITE (WTW)

a. **Impact:** Alteration of hydrology and geomorphology of adjacent drainage line due to poor operational stormwater management at WTW site.

▶ **Mitigation Measures:**

- Stormwater infrastructure on the development site must be designed in line with the principles of SuDS in order to polish stormwater by trapping sediments and by removing pollutants that could pollute downgradient freshwater ecosystems, and in order to allow the gradual discharge of stormwater into the drainage lines following rainfall events;
- As such the use of 'soft' engineering features such as bioswales that are vegetated with suitable vegetation that are tolerant of both wet and dry conditions is strongly recommended; and
- 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 Stormwater Management Plan (SWMP).

b. **Impact:** Alteration of hydrology and water quality (pollution) impacts due to potential discharge of treatment residues into freshwater ecosystems.

▶ **Mitigation Measures:**

- It is recommended that water treatment residue (waste byproduct from the treatment process) not be discharged into the adjacent (downgradient) EDL or other EDL in the investigation area, and that options for the disposal of the residue at a suitable landfill site, or its re-use for mining / agricultural activities.

c. **Impact:** Alteration of the hydrology of the EDL due to stormwater discharge from the access road.

▶ **Mitigation Measures:**

- Stormwater will be channelled from the road into the drainage line that is crossed. 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; and
- Stormwater from the section of the road that runs closely in parallel to the western EDL must be designed to not cause erosion and scour in the adjacent riparian zone and channel of the drainage line.

d. **Impact:** Potential pollution of the EDL due to spills and other road maintenance activities.

▶ **Mitigation Measures:**

- Road maintenance activities must be confined to the developed footprint of the access road; and
- All spills of potential pollutants on the road surface must be immediately remediated.

12.3.3 CONSTRUCTION PHASE IMPACTS AND MITIGATION MEASURES: PREFERRED SITE (WTW)

a. **Impact:** Potential sedimentation of freshwater ecosystems due to site clearing and poor stormwater management.

▶ **Mitigation Measures:**

- 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 WTW; and
- Limiting of clearing of natural vegetation in non-developed parts of the development site footprint.

- b. **Impact:** Potential contamination of freshwater ecosystems due to poor management of hazardous materials and potential pollutants such as paint, hydrocarbons and due to cement mixing.

▶ **Mitigation Measures:**

- 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; and
- 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.

12.3.4 OPERATION PHASE IMPACTS AND MITIGATION: PREFERRED SITE (WTW)

- a. **Impact:** Alteration of hydrological and geomorphological processes of adjacent drainage line due to potentially poor operational stormwater management at the WTW.

▶ **Mitigation Measures:**

- Inclusion of formal stormwater controls in the operational design of the WTW facility; and
- Inclusion of SuDS principles in the operational stormwater design for the WTW facility.

- b. **Impact:** Potential discharge of treatment residue into a freshwater ecosystem (as one of the potential options for handling residue / waste from the water treatment process) ; that could permanently alter the hydrological characteristics and water quality of the receiving freshwater ecosystem.

▶ **Mitigation Measures:**

- It is recommended that that water treatment residue (waste byproduct from the treatment process) not be discharged into the downgradient EDLs or into any other freshwater ecosystem, and that options for the disposal of the residue at a suitable landfill site, or its re-use for mining / agricultural activities rather be implemented.

12.4 OBSTACLE LIMITATION SURFACE (OLS) AND CIVIL AVIATION

The undertaking of this high-level concept OLS assessment indicate that the proposed Mokopane sites does not protrude the OLS of the Potgietersrus Airport nor the Shikwaru Lodge airfield.

Although the planned infrastructure falls within the high sensitivity rating for the proposed site being within 8km of a civil aviation aerodrome, it is not foreseen that these civil aviation installations are impacted by the planned activities with consideration of the OLS of the Potgietersrus Airport and the Shikwaru Lodge airfield.

12.5 DEFENSE COMPLIANCE STATEMENT

The Defence Site Sensitivity Verification process yielded the following key findings:

- ▶ **Confirmation of Land Use and Sensitivity:** The desk-top analysis confirmed the medium environmental sensitivity of the Mokopane Site, consistent with the results of the national screening tool report. On-site inspection further supported this sensitivity rating; and

- ▶ **No Disputes Detected:** The verification process did not uncover any disputes regarding the site's current land use or environmental sensitivity as identified by the screening tool.

12.6 DESKTOP GEOTECHNICAL INVESTIGATION STUDY

Given the limited nature of the geotechnical information at the sites, additional geotechnical investigations would be required to reduce the geotechnical risk of the project as it moves into subsequent design phases, particularly at the preferred site where no intrusive information is currently available. To provide sufficient information for the geotechnical design of the foundations and slopes at the facility, it is recommended that further geotechnical investigation work be undertaken at the selected site, such as site walkovers with mapping of rock outcrops, excavating of test pits, drilling of rotary core boreholes, and laboratory testing. The quantity and extent of the geotechnical investigation will take into consideration the chosen site, the details of the infrastructure, and the stage of development, be it feasibility or concept design or detailed design.

12.7 HERITAGE IMPACT ASSESSMENT

The desktop study revealed that a long and significant history characterises the surroundings of the study area. Additionally, archaeological and heritage studies from this area have revealed a number of archaeological and heritage sites from the surroundings of the study area.

As no heritage resources were identified during the fieldwork, no impact on identified heritage resources could be assessed. The risk exists for heritage resources not identified during the present fieldwork to be located within the study area. This risk is due to the vegetation cover observed in sections of the study area, and the identification and excavation of Iron Age sites a few kilometres northeast of the study area.

12.7.1 IMPACT ASSESSMENT

- a. **Impact:** Destruction of presently unknown heritage resources.

- ▶ **Mitigation Measures:**

- An archaeological watching brief must be implemented during the construction phase. This watching brief is aimed at monitoring the construction and excavation work for any archaeological deposits and features which may be exposed during these development activities.

12.8 PALAEOLOGICAL IMPACT ASSESSMENT

No palaeontological evidence was discovered during the field assessment around the project site. However, the following impact risks can be identified:

- a. **Impact:** Destruction / Damage to Presently Unknown Heritage Resources.

- ▶ **Mitigation Measures:**

- If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO or site manager in charge of these developments; and
- These discoveries ought to be protected (if possible, in situ) and the ECO or site manager must report to 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) so that mitigation (recording and collection) can be carry out by a paleontologist.

12.9 SOCIO-ECONOMIC IMPACT ASSESSMENT

The desktop 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 Mokopane WTW.

Key impacts determined during the assessment as well as recommended mitigation measures are summarised in **Table 12-4** below.

Table 12-4: Summary of social impacts and recommended mitigation measures

PROJECT PHASE	IMPACT DESCRIPTION	MITIGATION MEASURES
<p>Pre-construction & Construction</p>	<p>Land acquisition Mokopane WTW alternative site is proposed on Portion 69 of the Farm Maribashoek and Portion 80 of the Farm Piet Potgietersrus which are both owned by Mogalakwena Local Municipality. As such, it is anticipated that the applicant MLM will amend its land use scheme by rezoning for the construction of the proposed development.</p>	<p>The MLM will amend the land use for rezoning of the two farm portions. Engagements with Land Affairs should be done to determine any land claims made to the proposed to project area. If there are land claims land acquisition process will be followed. This process requires relevant Government bodies to oversee and managed by the developer/implementing agent. Public participation with affected parties will be required.</p>
<p>Pre-construction & Construction</p>	<p>Procurement of goods and services Development projects are known for procurement of goods and services prior and during the construction phase. It is anticipated that this will also be the case for the proposed development and that the developer will require various goods and services, such as the purchase of building supplies and equipment. This requirement is likely to generate economic opportunities for existing Small, Medium, and Micro Enterprises (SMMEs) in the area and potential new SMMEs which will be established because of the proposed development. It is, however, anticipated that some required goods and services might not be available in the local study area. In this case, the developer will procure from businesses elsewhere in the country or outside the country if necessary.</p>	<p>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 (Act 5 of 2000). The contractor will need to implement quality control measures, to ensure that all goods and services are of required quality.</p>
<p>Pre-construction & Construction</p>	<p>Employment opportunities During the construction phase, it is anticipated that employment opportunities will be triggered for skilled, semi-skilled and unskilled workforce. The number of locally employed people during the construction phase of the proposed development will largely depend on the developer's project activities and associated recruitment policy, including the applicant's level of education, skills, and work experience.</p>	<p>Recruitment will be undertaken in accordance with the applicable law of the Republic of South Africa. Project specific recruitment policy/requirements should be developed. It is advised that the developer or contractor develop a skills distribution for the project based on the skills found in the project area, i.e. 100% of unskilled labour required should come from the local communities. The recruitment will follow the ethic of fairness and local community members, those with the required skills and knowledge will be recruited.</p>
<p>Pre-construction & Construction</p>	<p>Community expectations It is anticipated that community expectations will be very high during the construction phase. The development is proposed nearby communities where the unemployment rates are very high, as shown in Table 4, as such, unemployed individuals and opportunity seekers from doorstep communities are</p>	<p>To manage community expectations project information should be made available for them. The project information should include detailed requirements for employment, procurement, or other project related opportunities. Have an information centre placed strategically that will house project related information</p>

	<p>anticipated to have high expectations related to employment and business opportunities. Should these expectations not be met, individuals and community groups can mobilize against the project.</p>	<p>and where community members can log their project related grievances on a grievance mechanism.</p> <p>The contractor should also seek for information on wages paid to the locals on previous projects in the area and better communicate the proposed wages and benefits. To communicate it to the community before the recruitment process commences, to better manage community expectations regarding wages and benefits associated to the project.</p>
<p>Pre-construction & Construction</p>	<p>Health, safety and security</p> <p>Construction projects are generally known to impact negatively on the health and safety of communities and employees. It is anticipated that similar impacts will be triggered by the proposed development. During the construction phase, nearby communities and employees may be exposed to increased dust, noise, visual and other nuisance disturbances, construction vehicles and man-machine interfaces. The dust will likely to be induced by construction phase activities such as excavation, cement mixing and material or waste transportation. The dust from construction activities may affect the respiratory system of those exposed to the dust. Construction noise will likely be induced by construction machines and transportation vehicles and although the construction noise will not damage the hearing ability of those exposed to the noise in the community, it will be at a nuisance level. An increase in construction vehicle traffic causes an increase in man-machine interfaces which could put pedestrians, children, and livestock at risk on busier routes. Additionally, an influx of job and opportunity seekers is often characterized by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates (Daniel Owens, et al).</p>	<p>Impact related to health and safety will be managed as per the recommendations made in other specialist studies viz., air quality, agriculture, aquatic, obstacle limitation surface, defence, geotechnical, heritage, terrestrial, visual and landscape assessment. and as per the duties as defined in the Construction Regulations (Occupational Health and Safety Act).</p>
<p>Pre-construction & Construction</p>	<p>Security</p> <p>Construction activities are likely to attract criminals into the area, hence compromising the security of nearby farm owners, communities, contractors' property, and employees. During the construction phase, it is anticipated that criminal activities will escalate in the area, including the trespassing of properties as well as being a potential target for the construction mafia and extortion.</p>	<p>OMM will deploy an overarching security solution comprising of Patrol vehicles, control centre and intelligence sources. The intelligence sources will need to continuously gather community intelligence to gather information on possible unrest from mines within the proximity of the project area or community unrest.</p> <p>The contractor will deploy Security personnel stationed at the project site to avoid vandalism/ site specific criminal activities, protecting the broader community will remain the responsibility of the SAPS. Additionally, the developer should engage with the Provincial commissioner to assist with handling potential construction mafia.</p>

<p>Operation</p>	<p>Employment Opportunities</p> <p>During the operation phase, it is anticipated that long-term and permanent opportunities related to WTW functionality and maintenance be induced during this phase. Consequently, this will contribute positively to the income of the successful job applicants as they will be able to support their dependents for an extended period. Like the construction phase, the number of locally employed people during the operational phase will largely depend on the developer's recruitment policy and the applicant's level of education, skills, and work experience.</p>	<p>Recruitment will be undertaken in accordance with the applicable law of the Republic of South Africa. Project specific recruitment policy/requirements should be developed. It is advised that the developer or contractor develop a skills distribution for the project based on the skills found in the project area, i.e. 100% of unskilled labour required should come from the local communities.</p> <p>The recruitment will follow the ethic of fairness and local community members, those with the required skills and knowledge will be recruited.</p>
<p>Operation</p>	<p>Access to portable water for selected communities in the Northern Limb</p> <p>Mogalakwena Local Municipality has been reported to be severely water stressed and experiencing water shortages. It is anticipated that the defined communities in the Northern limb (as per the Mogalakwena Water Master Plan to be updated) will have access to potable water.</p> <p>Water shortages are an issue in the proposed project area. Unfortunately, serious water shortages may be accompanied by chronic illnesses, thus, putting pressure on the hospitals and clinics. Sufficient water supply minimises the spread of diseases in an area and increases the livelihood status of the individuals. Additionally, a secure water supply reduces expenditure on 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 diarrhea. Further, water supplies the individual with the opportunity to do everyday activities such as drinking water, cooking, bathing, and cleaning.</p>	<p>The Mogalakwena Local Municipality Water Master Plan will be updated with defined Northern Limb communities which will benefit from the OMM Programme potable water.</p>
<p>Operation</p>	<p>Community Expectations</p> <p>Once the WTW is operational, it is anticipated that doorstep communities, especially those in the Northern limb will expect to have access to potable water. Unfortunately, it is assumed that not all communities in the study area will have access to potable water from this specific development, it is assumed by the specialist that the proposed WTW will serve the communities generally situated along the route of the proposed 2B+ pipeline project and the communities surrounding the commercial users in the area between Mokopane and Sekuruwe. However, the beneficiaries of the potable water in the Northern limb will be determined as per the updated Mogalakwena Water Master Plan.</p>	<p>To manage community expectations project information should be made available for them. The project information should include detailed requirements for employment, procurement, or other project related opportunities. Have an information centre placed strategically that will house project related information and where community members can log their project related grievances on a grievance mechanism.</p> <p>The contractor should also seek for information on wages paid to the locals on previous projects in the area and better communicate the proposed wages and benefits. To communicate it to the community before the recruitment process commences, to better manage community expectations regarding wages and benefits associated to the project</p>

<p>Operation</p>	<p>Health and safety</p> <p>During the operation phase, some of the activities associated with the maintenance of the WTW will be reliant on human labour and therefore operation phase workforce will be exposed to health and safety risks. It is anticipated that injuries can occur due to incorrect handling of equipment and materials falling from heights, stacked items tipping over, accidents involving forklifts and vehicles, and exposure to hot and cold temperatures. Additionally, it is also anticipated that operational noise will be a health hazard during operation (may damage the hearing ability of those exposed to the noise) and the noise will likely be introduced by back-up generators as well. Confined space entry and chemical exposure are also risks that can occur during the operation phase of the asset.</p>	<p>Impact related to health and safety will be managed as per the recommendations made in other specialist studies viz., air quality, agriculture, aquatic, obstacle limitation surface, defence, geotechnical, heritage, terrestrial, visual and landscape assessment. and as per the duties as defined in the Construction Regulations (Occupational Health and Safety Act).</p>
<p>Decommission</p>	<p>Employment and business opportunities</p> <p>Although the operation phase workforce will lose their jobs during this time, short term employment and businesses will be created with the aim of executing the decommission activities.</p>	<p>Recruitment will be undertaken in accordance to the applicable law of the Republic of South Africa. The recruitment will follow the ethic of fairness and local community members with the required skills and knowledge will be recruited.</p>
<p>Decommission</p>	<p>Health and safety</p> <p>Decommission activities are likely to impact negative on the health and safety of employees and communities. The health and safety are likely to be induced by decommissioning activities such as demolition and the handling and transportation of demolished materials.</p>	<p>Impact related to health and safety will be managed as per the recommendations made in other specialist studies viz., air quality, agriculture, aquatic, obstacle limitation surface, defence, geotechnical, heritage, terrestrial, visual and landscape assessment. and as per the duties as defined in the Construction Regulations (Occupational Health and Safety Act).</p>
<p>Decommission</p>	<p>No access to potable water</p> <p>Should the proposed WTW be decommissioned, social water users will not have access to potable water. Specifically, the selected defined communities in the Northern limb (as per the updated Mogalakwena Water Master Plan).</p>	<p>Potable water beneficiaries should be notified on the decommissioning of the WTW prior to decommissioning. The municipality should provide alternative potable water source for the northern limb beneficiaries.</p>
<p>Decommission</p>	<p>Loss of employment and business opportunities</p> <p>It is anticipated that operation phase workforce will lose their jobs during the decommission phase, including businesses opportunities which would have been induced by the need for procurement of operational goods and services.</p>	<p>Employees and businesses benefiting from operation of the WTW should be notified in time regarding the decommissioning of the WTW prior to decommissioning.</p>

12.10 TERRESTRIAL BIODIVERSITY COMPLIANCE STATEMENT

The proposed activities will impact on the habitat units within the focus area to varying degrees, i.e., the proposed alternative site will impact on approximately three 3 ha (high floral SEI and high faunal SEI) of Mountain Bushveld and minimally on the EDL (0.003 ha), whereas the preferred site will impact on 7 ha of Plateau Bushveld (medium floral SEI and low faunal SEI). Within the entire focus area, very little of the Transformed Habitat is utilised as part of the project footprints (i.e., only ± 0.007 ha).

The assessment of floral and faunal communities within the focus area determined that the Mountain Bushveld and associated EDL is of higher importance and sensitivity than the Plateau Bushveld and Transformed Habitat. The Mountain Bushveld is more intact and less degraded than the Plateau Bushveld, and it provides more suitable habitat for floral and faunal SCCs and is associated with better CBA functioning.

The below summarises the impacts on flora habitat, biodiversity, SCC and associated mitigation measures. The full terrestrial biodiversity impact assessment can be found on Appendix D of the BAR.

12.10.1 IMPACTS RELATED TO THE PRE-CONSTRUCTION PHASE

IMPACTS ON FLORAL HABITAT AND DIVERSITY

- a. **Impact (alternative site):** Potential loss of floral habitat and diversity due to 1) general site preparation and project planning, and 2) potential poor infrastructure design and planning for all proposed activities (Mokopane WTW and associated access road).
- b. **Impact (preferred site):** Potential loss of floral habitat and diversity due to 1) general site preparation and project planning, and 2) potential poor infrastructure design and planning for all proposed activities

► Required mitigation:

- Ensure that sound environmental management is in place during the planning phase;
- Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as other specialist studies (e.g., freshwater assessment (SAS 23-1135, 2023));
- Prior to the commencement of construction activities on site, an AIP control plan should be drafted, and the AIP control should subsequently be implemented throughout all phases of the proposed project. The AIP control and management plan should be regularly updated by a suitably trained specialist. It is highly recommended that the AIP Management/ Control Plan should be monitored on a yearly basis (or as specified by an AIP professional);
- Prior to the commencement of construction activities, the entire construction servitude, including lay down areas, should be clearly demarcated; and
- Prior to the commencement of construction activities on site, a rehabilitation plan and/or strategy should be developed for implementation throughout the project phases.

IMPACTS ON FLORAL SCC

- a. **Impact:** Reduced number of floral SCC within the Mountain Bushveld and associated EDL (Removal, destruction, and/or relocation of affected SCC prior to proposed activities).

- b. **Impact:** Reduced number of floral SCC within the Plateau Bushveld (Removal, destruction, and/or relocation of affected SCC prior to proposed activities).
- c. **Impact:** Reduced number of floral SCC within the Transformed Habitat (Removal, destruction, and/or relocation of affected SCC prior to proposed activities).

▶ **Required mitigation:**

- Before any construction activities can occur, a detailed walkdown of the footprint area must take place, during which all SCC should be marked, and permits applied for to remove / cut / destroy these species;
- Before any proposed construction activities may take place, permits from the relevant authorities should be obtained before removal, cutting or destruction of protected species occurs, i.e., Limpopo Economic Development, Environmental and Tourism (LEDET) for provincially protected species and/or DFFE for nationally protected species (e.g., NFA-protected trees), or threatened species;
- A rescue and relocation plan should be developed (based on the outcome of the floral walkdown) for RDLs, NFA-protected trees, and LEMA-protected species where relevant. The plan must be approved by the relevant authorities (along with the necessary permits where applicable);
- If SCC, which are not RDL species, are encountered and will be affected by the construction activities, these species must, as far as is possible, be relocated to suitable habitat surrounding the disturbance footprint. If RDL species are encountered, avoidance is the best mitigation (as stipulated by the SANBI); and
- If RDL plant species will be lost due to clearing of vegetation, such species must be replaced (considering liaison with authorities) either during rehabilitation initiatives or through translocation to suitable habitat surrounding the disturbance footprint. Avoidance of impacts to RDL species, however, must always be prioritised. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential until it is evident that the species have successfully established (a species-specific management plan will be required).

12.10.2 IMPACTS RELATED TO THE CONSTRUCTION PHASE

IMPACTS ON FLORAL HABITAT AND DIVERSITY

- a. **Impact:** Loss of floral habitat and diversity associated with the Mountain Bushveld and associated EDL (clearance of vegetation).
- b. **Impact:** Loss of floral habitat and diversity associated with the Plateau Bushveld (clearance of vegetation).
- c. **Impact:** Loss of floral habitat and diversity associated with the Transformed Habitat (clearance of vegetation).
- d. **Impact:** Degradation of floral habitat beyond the footprint due to uncontrolled or poorly managed edge effects (focus area)

▶ **Required mitigation:**

- Design of infrastructure should be environmentally sound, and all possible precautions taken to prevent potential spills and /or leaks. All spills and /or leaks from equipment during construction activities must be immediately remedied and cleaned up to ensure that these chemicals do not enter the soils;
- The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management). Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint;

- Mitigation measures as proposed by the Freshwater specialist (SAS 23-1135, 2023) regarding construction related to the EDL must be implemented. Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the delineated freshwater ecosystems and applicable setback area;
- Edge effects of all construction activities, which may affect floral habitat within surrounding areas, must be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles. Stormwater controls such as berms and silt fences must be established and are particularly important in the part of the road alignment falling with the GN509 regulated area (SAS 23-1135, 2023);
- Open fires must be restricted to fire safe zone facilities and suitable fire control measures must be in place. However, use of trees, shrubs or any vegetation for fire-making purposes must be strictly prohibited. A Fire Management Plan (FMP) must be in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs;
- No indiscriminate driving through the veld may be allowed. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities;
- No collection of indigenous floral species must be allowed by construction personnel;
- A rehabilitation plan should be implemented upon completion of the construction activities to ensure that the affected areas outside of the project footprints return to an ecologically functioning state, thereby increasing habitat connectivity within affected areas. Rehabilitation of natural vegetation should proceed in accordance with the rehabilitation plan; and
- Avoidance of impacts to the CBA 1 associated with the alternative site and associated access road must be prioritised, and the preferred site instead considered as the preferred option. Options to mitigate the loss of habitat associated with a CBA 1 is limited; however, where avoidance is not possible, the focus of mitigation measures should be on managing edge effects to reduce cumulative loss of CBAs through: 1) minimisation of habitat loss through reconsideration of layouts (preferred site as the preferred option), 2) prevention of habitat fragmentation through keeping new construction activities within or close to existing disturbances, and 3) ensuring a rehabilitation plan/strategy is developed and approved by authorities prior to activities commencing that will promote connectivity and ongoing ecological processes within the landscape.

IMPACTS ON FLORAL SCC

- a. **Impact:** Reduced number of floral SCC within the Mountain Bushveld and associated EDL (monitoring of rescue and relocation initiatives, and harvesting of flora).
- b. **Impact:** Reduced number of floral SCC within the Plateau Bushveld (monitoring of rescue and relocation initiatives, and harvesting of flora).
- c. **Impact:** Reduced number of floral SCC within the Transformed Habitat (monitoring of rescue and relocation initiatives, and harvesting of flora).

► **Required mitigation:**

- No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC;
- Monitoring of relocated and/or rescued species should occur on a regular basis (e.g., twice yearly). Good record keeping should be implemented. If species have not successfully established post rescue and relocation, then conditions should be assessed, and measures developed to ensure survival of other such species. New species should be planted in the case of unsuccessful establishment of rescued/relocated species; and

- Edge effect control needs to be implemented by fencing off or demarcating no-go areas to prevent further degradation and potential loss of floral SCC and their habitat outside of the proposed development footprint area.

12.10.3 IMPACTS RELATED TO THE PERATIONAL AND MAINTENANCE PHASE

IMPACTS ON FLORAL SCC

- a. **Impact:** Reduced habitat integrity of the habitat surrounding the footprint areas due to poor implementation of maintenance activities and edge effects (applicable to all habitat types)

▶ **Required mitigation:**

- Manage all edge effects or indirect disturbances stemming from operational and maintenance activities: 1) implement erosion control measures where necessary to ensure that further habitat loss does not occur, 2) no uncontrolled or unsanctioned fires must be allowed (FMP should be in place), 3) maintenance vehicles must be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed activities, and 4) implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species;
- Management of AIPs during the operational-phase activities must be focused on limiting their introduction and preventing their spread. For example, roadsides should be monitored, as they serve as common corridors along which AIP species are introduced and dispersed and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated; and
- Any natural areas beyond the direct footprint, which have been affected by construction activities must be rehabilitated using indigenous species. As part of rehabilitation activities following the construction of the WTW, ensure that a vegetation layer is reinstated and maintained where natural areas beyond the direct footprint have been affected by construction activities – i.e., to promote soil health and vegetation establishment, to reduced habitat fragmentation, and to provide resources for fauna. In this regard, the use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes (e.g., planting trees such as *Combretum apiculatum*, *Dombeya rotundifolia*, *Sclerocarya birrea subsp. Caffra* (NFA-protected species), *Phyllogeiton zeyheri* (NFA-protected species), *Searsia leptodictya*, *Ziziphus mucronata*, and *Vitex rehmannii*).

The below summarises the impacts on fauna habitat, biodiversity, SCC and associated mitigation measures. The full terrestrial biodiversity impact assessment can be found on Appendix D of the BAR.

12.10.4 IMPACTS RELATED TO THE PRE-CONSTRUCTION PHASE

PROPOSED ALTERNATIVE SITE AND ACCESS ROAD

- a. **Impact:** Loss of faunal habitat and diversity.
- b. **Impact:** Potential loss of floral habitat and diversity due to 1) general site preparation and project planning, and 2) potential poor infrastructure design and planning for all proposed activities Loss of faunal SCC.
- c. **Impact:** Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects.

▶ **Required mitigation:**

- At all times, ensure that sound environmental management and practices will be implemented during the pre-construction phase; and carried forward to the construction and operational phases;
- In the event that any faunal SCC listed in Appendix I (of the Terrestrial Biodiversity Compliance Statement) are encountered in the focus area and require relocation, the relevant provincial and national permits should be obtained from the Department of Forestry, Fisheries and the Environment (DFFE);
- Human and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment;
- As far as possible use existing roads. New roads are to be designed in such a way as to minimise habitat fragmentation and habitat loss using suitable culvert designs; and
- It is recommended that the alternative WTW site would be considered as lower impacts can be expected.

PREFERRED SITE

- a. **Impact:** Loss of faunal habitat and diversity.
- b. **Impact:** Loss of faunal SCC.
- c. **Impact:** Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects.

▶ **Required mitigation:**

- At all times, ensure that sound environmental management and practices will be implemented during the pre-construction phase; and carried forward to the construction and operational phases;
- In the event that any faunal SCC listed in Appendix I (of the Terrestrial Biodiversity Compliance Statement) are encountered in the focus area and require relocation, the relevant provincial and national permits should be obtained from the Department of Forestry, Fisheries and the Environment (DFFE);
- Human and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment; and
- As far as possible use existing roads. New roads are to be designed in such a way as to minimise habitat fragmentation and habitat loss using suitable culvert designs.

12.10.5 IMPACTS RELATED TO THE CONSTRUCTION PHASE

PROPOSED ALTERNATIVE SITE AND ACCESS ROAD

- a. **Impact:** Loss of faunal habitat and diversity.
- b. **Impact:** Loss of faunal habitat and diversity associated with the Mountain Bushveld.
- c. **Impact:** Loss of faunal habitat and diversity associated with the EDL.
- d. **Impact:** Loss of faunal habitat and diversity associated with the Transformed Habitat.
- e. **Impact:** Loss of faunal SCC associated with the Mountain Bushveld.
- f. **Impact:** Loss of faunal SCC associated with the EDL.
- g. **Impact:** Loss of faunal SCC associated with the Transformed Habitat.
- h. **Impact:** Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects.

► **Required mitigation:**

- Where possible, consideration to further footprint reduction should be given;
- Where roads will cross the freshwater habitat, appropriate culverts and road designs must be implemented to ensure that the hydrological flow is not impacted upon and that freshwater faunal species are still able to traverse along this habitat unit;
- The boundaries of the development footprint must be clearly demarcated and no development activities or movement of personnel or vehicles are to go beyond these boundaries;
- Vegetation clearance must be restricted to the proposed footprints only;
- Construction within sensitive habitats should be strictly monitored and should be limited to that which is absolutely necessary and authorised;
- Vegetation clearance must be planned in such a way that not all areas are cleared at once, whilst clearance activities should be undertaken in a phased manner as to limit habitat fragmentation and allow for faunal species to naturally relocate out of an area;
- Construction vehicles are to utilise existing roads as far as possible, no off-roading is to be allowed to prevent unnecessary soil compaction, habitat disturbance and potential species mortalities from vehicle collisions;
- As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is a lower risk to nesting avifauna. As part of the clearing activities, it is acknowledged that during the winter months, reptiles and some invertebrates will be slower moving and/or, in a state of torpor. As such, it is recommended that as vegetation clearance/earth works takes place, a team of trained individuals (may also include construction staff that have been suitably upskilled and trained), moves ahead of these activities and searches for and relocates any species unable to move out of the way themselves. Species are to be moved to the open space areas, ideally of the same or similar habitat type;
- No hunting or trapping of fauna (Common and SCC) by construction personnel within the footprints or surrounding natural areas is to be allowed;
- Stormwater runoff must be managed in adherence to the stormwater management plan;
- All construction related waste and material is to be disposed of at a registered waste facility and no waste or construction rubble is to be dumped in the surrounding natural habitats;
- Erosion inspections should be undertaken frequently, but especially following heavy rains. Where erosion activities are identified, they are to be rectified timeously to avoid further erosive action and habitat loss;
- If any spills occur, they should be immediately cleaned up to avoid soil contamination. In the event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil;
- No on-site informal fires are allowed;
- Regular dust suppression must be undertaken on bare soils;
- External lighting should be kept to a minimum with downward facing lights being used. Yellow or red fluorescent lights are preferable, while the use of bright white or LED lights should be avoided;
- Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report;
- Construction personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpions. None of these or other species are to be killed or injured by construction personnel. Should any of these species be encountered, these species are to be safely and carefully relocated to the surrounding natural habitat adjacent the development site, should they not move off on their own;
- The contact details of a suitably qualified snake handler be made available to construction teams should a venomous snake be encountered that needs removal. Alternatively, it is

- recommended that a member of the construction team be trained to handle and remove snakes through a recognised snake handling course;
- Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habitat for such species outside of the footprint areas;
- Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type. Improper revegetation of the focus area can lead to permanent loss of SCC habitat and food resources; and
- Faunal SCC will likely require rescue and relocation. Walkdowns and rescue and relocation activities as mentioned in the planning phase mitigation measures must be implemented during the construction phase as and when necessary.

PROPOSED PREFERRED SITE

- a. **Impact:** Loss of faunal habitat and diversity associated with the Plateau Bushveld.
 - b. **Impact:** Loss of faunal habitat and diversity associated with the Transformed Habitat.
 - c. **Impact:** Loss of faunal habitat and diversity associated with the EDL. Loss of faunal SCC associated with the Plateau Bushveld.
 - d. **Impact:** Loss of faunal SCC associated with the Transformed Habitat.
 - e. **Impact:** Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects.
- ▶ **Required mitigation:**
- Similar to the mitigations mentioned above (i.e., for the alternative site)

12.10.6 IMPACTS RELATED TO THE CONSTRUCTION PHASE

PROPOSED ALTERNATIVE SITE AND ACCESS ROAD

- a. **Impact:** Loss of faunal habitat and diversity.
 - b. **Impact:** Loss of faunal SCC.
 - c. **Impact:** Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects.
- ▶ **Required mitigation:**
- Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed;
 - Stormwater is to be monitored and managed;
 - Culvert systems installed at points where roads intersect EDL, habitat must be monitored and maintained to ensure they do not become filled with debris/overgrowth and allow movement of fauna;
 - No further vegetation clearance is allowed, unless part of mandatory maintenance activities along roadways, fences and inside facilities;
 - No hunting, trapping or setting of snares is to be allowed;
 - The contact details of a suitably qualified snake handler must be made available should a venomous snake be encountered that needs removal. Alternatively, suitable training of select staff members (security team) must be undertaken to effect the safe capture and relocation of snakes;
 - If any spills occur, they should be immediately cleaned up to avoid soil contamination. In the event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil;

- No on-site open fires are allowed;
- External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided. Lights should not be aimed or cast onto the remaining open space areas;
- Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habitat for such species outside of the footprint areas; and
- Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type. Improper revegetation of the focus area can lead to permanent loss of SCC habitat and food resources.

PROPOSED PREFERRED SITE

a. **Impact:** Loss of faunal habitat and diversity.

b. **Impact:** Loss of faunal SCC

▶ **Required mitigation:**

- Similar to the mitigations mentioned above (i.e., for the alternative site)

12.11 VISUAL AND LANDSCAPE COMPLIANCE STATEMENT

Since the proposed alternative site is situated adjacent to the Planknek AH settlement and the preferred site adjacent to light industrial / warehousing and both WTW in the vicinity of the Mogalakwena landfill site, the landscape has been degraded by anthropogenic changes and the receptors located within the receiving environment have grown accustomed to an altered landscape.

The alternative site will have a higher visual impact than the preferred site, due to the alternative site situated at a higher elevation and located adjacent to the Planknek AH where people reside. Whereas the preferred site is situated in the vicinity of the light industrial / warehousing area where people are working and thus focusing less on the surrounding environment.

When considering the development phases of the proposed project, the construction phase will have the highest visual intrusion due to the removal of vegetation and levelling of the ground in preparation for the proposed WTW, with increased vehicular movement in the area, temporarily altering the sense of place of the area as well.

The points below briefly describe the visual impacts the proposed project will have during the construction and operational phases:

- ▶ The sense of place of the area will shift from calmness and tranquillity to busy due to vehicular movement in the area during the preparation of the area and removal of vegetation for the proposed WTW;
- ▶ Visual contrast to the surrounding environment may occur during earthworks and construction activities and the yellow construction vehicles may be clearly noticeable from the green and brown background formed by the vegetation, and hill with outcrops as well as the landfill site;
- ▶ Direct visual exposure of the construction activities will occur for road users traveling on the N1 national road and R518 road, within a limited distance and of a limited duration, as well as indirectly through fugitive dust generated by the earthworks on a windy day; and
- ▶ The sources of lighting associated with the proposed WTW will contribute somewhat to the effects of night time lighting and skyglow.

The mitigation measures outlined below would serve to minimise the potential visual impacts during the construction and operational phases of the proposed project:

- ▶ The development footprint and disturbed areas surrounding the proposed WTW should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum. By ensuring that the surrounding bushveld vegetation is retained, the proposed WTW will be screened either partly or fully from the receiving environment, at certain vantage points;
- ▶ With the proposed WTW situated within the Fossil Hominid Sites of SA, it must be ensured that the heights of the proposed infrastructure be kept as low as possible without increasing the footprint considerably;
- ▶ All construction areas must be kept in a neat and orderly condition at all times and fenced of;
- ▶ Making use of motion detectors on security lighting, where possible, ensures that the site will remain in relative darkness, until lighting is required for security purposes; and
- ▶ Should the preferred site be selected for the proposed development, it must be ensured that the roadside vegetation along the R518 road, with particular mention of the trees and shrubs, be retained in order to partly obscure the view toward the proposed development.

12.12 HYDROLOGICAL IMPACT ASSESSMENT

The flood line presented in this Hydrological Impact Assessment for the proposed Mokopane Preferred Site is to be used for the environmental and water use license process only and not for detailed design because it was based on a design flood that was determined using only one deterministic method. It is recommended that if the Mokopane Preferred Site is chosen for development, that a detailed flood risk assessment be compiled for the site. It is also recommended that a stormwater management plan is compiled for either of the location options.

The LiDAR survey confirmed the lack of a defined watercourse near the proposed Preferred Mokopane site and indicated that runoff is likely to be sheet flow rather than flow within a stream. The Mokopane Preferred WTW site would be inundated in a 1-100-year flood to an approximate depth of up to 0.85m (the depth will vary across the site). This can be mitigated through appropriate design interventions to capture and divert the runoff around and away from the site.

Based on the findings of this study, the following three options can be recommended to reduce the risk of flooding from the watercourses at the preferred Mokopane WTW site:

- ▶ Raise the infrastructure above the flood level possibly through infilling important parts of the site, and,
 - Construct channels from an appropriately selected material based on the velocity and depth to divert flows around the site.
 - Compile a flood risk assessment using the designed channels and reshaped flow paths to determine the lateral extent and depths of the 1-100-year flood after construction.
 - It is recommended that the footprint of the WTW does not extend into the remodelled flood line.
 - It is recommended that the detailed design of the WTW prevents flooding of all important infrastructure on the site.
- ▶ Construct berms around the site with sufficient freeboard, and,
 - Construct channels with an appropriately selected material to prevent erosion, based on the velocity and depth, to divert flows around the site adjacent to the berms.
 - Compile a flood risk assessment using the designed berms and channels and reshaped flow paths to determine the lateral extent and depths of the 1-100-year flood after construction.
 - Design for stormwater drainage from the site, preferably by gravity, while preventing flooding from outside.

- It is recommended that the detailed design of the WTW prevents flooding of all important infrastructure on the site.
- ▶ Move the proposed site across the road in the northern direction, and
 - Install berms and cutoff drains on the upstream edge of the proposed WTW building and road footprints, or the entire site, to divert runoff and protect them from flooding.
 - Design appropriate stormwater drainage from the site, preferably by gravity, while preventing flooding from outside.
- ▶ At detailed design stage, the design floods must be determined using at least two methods, and hydraulic modelling must be updated using a detailed topographical survey of the site and the adjacent watercourse and updated flood lines must be determined.
- ▶ Appropriate stormwater drainage options should be investigated for the proposed WTW building and road footprints to accommodate runoff and protect them from flooding. The impact of the stormwater drainage system must be investigated to determine its impact on the 1-100 year floodline extent
 - Given the site location, rainfall pattern and maintenance requirements, appropriate stormwater drainage options include v-drains alongside the road, lined trapezoidal channels within the site and vegetative trapezoidal channels outside the site boundary.
 - Inclusion of detention ponds to reduce the peak flows from the site to predevelopment levels is recommended.

12.12.1 RECOMMENDATIONS FOR MANAGEMENT OF STORMWATER

The following recommendations are made based on the findings of the flood risk determination and proposed management options described in the previous two sections, and municipal standards for the design of the stormwater management system:

- ▶ Infiltration testing should be conducted as part of the geotechnical investigation to assess the suitability of designing and installing infiltration-related sustainable drainage systems to manage stormwater runoff generated by the developed site.
- ▶ During construction there must be erosion and sedimentation controls in place to mitigate erosion risk and damage to topsoil and vegetation.
- ▶ The design of the stormwater management system should use water sensitive design principles and mimic the natural run-off volume and quality as closely as possible, including a reduction in the flood peaks off the developed site back to those which would have occurred prior to development, and treatment of stormwater to prevent pollution entering the surrounding environment. More details on this are given in the points below.
- ▶ Infrastructure will not be permitted within the 1:100 year flood line or within the delineated wetland or riparian zone or associated buffers without suitable design measures and additional permissions from the relevant authorities. The design measures required to manage the flood risk on the sites will also have a bearing on the stormwater system design.
- ▶ A stormwater management plan must be submitted for approval by the relevant authorities prior to construction approval. In the absence of local municipal stormwater management guidelines, which at the time of writing this report were not available; it is recommended that the plan must meet the following standards taken from the Johannesburg Built Environment Guidelines and Standards (2014):
 - Peak discharge must not increase for any event of any duration up to the 25-year RI event.
 - Volume of runoff must not increase up to the annual 10-year rainfall.
 - No surface runoff for the 1-year RI event of any duration.
 - No deterioration of water quality.

- ▶ The stormwater management plan and design should meet the following objectives:
 - Reproduce as closely as possible the hydrological conditions at the point of discharge that existed prior to the development of the site.
 - Provide for removal of most urban pollutants.
 - Have a neutral to positive impact on the natural and human environment.

- ▶ The stormwater management plan and design should meet the following objectives:
 - Reproduce as closely as possible the hydrological conditions at the point of discharge that existed prior to the development of the site.
 - Provide for removal of most urban pollutants.
 - Have a neutral to positive impact on the natural and human environment.

- ▶ The stormwater management plan should also minimise the generation of surface runoff and stormwater through adopting the principles of Water Sensitive Urban Design (WSUD) and Sustainable Urban Drainage Systems (SUDS). The WSUDs and SUDS can be used to manage the impacts of urban development on the water cycle as an alternative or supplement to traditional 'end of pipe' techniques, and typically include techniques relating to stormwater conveyance, receiving water body protection, and water usage and recycling, to reduce the negative impacts of urban development on the water cycle.

- ▶ To minimise surface runoff and to maintain water quality, consideration should be given to:
 - The use of bioretention ponds,
 - Enhanced swales and grass lined channels,
 - Stone filled infiltration ditches (dependent on geotechnical investigations and a lack of dolomite), and,
 - Permeable paving.

- ▶ The layout and associated stormwater management plan should optimise opportunities for linking the water cycle and integrating engineering, water conservation, and greening through:
 - Capturing of runoff for re-use,
 - Natural irrigation and links to landscaping, and,
 - The use of natural plant filters.

- ▶ Stormwater management must seek to recharge natural underground water systems (provided there is no dolomitic risk) and the discharge of runoff must take place as close to the point of interception as possible. In addition, single discharge points must be avoided in favour of multiple discharge systems to achieve more natural diffuse energy flow.

13 SUMMARY OF IMPACTS AND ASSOCIATED MITIGATION MEASURES

The following tables cover the construction activities and associated environmental impacts that will occur during the development of the Mokopane WTW.

The tables consider the expected impacts during the different phases of the project, as well as the mitigation measures and environmental management procedures required to effectively manage the expected impacts. The following sections are dealt with in the table:

- ▶ **Section 13.1:** Pre-construction and construction site environmental management
- ▶ **Section 13.2:** Materials
- ▶ **Section 13.3:** Waste
- ▶ **Section 13.4:** Surrounding properties
- ▶ **Section 13.5:** Flora, fauna, air quality, noise, water and other
- ▶ **Section 13.6:** Rehabilitation
- ▶ **Section 13.7:** Planning and engineering considerations

13.1 PRE-CONSTRUCTION AND CONSTRUCTION SITE ENVIRONMENTAL MANAGEMENT

Table 13-1: Pre-construction and construction site environmental management

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.1.1 Engineering Design	All aspects listed in the EMPr	Incompatibility between the design and the receiving environment	Developer	<p>Objective: To ensure the design of The Project considers environmental sensitivities.</p> <p>Target:</p> <ul style="list-style-type: none"> Assimilate requirements of the EMPr in the design and construction management giving special attention to the environmental sensitivities identified by the EIA specialists. 	During the tender, design and design review stages	Mogalakwena Local Municipality and/or relevant Project Implementer in consultation with appointed specialists.	Throughout design phase	The design meets objectives and does not degrade the receiving environment.
13.1.2 Establishment of the construction site	Construction site	Construction activities infringing on no-go areas.	Developer, Contractor and EM with the inputs from appointed specialists	<p>Objective: Ensure the establishment of the construction site does not infringe on or damage/pollute the no-go (buffer zone) areas.</p> <p>Target:</p> <ul style="list-style-type: none"> Adequately fence off all no-go areas according to the specialist reports conducted as part of the EIA process. Erect no-go signage on the fences of these areas. Ensure all appointed staff and visitors are aware of these areas. 	Pre-construction phase	Developer, Contractor and ECO in consultation with appointed specialists.	<ul style="list-style-type: none"> Throughout the pre-construction phase until targets are met. Monitor during the construction phase. 	No trespassing within or damage to the no-go areas.
13.1.3 Establishment of the construction site	Construction site	Undue damage to or loss of vegetation	Mogalakwena Local Municipality and/or relevant Project Implementer and EM	<p>Objective: To prevent and mitigate the undue damage or loss of natural vegetation outside the boundaries of The Project footprint.</p> <p>Targets:</p> <ul style="list-style-type: none"> Site establishment shall take place in an orderly manner and all amenities shall be installed or be available before the onset of construction. Where such amenities are not available, chemical toilets shall be provided. A method statement is required from the Contractor that includes the layout of the site, management of facilities and wastewater management. A site plan of the construction site must be provided indicating waste areas, storage areas and placement of facilities. 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. The Contractor shall supply sealable waste collection bins and all solid waste collected shall be disposed of at a registered waste facility. Certificates of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site or illegally dumped. Refuse bins will be emptied and secured. The construction site office and other areas must be placed on already disturbed land as far as possible. Fences and security access must be maintained, throughout the project. Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible. 	Pre-construction phase	Engineer and ECO	Once off, unless the site area changes in which case the method statement and layout plan must be updated.	Establishment of a construction site in compliance with objectives and no evidence of environmental degradation.
13.1.4 Establishment of the construction site	Construction site	Loss of soil fertility	Contractor and EM	<p>Objective: Whilst establishing the construction site the footprint of disturbance is to be minimised thereby preventing the undue degradation and loss of soil.</p> <p>Targets:</p>	Design phase and site establishment	Engineer and ECO	Once-off	Established construction camp in compliance with objectives and no evidence of environmental degradation.

				<ul style="list-style-type: none"> Protect stockpiles of topsoil and subsoil material with silt fences that should be maintained during the entire construction phase on site. Locate stockpiles outside of any buffer zones as indicated in the specialist reports and not on slopes with a gradient greater than 1:3. Identify and clearly demarcate existing infrastructure within the study area in order to avoid damage throughout the construction phase. 				
13.1.5 Temporary closure of the construction site	Construction site	Potential impacts associated with the closure of the construction site.	Contractor and EM	<p>Objective: To limit potential impacts on the environment for periods during which the construction site is closed.</p> <p>Targets:</p> <ul style="list-style-type: none"> Should the construction site be closed for a period of more than one week, a report on compliance will be lodged with the Engineer and Project Manager confirming the following: <ul style="list-style-type: none"> No persons allowed other than project employees. Minimal materials are kept stored. Materials will be stored in leak-proof, sealable containers or packaging. The store area is secure and locked. Fire extinguishers will be serviced and accessible. The area is secure from accidental damage through vehicle collisions, etc. Emergency and contact numbers of the contractor will be available and prominently displayed. Chemical toilets are emptied, kept hygienically clean and secured. 24-hour security will be on-site during this period. 	Closure of construction site (for example over holiday breaks)	Engineer and ECO	Whenever the construction camp is closed for longer than a week.	Closure of the construction camp in line with the requirements of the EMP.
13.1.6 Construction of site buildings during site establishment	Materials used to construct site buildings	Soil pollution and permanent alteration to the receiving environment.	Contractor and EM	<p>Objective: To ensure the material for site buildings, used by the Contractor during the construction of the project, are removable and to minimise the impacts of the construction of the buildings on the environment.</p> <p>Targets:</p> <ul style="list-style-type: none"> No permanent structures will be permitted at the construction site. Temporary structures shall be founded on a platform, either subsoil or screed slab. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. All temporary structures must be soundly built and not pose a danger to workers. All structure footprints are to be rehabilitated and landscaped after construction is complete. 	Site establishment	Engineer and ECO	Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required.	On-site buildings constructed according to the requirements of the EMP.
13.1.7 Operation of sanitation systems	Sanitation systems	<ul style="list-style-type: none"> Unpleasant odours on site. An inadequate number of latrines on site. Position of latrines. Mismanagement of wastewater. 	Contractor and EM	<p>Objective: To ensure good sanitation systems and management throughout the construction period.</p> <p>Targets:</p> <ul style="list-style-type: none"> Adequate toilets must be provided for all staff. Chemical toilets must be emptied/serviced on a regular basis to prevent them from overflowing. Proof of this must be provided to the ECO. A minimum of one toilet must be provided per 15 persons. 	Pre-construction and site establishment	Engineer and ECO	Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required.	<ul style="list-style-type: none"> Adequate toilets will be positioned at the right places as per the EMP and ECO. Absence of odours, erosion and build-up of detergents.
13.1.8 Vehicle parking. Storage of equipment.	<ul style="list-style-type: none"> Vehicle parking and parking area(s). Storage of equipment. 	<ul style="list-style-type: none"> Pollution of soils. Disturbance of soils due to parking of vehicles outside of designated areas. 	Contractor and EM	<p>Objective: Ensure vehicles are parked according to the specifications in the EMP and that equipment is handled appropriately.</p> <p>Targets:</p> <ul style="list-style-type: none"> No storage of vehicles or equipment will be allowed outside of the designated area. Drip trays or any form of oil-absorbent material must be placed underneath vehicles and equipment when not in use. 	<ul style="list-style-type: none"> Throughout the construction period. Planning to be done during the site establishment phase. 	Engineer and ECO	Whenever there are stationary vehicles or equipment present on site.	<ul style="list-style-type: none"> No incidents of soil pollution due to spills from stationary vehicles and equipment. No undue disturbance of soils. No incidents of vehicles being parked outside the designated parking area.

13.1.9 Servicing and washing of vehicles and machinery	Workshop and equipment storage areas	<ul style="list-style-type: none"> Water contamination. Soil contamination. Noise pollution. 	Contractor and EM	<p>Objective: Ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised.</p> <p>Targets:</p> <ul style="list-style-type: none"> No servicing of equipment on site. Leaking equipment shall be repaired immediately or removed from the site to facilitate repair. All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site. Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills. The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required to ensure compliance with this document. Noise levels to be maintained in compliance with OSH requirements. All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages. The following shall apply: <ul style="list-style-type: none"> All contaminated soil/yard stone shall be removed and placed in containers. Contaminated material can be taken to one central point where bioremediation can be done. A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise are not available on-site. All spills of hazardous substances must be reported to the ECO. 	Whenever servicing or maintaining vehicles or equipment throughout the construction period.	Engineer and ECO	Daily monitoring by EM and monthly inspections by ECO.	<ul style="list-style-type: none"> Evidence of prescribed servicing and washing services. No incidents of soil or water contamination. No complaints from neighbours of noise pollution due to servicing and washing of vehicles.
13.1.10 Personnel conduct	Personnel	Infringement of the EMPr requirements by personnel on site.	Contractor, EM and labourers.	<p>Objective: To ensure that personnel are adhering to the EMPr requirements.</p> <p>Targets:</p> <ul style="list-style-type: none"> The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase. All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Toolbox talks to include aspects of the EMPr, especially specialist mitigation measures. Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements. Adequate first aid services must be provided by the contractor. The contractor will be responsible for his own security arrangements and shall comply with all site security instructions. Basic fire-fighting equipment must be available on site. Personal Protective Equipment (PPE) to be provided and well maintained. All incidents should be reported to ECO, investigated, documented and kept in safety file. 	Approved PPE must be issued to all employee's pre-construction but must be used for the duration the construction phase	Engineer and ECO	Daily monitoring by EM and SOs.	<ul style="list-style-type: none"> Personnel wearing proper safety uniform. Absence of trespassers on site.

13.2 MATERIALS

Table 13-2: Handling Materials

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.2.1 Transportation of materials	Material transport	<ul style="list-style-type: none"> Traffic congestions. Production of dust during transportation. Excessive noise. 	Contractor and EM.	<p>Objective: To ensure that whilst the material is transported, it cannot be of negative influence on the surrounding environment.</p> <p>Target:</p> <ul style="list-style-type: none"> The contractor should note that existing roads are sufficient to facilitate access to the new office site and that the following should be adhered to: Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads. The Contractor shall take preventative measures e.g. screening, muffling (where possible), timing, and pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from construction activity sources. Fine materials such as sand must be covered during transportation. Appropriate response plans must be prepared by the contractor to ensure the fastest possible reaction to spills or accidents. Deliveries must be scheduled for off-peak hour traffic times where practical. All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets/covers) to prevent rocks and spoil from falling onto the road surfaces. Vehicle speeds on site should not exceed 20 km/hr. All drivers are to have licences for driving and operating the plant on site All road vehicles are to be road worthy. 	Targets are to be implemented prior to the start of construction and continually implemented throughout the construction phase.	Engineer and ECO.	Throughout construction phase	<ul style="list-style-type: none"> Covering of material during transportation. No complaints received. Emergency reaction plans (for spills/accidents) must always be readily available on-site.
13.2.2 Storage and handling of hazardous materials.	Hazardous material handling and storage.	<ul style="list-style-type: none"> Contamination of soil, water and groundwater by hazardous material. Inadequate remediation measures for spills. 	Contractor and EM	<p>Objective: To ensure adequate protection of soil and soil remediation measures in case of spills.</p> <p>Targets:</p> <ul style="list-style-type: none"> Hazardous materials – such as paint, cement, fuels, bitumen, fuel, oil, herbicides, battery acid or detergents – must be stored in sealed, lockable containers when not in use. A register shall be kept of all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. No decantation into unmarked containers or containers with incorrect labels. No decanted fuel is to be left unattended in the sun. When handling hazardous materials, the manufacturer's specifications must be complied with. The 16-point Material Safety Data Sheet is available on-site. Drip trays must be used when handling hazardous substances. No hazardous substance containers may be placed on the soil. All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and EM within 24 hours of occurrence. The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor hazardous material spillages. No material may be stacked higher than 2m unless agreed to by the SE and Health and SO. All products are to be stored with compatibility in mind. 	Construction period	Engineer and ECO	The duration of the construction period is dependent on the presence of hazardous material on site.	<ul style="list-style-type: none"> Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material are readily available on site.

				<ul style="list-style-type: none"> 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. The contractor shall supply a method statement to the engineer for approval for the storage of hazardous materials prior to site preparation. Appoint appropriate contractors to remove any residue from spillages from the site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of pertinent Regulations and Acts (e.g. Hazardous Substances Act (Act No 15 of 1973); NWA. 				
13.2.3 Storage of fuel	Storage areas	<ul style="list-style-type: none"> Contamination of soil by fuel. Inadequate remediation measures for spills. 	Contractor and EM	<p>Objective: To ensure that there is optimum environmental protection (especially soil) from fuel spills.</p> <p>Targets:</p> <ul style="list-style-type: none"> Fuel must be stored in above-ground storage tanks or sealed containers, 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 apply to above-ground storage, and include fuels). No drainage from fuel storage areas shall be permitted. Any other hazardous substances stored in bulk will require bunding. 	Pre-construction phase and site establishment.	ECO	Once-off	Established fuel storage areas in compliance with the objectives of the EMPr.
13.2.4 Use of cement	Cement	<ul style="list-style-type: none"> Contamination of soil and surrounding environment. Decrease in ambient air quality. 	Contractor and EM	<p>Objective: Ensure that the environment is protected from the cement that will be used on site.</p> <p>Targets:</p> <ul style="list-style-type: none"> Cement must be delivered in sound and properly 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. The storage facility and surrounding area must be swept and cleaned regularly as required to ensure that cement products do not pollute the surrounding environment. Cement bags are not to be burnt on site but should be disposed of at a registered hazardous waste disposal site, as mandated by the manufacturer and the applicable legislation. No concrete batching on bare soil. 	As long as cement is in use on site.	ECO	Weekly monitoring monthly audits	ECO and Cement delivery, storage and use will be in line with the EMPr requirements.

13.3 WASTE

Table 13-3: Handling Waste

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.3.1 Storage, removal and disposal of construction waste	Construction waste	<ul style="list-style-type: none"> Land pollution. Compaction of soil by rubble. The decreased aesthetic integrity of the site. 	Contractor and EM.	<p>Objective: To ensure that waste is correctly stored and disposed of, decreasing the visual impact during the construction and post-construction period. Disposal of rubble and refuse in an appropriate manner. Minimise litigation. Minimise public complaints.</p> <p>Target:</p> <ul style="list-style-type: none"> Surplus concrete, sludge, silt, rubble or any other construction waste may not be dumped indiscriminately on site but shall be disposed of in a registered waste landfill site or recycled as per the approved contractor’s Waste Management Plan (WMP). 	<ul style="list-style-type: none"> Waste bins/ skips must be available prior to construction. Removal of waste throughout the construction period. 	ECO.	Throughout the construction phase and at a frequency agreed upon in the approved waste management plan.	Construction waste is stored, collected and disposed of as per the requirements of this EMPr.

				<ul style="list-style-type: none"> Concrete trucks shall not be washed on site after depositing concrete unless it is within an appropriate wash bay. Any spilt concrete shall be cleaned up immediately. Bins and containers/skips must be made available by the contractor for the storage of construction waste and the bins to be removed from the site as required. Temporary storage of construction waste will take place within the site, and within areas designated by the ECO and the Contractor according to the approved site layout plan. The Contractor will be responsible to remove and transport all construction waste material off-site to a registered waste disposal or recycling facility (proof of this as well as a copy of the site's Registration Permit, must be provided by the Contractor to the ECO). No burning of waste is permitted on site. No waste is permitted to pollute the watercourses. 				
13.3.2 Storage, removal and disposal of domestic waste.	Domestic waste	<ul style="list-style-type: none"> Land pollution. Unpleasant odours. The decreased aesthetic integrity of the site. 	Contractor and EM	<p>Objective: To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post-construction period.</p> <p>Targets:</p> <ul style="list-style-type: none"> The Contractor must supply sealable waste bins at the construction camp for the storage of domestic waste. Clearly marked waste bins are to be provided for the separation of waste according to the WMP. Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible. Personnel must be informed about the necessity of using the waste drums. The Contractor must do site clean-ups of litter other than construction waste on a daily basis and dispose of it in the designated refuse bins provided. The contractor must ensure that general site-wide litter clean-up will occur at least once a week. The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate. Sealable waste drums should be provided in close proximity to all working areas during the construction of the new office building. The waste storage area must not be allowed to overflow with waste. 	<ul style="list-style-type: none"> Waste bins/ skips must be available prior to construction. Removal of waste throughout the construction period. Regular removal of waste from waste storage area to registered disposal site. 	Engineer and ECO	<ul style="list-style-type: none"> Waste bins/ skips must be available prior to construction. Throughout the construction phase and at a frequency agreed upon in the approved waste management plan. 	Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMPr.
13.3.3 Storage, removal and disposal of hazardous waste	Hazardous waste	Soil and water pollution	Contractor and EM	<p>Objective: To ensure that soil and the rest of the surrounding environment on site are protected from hazardous waste.</p> <p>Targets:</p> <ul style="list-style-type: none"> The Contractor is required to refer to the Hazardous Substances Act No 15 of 1973 act to determine whether any substance (new or waste) stored on site is subject to controls contained within the act. All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility. Any oil spillage on site will be excavated to a depth of 150 mm and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable 	Throughout the construction phase.	ECO	Old hydrocarbons and other hazardous materials must be removed on a regular basis (at least every 30 days).	All mitigation measures with regard to Hazardous waste mentioned in the EMPr are implemented.

				<p>replacement material. Alternative in-situ remediation techniques could be used if approved by the ECO.</p> <ul style="list-style-type: none"> Contaminated water must be stored in sealable marked containers and disposed of with other wastewater from the construction works. Refer and adhere to the approved WMP as compiled by the Contractor and approved by the ECO. 				
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13.4 SURROUNDING PROPERTIES

Table 13-4: Surrounding properties

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.4.1 Use of existing roads	Access roads	<ul style="list-style-type: none"> Damage to access roads. Damage to environment Erosion. 	Contractor and EM.	<p>Objective: To minimise damage to existing roads.</p> <p>Target:</p> <ul style="list-style-type: none"> Care to be taken to prevent damage to existing access roads. Adhere to traffic signs and road markings. Ensure that open trucks are covered with tarpaulins (plastic liners) to ensure no transported materials fall onto the road surface. 	Implement during site establishment and monitor throughout the construction phase.	ECO.	Daily	<ul style="list-style-type: none"> No claims from Landowners due to further damage on existing access roads. No damage visible on access roads

13.5 FAUNA, FLORA, AIR QUALITY, NOISE, WATER AND OTHER ENVIRONMENTAL ASPECTS

Table 13-5: Flora, fauna, air quality, noise, water and other

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.5.1 Vegetation clearing	Vegetation	<ul style="list-style-type: none"> Damage to vegetation. Erosion and sedimentation. 	Contractor and EM.	<p>Objective: Minimise damage to vegetation.</p> <p>Target:</p> <ul style="list-style-type: none"> The objective of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for the safe construction and operation of the proposed Mokopane WTW facility. No vegetation shall be pushed into heaps or left lying on the site for extended periods. Where possible, do not clear vegetation in areas where construction activities are only planned for a later period (i.e., implement a phased approach). All topsoil removed is to be stored for future use during rehabilitation. 	<ul style="list-style-type: none"> Plan vegetation clearing according to construction timeframes during the pre-construction phase. The clearing is to be done during the construction phase as required. 	ECO	Weekly monitoring	No unnecessary loss of vegetation.
13.5.2 Vegetation clearing	Conservation and protection of flora	<p>Unnecessary removal of flora.</p> <p>Removal of vegetative matter for firewood.</p>	Contractor and EM.	<p>Objective: Minimise the extent of vegetation removal.</p> <p>Target:</p> <ul style="list-style-type: none"> Only eradicated or trimmed-down vegetation matter may be removed from the site. 	During the establishment of the construction site.		Weekly monitoring	No unnecessary loss of vegetation.

				<ul style="list-style-type: none"> No vegetative matter may be removed for firewood – this is strictly prohibited unless approved by the ECO (i.e., disposal of Eucalyptus and Wattle invasives may be considered). No open fires are permitted. No material storage or lay down is permitted under trees. 				
13.5.3 Protection and handling of possible fauna on site.	Protection of fauna	<ul style="list-style-type: none"> Intentional or unintentional killing of fauna on site. Loss of fauna due to habitat disturbance. 	Contractor and EM	<p>Objective: To ensure that fauna found on site are protected and not interfered with.</p> <p>Target:</p> <ul style="list-style-type: none"> 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. The contractor must report problem animals or vermin to the ECO. Ensure that domesticated animals belonging to the local community are kept away from the construction works. The contractor may under no circumstances make use of pesticides or poison to control unwanted animals. Animals (incl. snakes, tortoises and lizards) must be removed from the site should they be directly threatened by vegetation clearance or construction activities. The EM or ECO must be contacted for assistance in this regard. Snake handling must be done by an appropriately trained individual. Excavations and trenches must be inspected daily (first thing in the morning) to check whether any animals have been trapped. Any trapped animals must be removed and relocated to a safe location outside of the development footprint. <p>In terms of fencing and movement of fauna, the following must be implemented:</p> <ul style="list-style-type: none"> Small ground-level openings, 20-30 cm in height, should be kept clear in electrical fencing, at least at strategic places, to facilitate the movement of small mammals and reptiles to move through the site. Fencing (e.g., palisade) must provide an appropriate opening for animals to pass through – bars placed 20cm apart should provide sufficient space for the movement of small animals whilst deterring humans; and If not electrified, the bottom wire of the perimeter fence must be at least 15cm from the ground, 20cm if electrified (tortoises retreat into shells when shocked). 	Throughout the construction and post-construction period.	ECO	Continuous	<ul style="list-style-type: none"> No evidence of domestic animals on site. The site is kept clean and does not attract pests or local fauna.
13.5.4 Earthworks	Dust control	Air pollution	Contractor and EM	<p>Objective: To reduce the generation of dust on the construction site.</p> <p>Target:</p> <ul style="list-style-type: none"> Dust suppression is to be conducted during construction, or as complaints are received The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works (such measures include frequent spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO). 	Throughout the construction period.	ECO	During periods of low rainfall or as required by the ECO.	Dust is kept within the dust control regulatory levels on site.
13.5.5 Use of construction vehicles and equipment	Construction vehicles, plant and machinery.	Noise and vibration.	Contractor and EM	<p>Objective: Noise levels are kept to a minimum on-site.</p> <p>Target:</p> <ul style="list-style-type: none"> Should construction have to continue after hours, all affected stakeholders must be notified. 	Throughout the construction period.	Engineer and ECO	Continuous	No complaints received from affected communities/stakeholders.

				<ul style="list-style-type: none"> All machinery and equipment must be maintained in good working order and fitted with approved and specified muffler systems (where possible). The contractor shall have updated complaints register on-site. 				
13.5.6 Water use and protection of the watercourse	Water management	<ul style="list-style-type: none"> Water wastage. Pollution of the watercourse. Degradation of the downstream water resource. 	Contractor and EM	<p>Objective: To prevent the pollution of water, any long-term degradation of the area's watercourses and the unnecessary wastage of water.</p> <p>Target:</p> <ul style="list-style-type: none"> Comply with all requirements of the approved WUL and aquatic assessments. Maintain all required buffer zones as per specialist assessments. During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g., including ensuring that construction equipment is well maintained, and drip trays must be used at all times. The use of silt fences is more important during summer months (rainy seasons) and would require more regular maintenance during this time. Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e., sandbags or geotextile fabric, to prevent sand and rock from entering the watercourses. Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows. All water used on site must be done so sparingly. Toolbox talks must include the conservation of water. Avoid unnecessary vehicle crossings and access into the watercourse. Any dewatering that needs to be done from excavated areas during the construction phase should be released into a silt bay that is maintained in order to trap and remove sediments before they enter the watercourse habitat. 	Construction phase	Engineer and ECO	Continuous when these activities are taking place.	Activities undertaken near watercourses must be in-line with and consider the specified environmental controls.
13.5.7 Protection of heritage resources	Heritage resources	Damage to heritage resources on site.	Contractor and EM.	<p>Objective: To prevent any damage to heritage resources on site.</p> <p>Target:</p> <ul style="list-style-type: none"> In the event that any sub-surface heritage resources or graves are unearthed, all work has to be stopped until an assessment as to the significance of the site (or material) in question has been made by a heritage practitioner. No archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. If any archaeological material is uncovered during the course of development, then work in the immediate area should cease. The find will need to be reported to SAHRA or an archaeologist. If any area that contains stone artefacts in reasonable numbers (e.g., more than 10 within a few metres of one another) or in high concentrations is noted during the proposed developments this should be inspected by an archaeologist prior to any disturbance. 	Continuous monitoring throughout the construction phase.	ECO	Daily monitoring by EM and weekly inspections by ECO	No damage to heritage resources on site.

13.6 REHABILITATION

Table 13-6: Rehabilitation

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.6.1 Rehabilitation of disturbed areas	Rehabilitation	<ul style="list-style-type: none"> The visual impact of construction sites due to poor or no rehabilitation. Risks of erosion and sedimentation of watercourse due to poor or no rehabilitation. Potential dust impact due to poor or no rehabilitation. 	Contractor and EM	<p>Objective: To ensure adequate rehabilitation of the entire construction site upon completion of construction activities.</p> <p>Target:</p> <ul style="list-style-type: none"> Completed areas are to be rehabilitated as soon as possible by following a phased approach. Rehabilitated areas are to be demarcated as no-go areas to prevent further disturbance during the construction phase. Indigenous species are to be used where feasible, especially when considering the planting of new trees. Where indigenous species are not considered, the contractor shall ensure that, at a minimum, the area is rehabilitated back to its original state. All waste, storage areas, bunds, toilets, temporary roads, buildings, etc. shall be removed from the site and legally and appropriately disposed of. 	Implement during the construction phase as and when sections of the works are completed.	Engineer and ECO.	Daily	<ul style="list-style-type: none"> The Mokopane WTW area adequately rehabilitated after construction completion. No complaints from the Project Proponent or stakeholders.

13.7 PLANNING AND ENGINEERING CONSIDERATIONS

Table 13-7: Planning and Engineering Considerations

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
13.7.1 Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage or loss of the plant.	Contractor and EM	<p>Objective: To prevent disruption or damage to existing infrastructure or services.</p> <p>Target:</p> <ul style="list-style-type: none"> Telephone lines, power lines and fibre lines shall be identified during the construction operations. Possible known pipelines must be considered during planning and construction. Where pipelines are found, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. Repairs to any damaged pipelines shall be prioritised and undertaken as soon as possible. All existing access roads used for construction purposes shall be maintained at all times to ensure that neighbours have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect. 	Prior to construction and during construction.	Engineer and ECO.	Continuous	<ul style="list-style-type: none"> No unplanned disruptions of services No damage to any plant or installations. No complaints from authorities or Landowners regarding disruption of services. No litigation due to losses of plant, or installations.

14 OPERATIONAL PHASE

The operational phase commences when the proposed development is being used for its intended purpose i.e., the Mokopane WTW. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the WTW facility, as well as continuing environmental management requirements (e.g., removal of alien and invasive vegetation).

14.1 ALIEN AND INVASIVE PLANT MANAGEMENT

According to the Terrestrial compliance report, a total of eight (8) Alien and Invasive Plant (AIP) species were recorded within the focus area (i.e., *Lantana camara*, *Argemone ochroleuca* subsp. *Ochroleuca*, *Flaveria bidentis*, *Tagetes minuta*, *Zinnia peruviana*, *Agave sisalana*, *Cereus jamacaru*, and *Opuntia ficus-indica*). Of the eight AIPs recorded during the field assessment, five species are listed under NEMBA Category 1b and one species is listed under NEMBA Category 2. The remaining species are not listed under NEMBA. However, several of these species, *Tagetes minuta*, and *Zinnia peruviana* are considered problem plants and are deemed pose a threat to native floral species if not adequately controlled.

The AIP Management Plan must therefore be drafted for implementation, covering all phases of the project from construction to operation. It will be necessary to implement AIP control and their spread within and surrounding the focus area must be managed appropriately.

14.2 WASTE MANAGEMENT

The incorrect management of solid waste such as the sludge that will be a product of the treatment of raw water can result in the pollution of soil, groundwater, and the general environment. Windblown litter can contribute to negative visual impacts and if consumed by grazing animals could result in fatality. In addition to the waste management methods discussed above, the following waste management practices must be implemented during the operational phase:

- ▶ Provide adequate scavenger-proof waste bins at the facility.
- ▶ Set up a system for regular waste removal using accredited service providers and dispose at an approved facility – preferably weekly.
- ▶ All solid and liquid waste must be removed from the operational areas and not discarded in the natural vegetation/veld.
- ▶ Minimise waste by sorting wastes into recyclable and non-recyclable waste streams (an independent contractor can be appointed to conduct this recycling if practical).
- ▶ No waste may be buried or burned under any circumstances.
- ▶ Hazardous waste must be removed from the site by an approved service provider e.g., used oil – certificates of safe disposal should be kept on record.
- ▶ No hazardous waste may be spoiled at the facility.
- ▶ The sludge lagoons must be lined with the recommended material from the waste assessment to mitigate leaching.
- ▶ A housekeeping team should be appointed to regularly maintain the litter and rubble situation in the facility; and
- ▶ Littering by the employees and visitors shall not be allowed under any circumstances.

15 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.

15.1 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).

15.2 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.
- ▶ 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.

15.3 HAZARDOUS WASTE AND POLLUTION CONTROL

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

15.4 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.
- ▶ 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 backfill is removed to a dedicated spoil area.

15.5 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 on-going 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 leafed 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 300mm. 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.

15.6 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.
- ▶ 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.

15.7 PLANTING

The use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes (e.g., planting trees such as *Combretum apiculatum*, *Dombeya rotundifolia*, *Sclerocarya birrea subsp. Caffra* (NFA-protected species), *Phyllogeiton zeyheri* (NFA-protected species), *Searsia leptodictya*, *Ziziphus mucronata*, and *Vitex rehmannii*).

15.7.1 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.

15.7.2 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.

15.8 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.
- ▶ 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.
- ▶ 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.

15.9 ERADICATION OF WEEDS

All weeds spreading 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.

15.10 CONTROL OF WEEDS

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

16 DECOMMISSIONING PHASE

- ▶ It is highly unlikely that the WTW facility would be decommissioned and returned to pre-construction conditions, and this has not been considered in the planning of the project. It is anticipated that the project will continue for as long as it is sustainable.
- ▶ Decommissioning refers to the discontinuation of the Mokopane WTW and the removal of all associated infrastructure. This would entail the dismantling and removal of all bulk infrastructure such as access roads, stormwater, water pipes as well as electrical supply. Rehabilitation of the site to a suitable end use would also form part of the decommissioning phase and would be associated with the decommissioning of the individual sites and structures yet to be developed as part of the WTW. However, it is highly unlikely that the WTW facility would be demolished and returned to pre-construction conditions.
- ▶ A Closure Plan for decommissioning is not applicable to this project as it is not anticipated that the proposed project will be closed. In case there is a need to close the Mokopane WTW, a closure plan should be developed at the time of closure. This would likely take place during the closure of the entire WTW footprint, comprising all infrastructure authorised as part of this development. All the relevant authorisations relating to closure should be granted before closure activities commence. Any closure plan developed should take into consideration all impacts and proposed mitigations identified in this EMPr and subsequent authorisations and should ensure the ongoing protection of all identified no-go areas.

17 CONCLUSION

The EMPr must be regarded as a living document and changes must be made to this EMPr as required as when the project evolves, while retaining the underlying principles and objectives on which the document is based. The compilation of the EMPr has incorporated environmental management best practice principles, impacts and mitigation measures from the draft Environmental Impact Assessment Report and all environmental specialist assessment reports (i.e., included as Appendix D of the Basic Assessment Report).

18 REFERENCES

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**APPENDIX A: ENVIRONMENTAL ASSESSMENT PRACTITIONER
DETAILS**

APPENDIX B: LEDET PRE-APPLICATION MEETING MINUTES

APPENDIX C: RROD (REF: 12/12/20/553) ISSUED IN 2006

APPENDIX D: PROCESS FLOW DIAGRAM

APPENDIX E: SITE MAPS

APPENDIX F: PROJECT SIP STATUS

APPENDIX G: PRE-AND POST-MITIGATION IMPACT AND RISK SIGNIFICANCE RATINGS

In diversity there is beauty and
there is strength.

MAYA ANGELOU

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