



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

**ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr):
SEKURUWE WATER TREATMENT WORKS (WTW)**

Submission to:

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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
TLGFA	Traditional Leadership and Governance Framework Act, No. 41 of 2003
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 Error! Reference source not found. and Appendix A
(ii) details of the expertise of that EAP to prepare an EMPr, including a curriculum vitae	Section Error! Reference source not found. 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 Error! Reference source not found. 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.
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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 Sekuruwe 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 Ms. Zinzi Portia Xakayi 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 Sekuruwe 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 (ZNV) 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 (ZNV)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

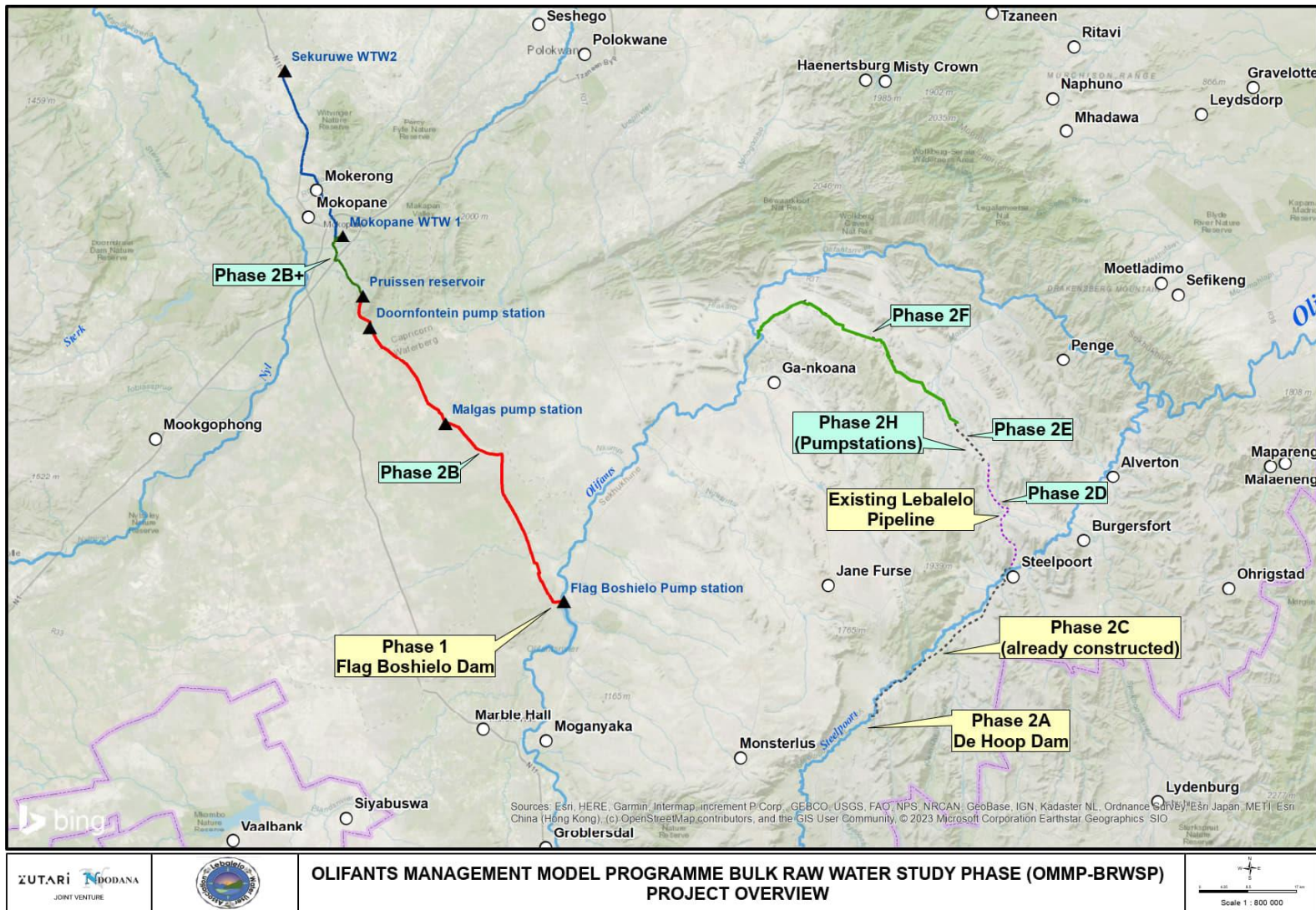


Figure 2-1: Map indicating the alignment of the different pipelines for the various Phases. The Northern Limb includes Phases 2B and 2B+ while the Eastern Limb consists of the phases in the east section of the project (i.e., Phases 2H, 2F, 2E and 2D).

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 Pruisen 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 **Figure 2-2**).

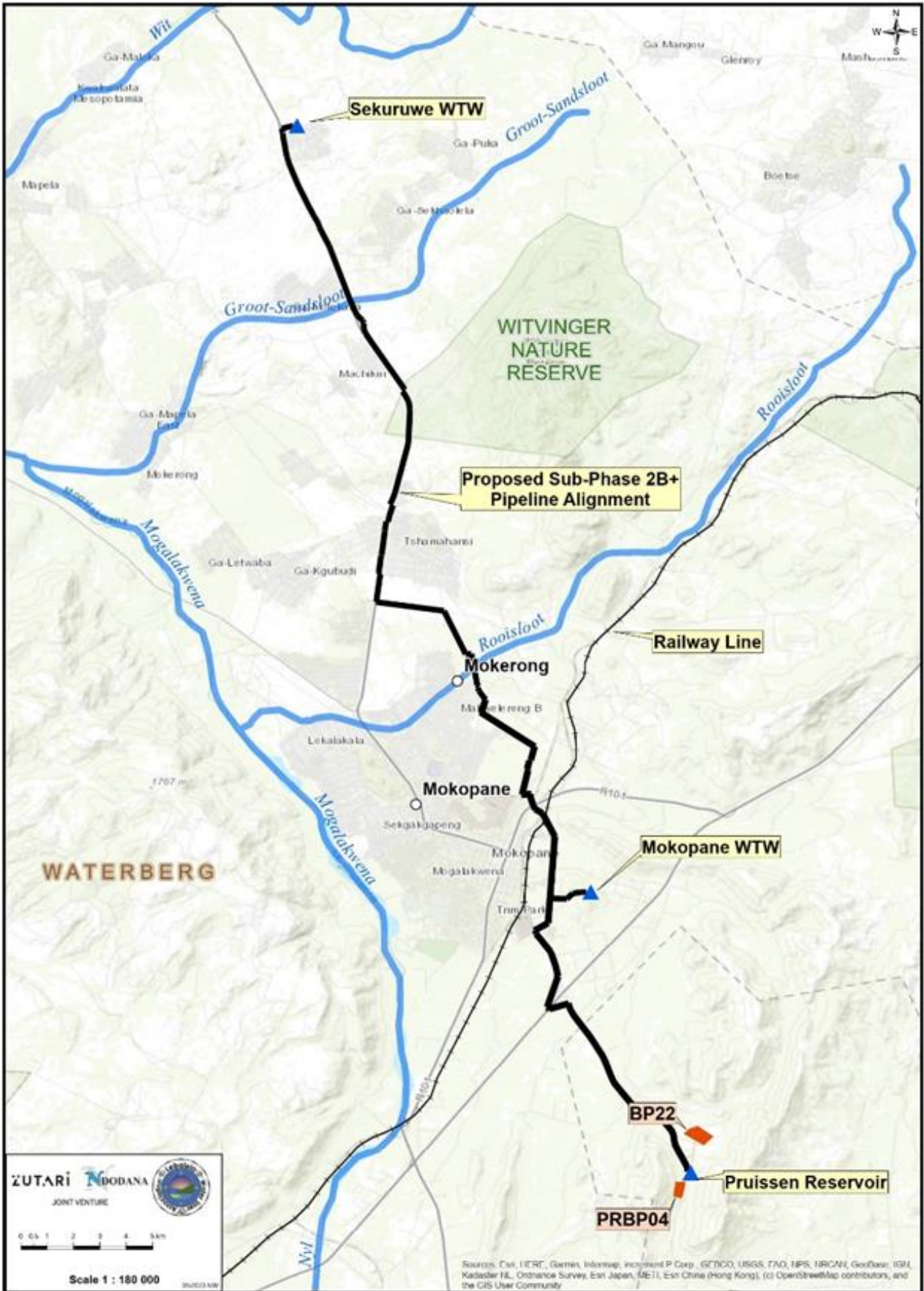


Figure 2-2: Map indicating the location of the proposed WTWs with respect to the alignment of Phase 2B+.

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 Sekuruwe WTW, which is situated along the Phase 2B+ pipeline alignment. LWUA is proposing to construct the Sekuruwe WTW and associated infrastructure located north of the town of Sekuruwe near the Mogalakwena Platinum Mine, 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 Mokopane 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 Sekuruwe 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 Sekuruwe WTW is located north of the town of Sekuruwe, near the Mogalakwena Platinum Mine. The proposed site is located on an undeveloped, mostly topographically flat, parcel of land, generally sloping from south to north. This WTW had to be placed on the border of the rural supply area (at the township of Sekuruwe), but also downstream of the final take-off point for raw water. The elevation at this point would also be sufficient to receive raw water and supply potable water under gravity. The potential site is located on Portion 0 of the Farm Blinkwater 820 LR and Portion 0 of the Farm Gillimberg 861 LR (refer to **Figure 2-3**). The property is owned by the Republic of South Africa, under the management of Mapela Traditional Authority (TA). The ultimate capacity of this WTW is proposed to be 21MI/d.

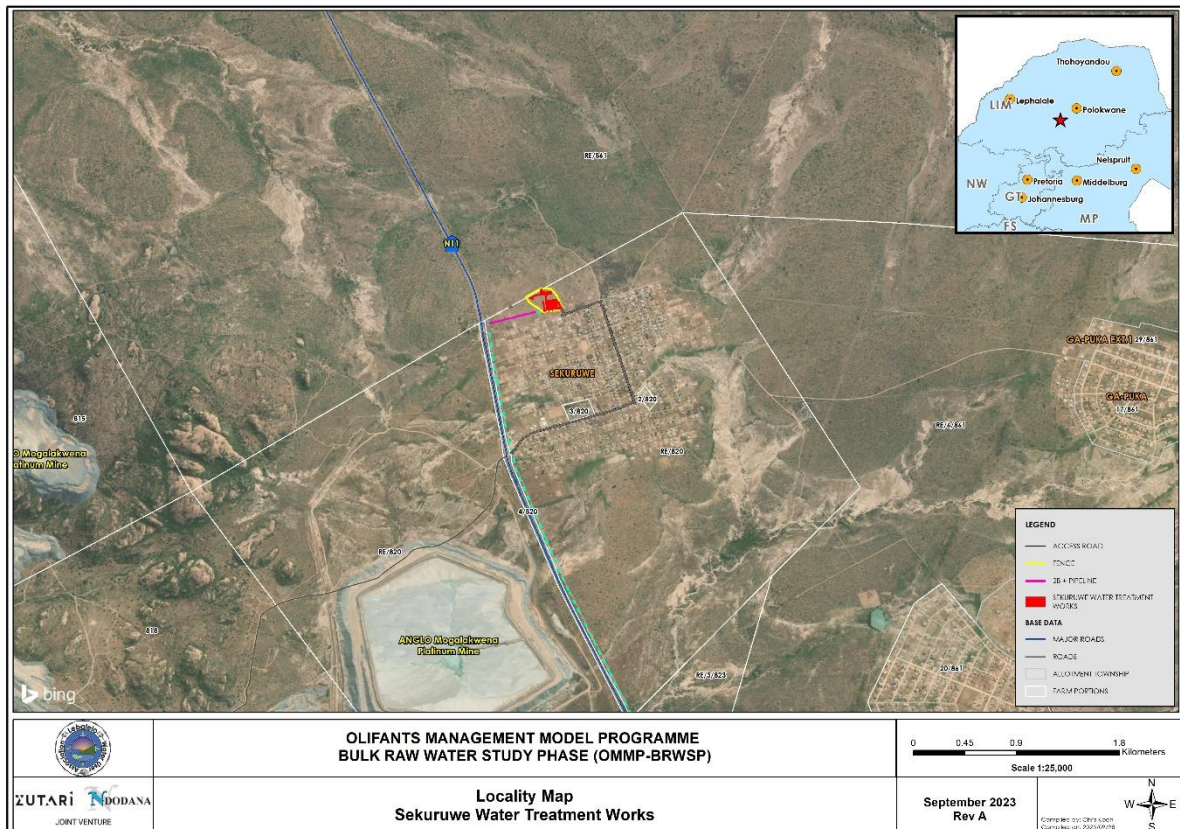


Figure 2-3: Locality Map of the proposed Sekuruwe WTW.

2.4 DESCRIPTION OF THE AFFECTED AREA

The description of the environmental and social baseline has been informed by the specialist studies undertaken.

2.4.1 SOCIAL BASELINE

The Sekuruwe 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, Mookgophong, Pienaarsrivier, Thabazimbi, and Vaalwater.

MLM covers 6,156 km² and was established on December 5, 2000, through the amalgamation of Greater Potgietersrus, Bakenberg, and Koedoesrand/Rebone local authorities.

2.4.2 BIODIVERSITY

The project area is in the Central Bushveld Bioregion, which is situated within the Savanna Biome. The National Vegetation Map project (VegMAP) indicated the associated vegetation types to consist of the Makhado Sweet Bushveld (SVcb 20) and the Polokwane Plateau Bushveld (SVcb 23). The vegetation within the proposed WTW footprint has lost much of its integrity due to anthropogenic related influences.

Despite recent fires, it was still evident that the grass sward was in a poor condition as seen with numerous patches of bare ground – an inevitable outcome of overgrazing.

The habitat associated with the proposed WTW may be under pressure from nearby anthropogenic activities, overgrazing, and altered fire regimes, but without any vegetation clearance within the preceding 10 years, the degraded bushveld meets the NEMA definition of indigenous vegetation. The proposed access road, however, does not qualify as indigenous vegetation.

From a faunal perspective, common faunal species adapted to co-exist within environments of increased anthropogenic impacts were observed and can be expected to be found within the project area. Common avifaunal species such as *Plocepasser mahali* (White-browed Sparrow-Weaver) and *Cinnyris mariquensis* (Marico Sunbird) were observed feeding on Aloe flowers, while other species such as *Crinifer concolor* (Grey Go-away-bird), *Urocolius indicus* (Red-faced Mousebird), *Dicrurus adsimilis* (Fork-tailed Drongo) etc. were observed perching on trees within the project area. The presence of mammals was mostly restricted to domestic species like dogs, cats, donkeys, and cattle, but some common small mammal species like rodents and mongoose can be expected within the project area. The abundance of rocks and rubble within the project area created shelter for several common reptile species like the observed *Trachylepis varia* (Variable Skink) and *Myriopholis longicauda* (Long-tailed Thread Snake). The dominant insect orders observed were Lepidoptera, Coleoptera and Orthoptera. Arachnid and other invertebrate diversity and abundance were limited which can be attributed to the lack of vegetation and degraded nature of the focus area.

2.4.3 AIR QUALITY

The Sekuruwe 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 footprint of the WTW facility is underlain by the Radian-aged Hout River gneisses (Rhr). The lithology is described as grey muscovite-biotite gneiss: leucogneiss or leucrogranite; banded gneiss, and migmatitic gneiss. Approximately 500m north of the site, a diabase dyke is located, striking in the west-northwest to east-southeast direction. A concealed/inferred fault striking northeast is located 2km south of the site. According to the geological map, no major faults, dykes, or shear zones are present within the site boundary.

To the southwest of the proposed site location, the geological formation changes to Utrecht Granite, an intrusive rock from the Vaalian age. The lithology is described as fine-grained, pink biotite granite. West of the proposed site location, the geological formation changes to Mapela Gabbro, forming part of the Rustenburg Suite of the Bushveld Complex, and the lithology is described as gabbro, norite, anorthosite, pyroxenite, harzburgite, troctolite.

The site is not underlain by potentially soluble rock such as dolomite. However, for reference, the Council for Geoscience (2023) indicates that there is a possibility of dolomitic land approximately 6km west of the site. This possible dolomitic area coincides with areas of serpentinized dolomite (Vma) on the geological map. Notwithstanding, the dolomite is a considerable distance away from the site and is not considered a risk for the current site.

2.4.5 CLIMATE

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. However, 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 soils found within the region are generally associated with collapse however, the relatively thin layer at the proposed project site limits the risk of such soils underneath the foundations.

2.4.8 GROUNDWATER

No groundwater was encountered during the geotechnical investigations undertaken by WSM Leshika Consulting (2016) and no indications of prolonged waterlogged conditions were identified.

3 PROJECT DESCRIPTION

3.1 COMPONENTS OF THE PROPOSED PROJECT

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;**
- ▶ 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 EMPr is compiled for the Sekuruwe WTW. The treatment process selected includes the following stages (refer to **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 (H_2SO_4) 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 Sekuruwe 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.

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	South African Heritage Resources	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

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

(Act No. 25 of 1999) (NHRA)	Agency (SAHRA) and/or Limpopo Heritage Resources Authority (LIHRA)	<p>subdivisions thereof”, “the construction of a road powerline, pipeline exceeding 300 m in length” or “the rezoning of site larger than 10,000 m² 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.</p> <p>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 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>
Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)	Department of Agriculture	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).
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA)	Department of Forestry, Fisheries and the Environment (DFFE) and LEDET	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.
National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM: AQA)	Mogalakwena Local Municipality	<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>

		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.
National Development Plan: A Vision for 2030	National Government	<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 IDP 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 Sekuruwe 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 Sekuruwe WTW will treat water from the same source as Flag Boshielo WTW. It is expected that, regardless of treatment</p>

		processes adopted for the proposed Sekuruwe WTW, the treatment residue will be similar in nature (containing coagulant precipitates and inert solids) as the sample collected at Flag Boshielo WTW.
Traditional leadership and governance framework amendment act (Act No. 23 of 2009)	Limpopo Department of Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA).	The Act provides for the establishment and recognition of Traditional Councils, defines the roles and powers of traditional leaders, and provides for dispute resolution and the establishment of a Commission on Traditional Leadership Disputes and Claims. The authority of the Tribal Authorities in the project area, in terms of acting on behalf of communities in their area of jurisdiction during land acquisition negotiations and granting access for construction work, therefore derives from the provisions of this Act. The proposed Sekuruwe WTW is on property owned by the Republic of South Africa, under the management of the Mapela Traditional Authority (TA). Therefore, the Mapela TA will have to be consulted during the Public Participation Process (PPP) and when construction commences.
Restitution of Land Rights (Act 22 of 1994)	Commission on Restitution of Land Rights.	The Restitution of Land Rights Act (Act 22 of 1994) provides a legal framework for the restitution of land to people who were forcibly removed from their land or dispossessed of it under previous discriminatory laws or practices. The Act allows for claims to be made by individuals, communities, or families who were dispossessed of their land after 19 June 1913. It establishes a Commission on Restitution of Land Rights to investigate and assess claims, and to recommend the restoration of land or alternative forms of compensation. The Act was amended in 2014 to extend the deadline for lodging claims to 30 June 2019 and to provide for the appointment of a Chief Land Claims Commissioner to oversee the process of restitution. The amendment also provides for the reopening of the lodgement period for certain claims that were previously rejected, as well as the introduction of a special dispensation for farm dwellers and labour tenants. There are parcels of land claimed by individuals on the footprint of the proposed Sekuruwe WTW.
National Forest Act (Act No. 84 of 1998) (NFA)	DFFE	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. Prior to site clearing, for all NFA-protected tree species within the footprint area (i.e., <i>Sclerocarya birrea subsp. caffra</i>), permit applications must be applied for their removal. Permits should be obtained from DFFE.

Other relevant South African legislation must be adhered to during all life cycles of the Sekuruwe 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, 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
12	The development of infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	A small portion of the project area is located within 32m of the delineated boundaries of the Episodic Drainage Line (EDL) located to the north-east of the development site. 
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.	The footprint of the proposed WTW is anticipated to be more than 1 hectares, therefore triggering this activity. The Sekuruwe site is anticipated to be approximately 3.95 ha. The DFFE screening report revealed that the Sekuruwe preferred site is not within a Critical Biodiversity Area (CBA). Although the Sekuruwe WTW is situated within a degraded bushveld, a terrestrial specialist has confirmed that the vegetation within the project site meets the NEMA definition of indigenous vegetation .

Note that the commencement of any listed activities that are not authorised may attract significant criminal and administrative penalties in terms of the NEMA.

4.3 LISTED ACTIVITIES IN TERMS OF NWA

A water use licence application will be submitted to DWS for the overall OMMP-BRWSP project. It is expected that the process silt lagoons will discharge settled supernatant from the filter backwash. The discharge from the lagoons needs to be registered with the DWS.

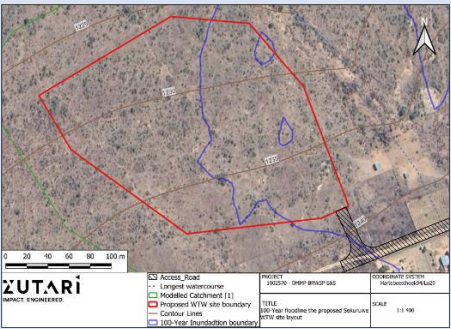
The Sekuruwe WTW falls within a regulated area of a watercourse (the EDL as identified by the aquatic specialist). In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21 (c) and 21(i) is defined as:

- the outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

- in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

The following water uses as per section 21 of the Act are triggered by the proposed project activities:

Table 4-3: Triggered water uses in terms of Section 21 of the NWA

Water Use	Project Activity
<p>Section 21 (c)</p>	<p>A small portion of the study area is located within 32m of the delineated boundaries of the EDL located to the north-east of the development site. The proposed WTW is located in the regulated area of a watercourse as defined by GN 509 and accordingly a Water Use Authorisation (WUA) in terms of the NWA would need to be acquired.</p> <p>The hydrology report also flagged that a portion of the Sekuruwe site is within a 1:100-year flood line:</p> 
<p>Section 21 (i)</p>	<p>A small portion of the study area is located within 32m of the delineated boundaries of the EDL located to the north-east of the development site. The proposed WTW is located in the regulated area of a watercourse as defined by GN 509 and accordingly a Water Use Authorisation (WUA) in terms of the NWA would need to be acquired.</p> <p>The hydrology report also flagged that a portion of the Sekuruwe site is within a 1:100-year flood line.</p>
<p>Section 21 (g)</p>	<p>This will be triggered by the presence of sludge lagoons at the WTW facility.</p>

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 (refer to **Table 4-4**). 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 Sekuruwe WTW will treat water from the same source as Flag Boshielo WTW. It is expected that, regardless of treatment processes adopted for the proposed Sekuruwe WTW, the treatment residue will be similar in nature (containing coagulant precipitates and inert solids) as the sample collected at Flag Boshielo WTW.

Table 4-4: Triggered activity in terms of the National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEM:WA) GN R921 of 2017

Triggered Activity	Project Activity
<ul style="list-style-type: none">• Category A (1): The storage of general waste in lagoons.	The dry sludge from the sludge lagoons will be stored on site and periodically removed for disposal or reuse. This will necessitate a WML as discussed above.

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.

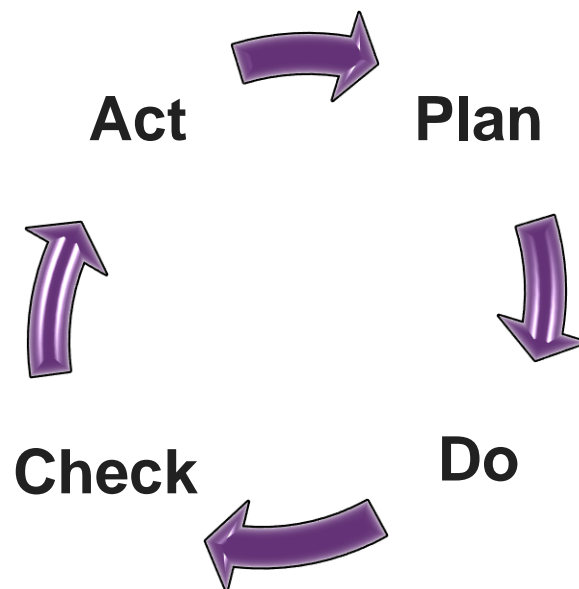


Figure 5-1: The Deming Cycle

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.

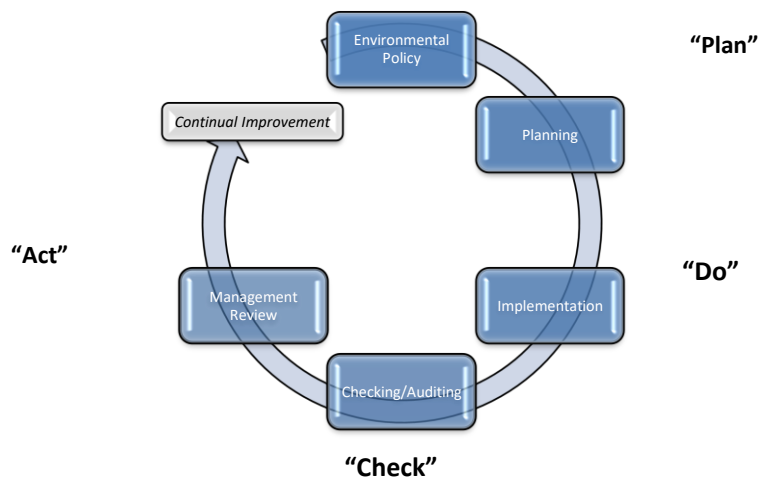


Figure 5-2: The Basic EMPr rationale based on the Deming Cycle

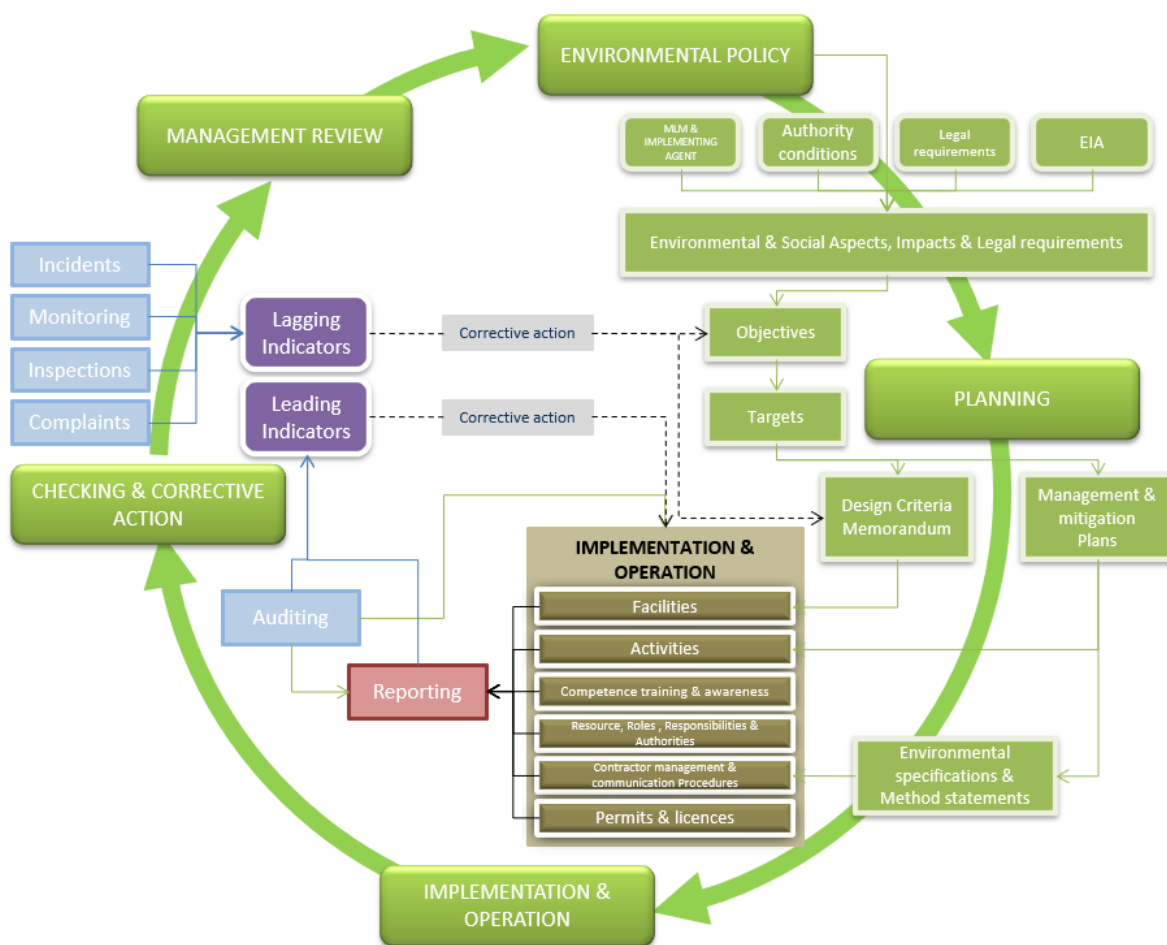


Figure 5-3: The Specific EMPr rationale based on the Deming Cycle

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 Sekuruwe 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.

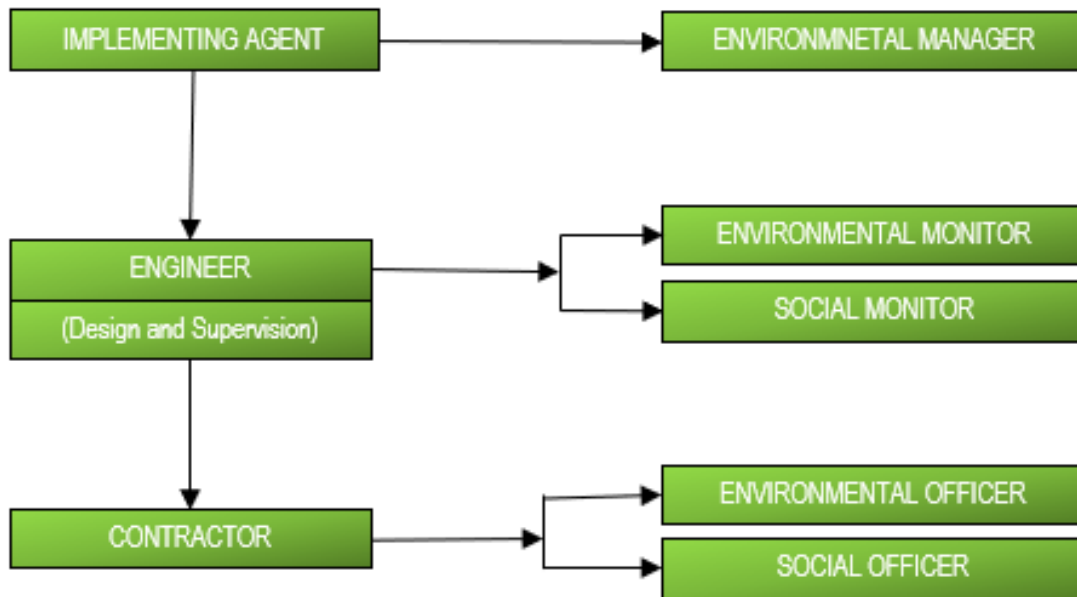


Figure 6-1: Staffing arrangements

6.1 PROJECT PROPONENT

MLM will be the Project Proponent for the proposed Sekuruwe WTW, an Implementing Agent is appointed to implement the development of the Sekuruwe 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 Sekuruwe WTW as well as the compliance to the applicable legislation, the authorised EA and approved EMPr.

6.3 ENGINEER – ZNJV

The Zutari Ndodana Joint Venture (ZNJV) is the appointed Engineer responsible for the design of the Sekuruwe WTW and associated infrastructure. It will be the responsibility of the Engineer to ensure that the Contractor adheres to construction specifications, the EA and EMPr. The Engineer has the authority to stop any construction activity which is in contravention of any of the specifications within the

documents mentioned above after consultation with the ECO. All major decisions which may affect the programme or costs of the project with regards to the environmental procedure or protocols must be approved by the Employer via the Engineer.

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 Sekuruwe WTW is a component of the larger OMMP-BRWSP project, so the applicant should be one of the representatives on this EMC. The frequency of these meetings may be varied should the need arise. As stipulated in the rRoD, the EMC as far as reasonably possible should consist of the following people listed below:

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

The purpose of the EMC will be to:

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

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. As stipulated in the rRoD the ACC should consist, but not be limited to, the following organisations listed below:

- ▶ Department of Forestry, Fisheries and the Environmental;
- ▶ Mpumalanga Department of Agriculture and Land Administration;
- ▶ Limpopo Department of Finance and Economic Development;
- ▶ Limpopo Office of the Department of Labour;
- ▶ South African National Parks; and
- ▶ Relevant affected municipalities (this includes the MLM which is the applicant for the Sekuruwe WTW).

The responsibilities of the ACC will be to:

- ▶ To ensure that all conditions of the rRoD and EMPr are met;
- ▶ To consider all relevant information and issues raised by the stakeholders when making project decision; and

- ▶ To review all of the reports and correspondence received from the Chairperson of the EMC in an effort to provide guidance.

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. 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	Red	Blue
High	Orange	Light Blue
Moderate	Yellow	Cyan
Low	Light Green	Light Green
Very low	Green	Green

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 Episodic drainage line (EDL) 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	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	Very low	Very low
HERITAGE	Destruction of presently unknown Heritage Resources	Moderate - negative	Low - negative
PALAEONTOLOGY	Impact on Presently Unknown Fossil 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	Low - negative	Low - negative
SOCIAL	Traffic and damage to local access road	Moderate - negative	Very low
TERRESTRIAL BIODIVERSITY	Loss of Floral Habitat and Floral Diversity during construction (i.e., removal of vegetation and surface grading across the footprint areas)	Moderate - negative	Low - negative
TERRESTRIAL BIODIVERSITY	Loss of Floral SCC during construction (i.e., removal of vegetation and surface grading across the footprint areas)	Very low	Very low
TERRESTRIAL BIODIVERSITY	Loss of protected floral species (unlawful destruction/removal of protected floral species within the footprint areas due to failure to comply with national legislation regarding permit applications for the removal, destruction, and/or relocation of trees protected under the National Forest Act, 1998 (Act No. 84 of 1998) (NFA))	Moderate - negative	Low - negative

TERRESTRIAL BIODIVERSITY	Degradation of surrounding floral and faunal communities during operational and maintenance phase (i.e, poorly managed edge effects, including 1) introduction of alien and invasive plant (AIP) species with construction vehicles, 2) ineffective rehabilitation of compacted areas, bare soils, or eroded areas, 3) potential inadequate design of stormwater management and erosion control, resulting in increased risk of erosion and additional degradation of faunal and floral habitat beyond the footprint area, and 4) potential fragmentation of natural habitat by transport vehicles not using designated roads).	Moderate - negative	Low - negative
TERRESTRIAL BIODIVERSITY	Loss of Faunal Habitat and Diversity during construction (i.e., removal of vegetation and surface grading across the footprint areas, fauna being displaced due to construction activities etc.)	Moderate - negative	Low - negative
TERRESTRIAL BIODIVERSITY	Loss of Faunal SCC during construction (i.e., removal of vegetation and surface grading across the footprint areas)	Very low	Very low
VISUAL AND LANDSCAPE	Impact on Landscape Character and Sense of Place	Low - negative	Low - negative
VISUAL AND LANDSCAPE	Visual intrusion impacts	Moderate - negative	Low - negative
VISUAL AND LANDSCAPE	Visual exposure and visibility impacts	Moderate - negative	Low - negative
VISUAL AND LANDSCAPE	Impacts due to Nighttime lighting	Moderate – negative	Low - negative

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 drainage line due to leakage or accidental discharge of untreated raw water into the adjacent drainage line.	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
VISUAL AND LANDSCAPE	Impact on Landscape Character and Sense of Place	Low - negative	Low - negative
VISUAL AND LANDSCAPE	Visual intrusion impacts	Moderate - negative	Low - negative
VISUAL AND LANDSCAPE	Visual exposure and visibility impacts	Moderate - negative	Low - negative
VISUAL AND LANDSCAPE	Impacts due to Nighttime lighting	Moderate - 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 proposed development is negligible because it leads to no loss of potential cropland and negligible loss of future agricultural production potential. The project site is located in an area where there is no crop production. The climate and soil combination provides an insufficient moisture reservoir for viable rain-fed crop production and limits the land's agricultural potential to grazing only. Furthermore, factors other than climate and soil capability also constrain the potential of the property to practically deliver agricultural produce and therefore influence its agricultural production potential. The site is highly unlikely to ever be viably utilised for agricultural production and its potential is therefore assessed as low.

The total footprint of land from which potential future agriculture will be excluded, is only approximately 3.9 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 be above 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: Mitigation through administrative control and best industry practice

- b. **Impact:** Gaseous Emissions During Operations

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

12.3 AQUATICS 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

a. **Impact:** Potential sedimentation of drainage line due to site clearing and poor stormwater.

▶ **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.

b. **Impact:** Potential sedimentation of drainage line due to site clearing and poor stormwater.

▶ **Mitigation Measures:**

- No storage of hazardous materials on parts of the construction site within 100m from the riparian zone boundaries;
- Storage of hazardous materials in a bunded contained space;
- Immediate remediation of hazardous material spills.

c. **Impact:** Potential pollution of the adjacent drainage line due to poor management of hazardous materials such as paint and hydrocarbons.

▶ **Mitigation Measures:**

- Fresh concrete and cement mortar must not be mixed near the north-eastern site boundaries or within 100m of the edge of the delineated extent of the drainage line riparian zone;
- Mixing of cement must only be undertaken within the construction camp and may not be mixed on bare soils;
- Mixing of cement is also to be strictly undertaken within a lined, bound or bunded portable mixer. Ready mix concrete must preferably be used;
- A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing;
- A washout area must be designated within the part of the development site that is located outside of a 100m buffer of the delineated riparian zone boundary;
- Cement bags must be disposed of in the demarcated hazardous waste receptacles;
- Liquid cement spillage outside of the demarcated area must be promptly removed and taken to a suitably licenced waste disposal site.

d. Impact: Indiscriminate movement of vehicles and personnel in the adjacent drainage line and potential dumping of construction material construction waste in the adjacent drainage line.

▶ **Mitigation Measures:**

- Clear demarcation of the riparian boundaries of the adjacent drainage line as a no-go area;
- Establish a formal construction waste control system that is properly controlled and enforced.

e. Impact: Potential pollution of downgradient drainage lines by sediment and other pollutants such as paint / bitumen resulting from road upgrading activities.

▶ **Mitigation Measures:**

- Clear demarcation of the riparian boundaries of the adjacent drainage line as a no-go area;
- Establish a formal construction waste control system that is properly controlled and enforced.

12.3.2 OPERATION PHASE IMPACTS AND MITIGATION

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

▶ **Mitigation Measures:**

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

b. Impact: Alteration of hydrology, geomorphology and water quality of adjacent drainage line due to leakage or accidental discharge of untreated raw water into the adjacent drainage line.

▶ **Mitigation Measures:**

- Regular maintenance of the WTW as part of its operation;
- Immediate remediation and repair in the event of a breakdown.

c. Impact: 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 the receiving EDL.

▶ **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.

12.4 OBSTACLE LIMITATION SURFACE (OLS) AND CIVIL AVIATION

The OLS assessment revealed that the Sekuruwe site is situated at a distance at least greater than 30 km from any airspace or civil aviation air drone, therefore no foreseeable impact posed by the new proposed WTW. The Civil aviation assessment revealed that the proposed site has a high sensitivity according to the DFFE screening tool. It is to be noted that the nearest restricted / dangerous airspace is the Lowveld Information sector that provides flight information services to flights above 1500 feet (457,2 meters). This airspace is situated well above the intended structure (s).

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 environmental sensitivity of the Sekuruwe Site, consistent with the national screening tool's previous identification. No Defence Installation or Facility is adversely impacted.
- ▶ **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 GEOTECHNICAL INVESTIGATION COMPLIANCE STATEMENT

The underlying geology of the proposed site is expected to comprise grey muscovite-biotite gneiss, and no potentially soluble rock like dolomite is present. Shallow test pitting from a previous geotechnical investigation at the water plant site encountered the presence of shallow granite rock, within approximately 0.5 m below ground level. This presents favourable conditions for founding of infrastructure, but difficult excavation conditions that may require blasting. The topography of the site is relatively gentle with an approximate slope of 3.7°, which may mitigate the amount of cut and fill that is required. Notwithstanding, from a geotechnical perspective, no fatal flaws that would inhibit the proposed development were identified at the site.

12.7 HERITAGE IMPACT ASSESSMENT

The desktop study revealed that a long and significant history characterises the surroundings of the study area. Additionally, previous 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. Additionally, the subterranean characteristics of some heritage features and archaeological sites, including unmarked graves, means that it is possible that the fieldwork findings made in the Heritage Impact Assessment (HIA) report do not completely represent the complete archaeological and heritage fabric from the study area.

12.7.1 IMPACT ASSESSMENT

The following impact risk, can therefore be identified:

- ▶ **Impact on Presently Unknown Heritage Resources**

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:

- ▶ **Impact on Presently Unknown Fossil Heritage Resources**

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations, the ECO in charge of these developments must be informed.

12.9 HYDROLOGY IMPACT ASSESSMENT

It is recommended that a flood risk assessment be compiled in conjunction with a stormwater management plan to determine the impact to on-site runoff of developing a WTW on the site.

12.9.1 SURFACE WATER IMPACTS AND MITIGATIONS

Based on the findings of the hydrology study, the following can be recommended to reduce the risk of flooding from the watercourses at the Sekuruwe WTW site:

- ▶ The design and construction of a rip-rap, gabion or earth channel (dependent on channel slope and design flow velocity) along the watercourse to better control the discharge and reduce the lateral inundation at areas of concern.
- ▶ Reshape the flow path to define shallow slopes and plant with appropriate vegetation.
- ▶ A flood risk assessment should be compiled using the designed channel and reshaped flow path to determine the lateral extent of the 1-100-year flood. It is recommended that the footprint of the WTW does not extend into the remodelled flood line.
- ▶ Install berms and cutoff drains on the upstream edge of the proposed WTW building and road footprints to divert runoff and protect from flooding.
- ▶ 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.

12.9.2 RECOMMENDATIONS

The following recommendations are made based on the findings of the hydrology impact assessment and municipal standards for the design of the stormwater management system:

- ▶ Provision for attenuation of stormwater will need to be made within the site and attenuation or infrastructure will not be permitted within the 1:100 year flood line or within the delineated wetland or riparian zone or associated buffers.
- ▶ A stormwater management plan must be submitted for approval by the relevant authorities prior to construction approval. The plan must meet the following standards:
 - 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 existing 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 of the water cycle as an alternative or supplement to traditional 'end of pipe' techniques, and typically include techniques relating to stormwater conveyance,

receiving water 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,
 - Enhances swales and grass lined channels,
 - Stone filled infiltration ditches (dependent on geotechnical investigation and the 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 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 flow.

12.10 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 Sekuruwe 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
Construction	<p>Income for Landowners / Occupiers (Land access)</p> <p>Sekuruwe WTW is proposed on the Farm Blinkwater 820 LR and on the Farm Gillimberg 861 LR, both Farm properties are owned by the National Government (Republic of South Africa). As such, the developer will require land access from the national government. Depending on the negotiations with the national government, access can either mean land purchase, lease agreement or servitude agreement.</p>	<p>The developer should enter into a formal and fair land access agreement. Depending on the negotiations with the affected land owner/s, land access can either mean land purchase, lease agreement or servitude agreement. Land purchase appears to be a financial feasible option as it will entail a once-off payment to the affected land owner/s.</p>
Construction	<p>Procurement of goods and services</p> <p>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>The developer should put in place a procurement policy aimed at supporting and prioritizing upcoming and qualifying subcontractors or SMMEs, where possible. The policy should be aimed at providing first preference to appropriate subcontractors/SMMEs located in the surrounding communities, followed by those located in the municipal area and lastly those located elsewhere or outside the province.</p>
Construction	<p>Employment opportunities</p> <p>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>The developer should have an employment policy aimed at maximising employment opportunities in the local area and in the region.</p>
Construction	<p>Community expectations</p> <p>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 such, unemployed individuals and opportunity seekers from doorstep communities are anticipated to have high expectations related to employment and business opportunities. Should these expectations be not met, individuals and community groups can mobilize against the project.</p>	<p>Community expectations should be managed via timely and clear messaging throughout the Stakeholder engagement and consultation process.</p>
Construction	<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</p>	<p>The developer should implement health and safety mitigation measures for communities and employees as per the recommendations made in other specialist studies viz., air quality, traffic, visual assessment etc. and as per the Client's</p>

	<p>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. Also, 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.</p> <p>Construction activities are likely to attract criminals into the area, hence compromising the security of nearby farm owners, communities, and employees. During the construction phase, it is anticipated that that criminal activities will escalate in the area, including the trespassing of properties.</p>	duties as defined in the Construction Regulations (Occupational Health and Safety Act).
Construction	<p>Traffic and damage to local access road</p> <p>The access road for the proposed Sekuruwe WTW preferred site is an existing road which transverse through the Sekuruwe community. It is anticipated that this will increase the traffic in the area and that the access road will be subject to damage. Heavy duty trucks and construction vehicles cause damage to the current road conditions as well as contribute to increased dust and congestion on the roads.</p>	Traffic should be managed as per the recommendations made in the traffic impact assessment specialist study. The developer should regularly maintain the existing road to avoid damage to the road.
Operation	<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>	The developer should have an employment policy aimed at maximising employment opportunities in the local area and in the region.
Operation	<p>Access to potable 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 selected doorstep communities in the Northern limb (<i>as per the Water Management Master Plan</i>) 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 minimizes 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</p>	A Water Management Master Plan should be in place, clearly specifying which communities in the Northern limb will benefit from accessing potable water.

	opportunity to do everyday activities such as drinking water, cooking, bathing, and cleaning. The ability to prepare healthy food ensures sustenance and strengthens the immune system.	
Operation	<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 Water Management Master Plan.</p>	The Water Management Master Plan and associated beneficiaries should be communicated to the project interested and affected communities, to avoid creating expectations to from those communities which will not benefit from the project.
Operation	<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>	The developer should implement health and safety mitigation measures for communities and employees as per the recommendations made in other specialist studies viz., air quality, traffic, visual assessment etc.
Decommission	<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>	The developer should have an employment policy aimed at maximising employment opportunities in the local area and in the region, including a procurement policy aimed at supporting and prioritizing upcoming and qualifying subcontractors or SMMEs, were possible.
Decommission	<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>	The developer should implement health and safety mitigation measures for communities and employees as per the recommendations made in other specialist studies viz., air quality, traffic, visual assessment etc. and as per the Client's duties as defined in the Construction Regulations (Occupational Health and Safety Act).
Decommission	<p>No access to potable water</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.

	Should the proposed WTW be decommissioned, social water users will not have access to potable water. Specifically, the selected doorstep communities in the Northern limb (as per the Water Management Master Plan).	
Decommission	<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>	Employees and businesses benefiting from operation of the WTW should be notified in time regarding the decommissioning of the WTW prior to decommissioning.

12.11 TERRESTRIAL COMPLIANCE STATEMENT

Given the overall low sensitivity verified for the project area from a plant species, animal species, and terrestrial biodiversity theme perspective, together with the low likelihood of triggered species being present in the project area, the direct impacts and associated edge effects arising from proposed activities for the Sekuruwe WTW, and associated access road are anticipated to be low. Despite this, general mitigation measures that are to be implemented during construction within the project area include the following:

► Impacts:

- Habitat loss (fauna and flora) through clearance or removal of degraded vegetation for construction activities. This will result in reduced floral and faunal species richness and density within the proposed WTW. No habitat loss will occur within the proposed access road;
- Habitat degradation beyond the footprint areas due to poorly managed edge effects, including 1) introduction of alien and invasive plant (AIP) species with construction vehicles, 2) ineffective rehabilitation of compacted areas, bare soils, or eroded areas, 3) potential inadequate design of stormwater management and erosion control, resulting in increased risk of erosion and additional degradation of faunal and floral habitat beyond the footprint area, and 4) potential fragmentation of natural habitat by transport vehicles not using designated roads;
- Unlawful destruction/removal of protected floral species within the footprint areas due to failure to comply with national legislation regarding permit applications for the removal, destruction, and/or relocation of trees protected under the National Forest Act, 1998 (Act No. 84 of 1998) (NFA).

► Required mitigation:

- Given that 1) an ephemeral drainage line (EDL) is in close proximity to the proposed WTW (SAS 23-1135), and 2) the proposed WTW is within an area connected to a larger expanse of natural habitat, all footprint areas should remain as small as possible, and the boundaries of the footprint areas must be clearly defined so to ensure that all activities remain within defined footprint areas. Moreover, it must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of natural habitat;
- As part of rehabilitation activities following the construction of the WTW, ensure that a vegetation layer is reinstated and maintained around the proposed WTW 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 *Dombeya rotundifolia*, *Sclerocarya birrea* subsp. *caffra*, *Searsia leptodictya*, *Terminalia sericea*, and *Vitex rehmannii*);
- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint; o Stormwater runoff should be adequately managed, notably how and where it is discharged into the receiving environment;
- Control invasive plant species throughout the life of the project. Specific mention in this regard is made of listed invasive species as per the NEMBA Alien species lists, 2020, in line with the NEMBA Alien and Invasive Species Regulations (2020). All cleared plant material must be disposed of at a licensed waste facility which complies with the legal standards, or a garden refuse site; and o Prior to site clearing, for all NFA-protected tree species within the footprint area (i.e., *Sclerocarya birrea* subsp. *caffra*), permit applications must be applied for their removal. Permits should be obtained from DFFE.

Key impacts determined during the assessment as well as recommended mitigation measures are summarised in **Table 12-5** below.

Table 12-5: Summary of terrestrial impacts and recommended mitigation measures

PROJECT PHASE	IMPACT DESCRIPTION	MITIGATION MEASURES
Construction	Loss of Floral Habitat and Floral Diversity during construction (i.e., removal of vegetation and surface grading across the footprint areas).	Given that 1) an ephemeral drainage line (EDL) is in close proximity to the proposed WTW (SAS 23-1135), and 2) the proposed WTW is within an area connected to a larger expanse of natural habitat, all footprint areas should remain as small as possible, and the boundaries of the footprint areas must be clearly defined so to ensure that all activities remain within defined footprint areas. Moreover, it must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of natural habitat.
Construction	Loss of Floral SCC during construction (i.e., removal of vegetation and surface grading across the footprint areas).	No threatened (red data listed) floral species will be impacted by the proposed development. The findings of the site inspection verify the screening tool outcome of a low sensitivity for the Plant Species Theme within the focus area and disputes the sections of medium sensitivity as identified by the screening tool.
Construction	Loss of protected floral species (unlawful destruction/removal of protected floral species within the footprint areas).	Prior to site clearing, for all NFA-protected tree species within the footprint area (i.e., <i>Sclerocarya birrea subsp. caffra</i>), permit applications must be applied for their removal. Permits should be obtained from DFFE.
Construction	Degradation of surrounding floral and faunal communities during operational and maintenance phase (i.e., poorly managed edge effects).	<p>As part of rehabilitation activities following the construction of the WTW, ensure that a vegetation layer is reinstated and maintained around the proposed WTW 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 <i>Dombeya rotundifolia</i>, <i>Sclerocarya birrea subsp. caffra</i>, <i>Searsia leptodictya</i>, <i>Terminalia sericea</i>, and <i>Vitex rehmannii</i>).</p> <p>No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint.</p> <p>Stormwater runoff should be adequately managed, notably how and where it is discharged into the receiving environment.</p>

		Control invasive plant species throughout the life of the project. Specific mention in this regard is made of listed invasive species as per the NEMBA Alien species lists, 2020, in line with the NEMBA Alien and Invasive Species Regulations (2020). All cleared plant material must be disposed of at a licensed waste facility which complies with the legal standards, or a garden refuse site.
Construction	Loss of Faunal Habitat and Diversity during construction (i.e., removal of vegetation and surface grading across the footprint areas, fauna being displaced due to construction activities etc.),	Given that 1) an ephemeral drainage line (EDL) is in close proximity to the proposed WTW (SAS 23-1135), and 2) the proposed WTW is within an area connected to a larger expanse of natural habitat, all footprint areas should remain as small as possible, and the boundaries of the footprint areas must be clearly defined so to ensure that all activities remain within defined footprint areas. Moreover, it must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of natural habitat.
Construction	Loss of Faunal SCC during construction (i.e., removal of vegetation and surface grading across the footprint areas).	**No SCC is anticipated to be found within the focus area. The findings of the site inspection dispute the screening tool outcome of a medium sensitivity for the Animal Species Theme and verifies a low sensitivity instead.

12.12 VISUAL AND LANDSCAPE COMPLIANCE STATEMENT

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 Sekuruwe settlement, 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 tranquility to busy due to vehicular movement in the area during the preparation of the area and removal of vegetation for the proposed Sekuruwe WTW;
- ▶ Visual contrast to the surrounding environment may occur during excavation activities and the yellow construction vehicles may be clearly noticeable from the green and brown background formed by the vegetation, mountainous terrain and waste rock dumps;
- ▶ Direct visual exposure of the construction activities will occur for road users traveling on the N11 national road, within a limited distance and duration along the N11 national road, as well as indirectly through fugitive dust generated by the earthworks on a windy day; and
- ▶ The sources of lighting associated with the proposed Sekuruwe 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 Sekuruwe settlement should be kept as small as possible, and the areas cleared of natural vegetation and topsoil must be kept to a minimum;
- ▶ 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;
- ▶ It is recommended that partial screening of the proposed Sekuruwe WTW takes place, especially to the small houses located directly south of the proposed Sekuruwe WTW.
- ▶ Partial screening can be achieved by planting a row of locally indigenous trees along the southern periphery of the Sekuruwe WTW; and
- ▶ Should any activities take place within close proximity to the N11 national roadway, it must be ensured that the roadside vegetation, with particular mention of the trees, shrubs, be retained in order to partly obscure the view toward the proposed development.

Key impacts determined during the assessment as well as recommended mitigation measures are summarised in **Table 12-6** below.

Table 12-6: Summary of visual and landscape impacts and recommended mitigation measures

PROJECT PHASE	IMPACT DESCRIPTION	MITIGATION MEASURES
Construction and Operation	Impact on Landscape Character and Sense of Place.	<ul style="list-style-type: none"> ▶ The development footprint and disturbed areas surrounding the proposed Sekuruwe WTW should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum; ▶ All construction areas must be kept in a neat and orderly condition at all times and fenced of; ▶ It is recommended that partial screening of the proposed Sekuruwe WTW takes place, especially to the small houses located directly south of the proposed Sekuruwe WTW. Partial screening can be achieved by planting a row of locally indigenous trees along the southern periphery of the Sekuruwe WTW; and ▶ Should any activities take place within close proximity to the N11 national roadway, it must be ensured that the roadside vegetation, with particular mention of the trees. shrubs, be retained in order to partly obscure the view toward the proposed development.
Construction and Operation	Visual intrusion impacts.	<ul style="list-style-type: none"> ▶ Construction and operation activities should be kept as short as possible, to reduce the visual intrusion on the receiving environment; ▶ The height of structures should be a low as possible, where this can be achieved without increasing the infrastructure footprint; ▶ Appropriate use of colours must be considered, it is recommended that neutral colours, such as shades of browns are to be utilised. Reflective materials are to be avoided as far as possible; ▶ It is recommended that partial screening of the proposed Sekuruwe WTW takes place, especially to the small houses located directly south of the proposed Sekuruwe WTW. Partial screening can be achieved by planting a row of locally indigenous trees along the southern periphery of the Sekuruwe WTW; and ▶ Should any activities take place within close proximity to the N11 national roadway, it must be ensured that the roadside vegetation, with particular mention of the trees. shrubs, be retained in order to partly obscure the view toward the proposed development.
Construction and Operation	Visual exposure and visibility impacts.	<ul style="list-style-type: none"> ▶ Construction and operation activities should take place as quickly as possible, to reduce the visual exposure to the impacted area; ▶ Housekeeping of the site during construction and operational activities must be maintained at a high standard. The site should be screened through the use of a fence which will result in a more unified and tidy appearance; ▶ It is recommended that partial screening of the proposed Sekuruwe WTW takes place, especially to the small houses located directly south of the proposed Sekuruwe WTW. Partial screening can be achieved by planting a row of locally indigenous trees along the southern periphery of the Sekuruwe WTW; and ▶ Should any activities take place within close proximity to the N11 national roadway, it must be ensured that the roadside vegetation, with particular mention of the trees. shrubs, be retained in order to partly obscure the view toward the proposed development.
Construction and Operation	Impacts due to Nighttime lighting.	<ul style="list-style-type: none"> ▶ As far as possible, operational activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow; ▶ An engineer may be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass;

		<ul style="list-style-type: none">▶ Outdoor lighting must be strictly controlled;▶ The use of high light masts and high pole top security lighting should be avoided along the periphery of the buildings;▶ Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass;▶ Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Only “full cut-off” light fixtures that direct light only below the horizontal must be used on the buildings;▶ Censored and motion lighting may be installed to prevent use of lights when not needed. Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light’s purpose;▶ The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts; and▶ Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night-time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow (BLM, 2013).
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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 Sekuruwe 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.

<p>13.1.9 Servicing and washing of vehicles and machinery</p>	<p>Workshop and equipment storage areas</p>	<ul style="list-style-type: none"> • Water contamination. • Soil contamination. • Noise pollution. 	<p>Contractor and EM</p>	<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. 	<p>Whenever servicing or maintaining vehicles or equipment throughout the construction period.</p>	<p>Engineer and ECO</p>	<p>Daily monitoring by EM and monthly inspections by ECO.</p>	<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.
<p>13.1.10 Personnel conduct</p>	<p>Personnel</p>	<p>Infringement of the EMPr requirements by personnel on site.</p>	<p>Contractor, EM and labourers.</p>	<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. 	<p>Approved PPE must be issued to all employee's pre-construction but must be used for the duration the construction phase</p>	<p>Engineer and ECO</p>	<p>Daily monitoring by EM and SOs.</p>	<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 Sekuruwe 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 Sekuruwe 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 Sekuruwe 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, the project site is situated within two vegetation types, namely the Makhado Sweet Bushveld (SVcb 20) and the Polokwane Plateau Bushveld (SVcb 23). Some regions of the Polokwane Plateau Bushveld (SVcb 23) has scattered populations of alien *Agave*, *Jacaranda mimosifolia*, *Melia azedarach*, *Opuntia ficus-indica* and *Ricinus communis* are of concern. It is also important to note that field survey results, as documented in the Terrestrial compliance report, reveal that the vegetation within the proposed access road was largely absent (i.e., transformed habitat), apart from alien vegetation such as *Jacaranda mimosifolia* and *Tagetes minuta*.

The Alien and Invasive Plant (AIP) Management Plan must therefore be drafted for implementation, covering all phases of the project from construction to operation.

14.2 EROSION CONTROL

According to the Terrestrial compliance report, the Makhado Sweet Bushveld (SVcb 20) has erosion levels ranging from low to high, while the Polokwane Plateau Bushveld (SVcb 23) has erosion levels ranging from high to moderate. This is further supported by the aquatics compliance statement which highlighted that the possible onset of erosion associated with construction activities and extending into the operational period of the development could transpire, given the nature of soils and the sloping nature of terrain in the area in which the proposed WTW and adjacent drainage line area are located.

With that said, the areas surrounding the sites, particularly the EDL must be monitored for signs of erosion and remedial actions implemented where required. The erosion management specifications described under the construction phase EMPr must be fully implemented, where applicable.

14.3 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

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 aloes 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

- a) 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.
- b) Decommissioning refers to the discontinuation of the Sekuruwe 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.
- c) 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 Sekuruwe 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 EMP 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

In diversity there is beauty and
there is strength.

MAYA ANGELOU

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