DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE PROPOSED CONSTRUCTION AND MAINTENANCE OF NEW SYSTEM 1 AT RAND WATER VEREENIGING TREATMENT WORKS, INSTALLATION OF APPROXIMATELY 7 KM PHASE 2 SLUDGE PIPELIN E IN VEREENIGING, 1.5 KM SLUDGE LINE IN PANFONTEIN AND ASSOCIATED INFRASTRUCTURE WITHIN THE JURISDICTION OF SEDIBENG DISTRICT MUNICIPALITY, GAUTENG PROVINCE.

Author: Shonisani Selahle
Email: shonie@scprojects.co.za / admin@scprojects.co.za
Date Issued: August 2025
Client: Rand Water
Contact: 011 026 2560 / 079 614 8298
Address: 546 16th Road, Constantia Park, Block 2, First Floor, Randjespark, 1682

Contents Page

List of Figures

List of Tables:

DOCUMENT STATUS	
Client	Rand Water
Project Name	Proposed Construction and Maintenance of New System 1 at Rand Water Vereeniging Treatment Works, Installation of Approximately 7 Km Phase 2 Sludge Pipeline in Vereeniging, 1.5 Km Sludge Line in Panfontein and Associated Infrastructure within the Jurisdiction of Sedibeng District Municipality, Gauteng Province
Document Name	Environmental Management Programme Report
Project Number (Internally)	04_0325A_ Rand Water
Version	Revision 1
Issued Date	September 2025

APPROVAL

This document has been approved for publishing by:

Action	Name / Designation	Signature	Date
Prepared by	**Shonisani Selahle** *Pr.Sci.Nat* *Pr. EAP* *Registered CHSM*		September 2025
Reviewed by	**Sinnah Mhlongo** *Can.Sci.Nat* *Registered CHSO*		September 2025
Approved by (internally)	**Shonisani Selahle**		September 2025

	Pr.Sci.Nat *Registered EAP* *Registered CHSM*		
Accepted by **(Rand Water)**	**Jimmy Maluleke**	Jimmy Maluleke Digitally signed by Jimmy Maluleke Date: 2025.08.26 10:13:09 +02'00'	

DISTRIBUTION *Controlled copies of this document are distributed as follows:*	
No.	
1.	Rand Water
2.	Gauteng Department of Environment
3.	Sedibeng District Municipality
4.	Emfuleni Local Municipality
5.	Midvaal Local Municipality
6.	Department of Defence
7.	Air Traffic Navigation Services
8.	Department of Agriculture, Land Reform, and Rural Development
9.	Department of Water and Sanitation
10.	Gauteng Provincial Heritage Resources Authority
11.	South African Heritage Resource Agency
12.	Department of Forestry, Fisheries and Environment

ACRONYMS & ABBREVIATIONS

BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
CM	Contract Manager
CRR	Comment & Response Report
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DMP	Disposal Management Plan
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
ECA	Environment Conservation Act, 1989 (Act No. 73 of 1989)
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
SEO	Site Environmental Officer
ESA	Ecological Support Area
GDEnv	Gauteng Department of Environment
GNR	Government Notice Regulation
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IAP	Invasive Alien Plants
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
MLD	Megalitres per Day
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PAOI	Project Area of Influence
PC	Principal Contractor
PES	Present Ecological State
PM	Project Manager
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SACPCMP	South African Council for the Project and Construction Management Professions
SAHRA	South African Heritage Resources Agency

SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SCP	Selahle Consultancy & Projects
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SO	Safety Officer
SWMP	Storm Water Management Plan
WULA	Water Use License Application

INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The Environmental Impact Assessment (EIA) Regulations, promulgated in terms of the National Environmental Management Act (Act no. 107 of 1998 as amended) dated 8th of December 2014. In terms of Appendix 4(1) of the EIA Regulations 2014 as amended, an Environmental Management Programme (EMPr) must contain the information that is necessary for the competent authority to consider and come to a decision on the application and must include –

Content of Environmental Management Programme (EMPr)	
(1) An EMPr must comply with section 24N of the Act and include- (a) details of- (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Chapter 1
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 2 & 3
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Chapter 3
(d) a description of the impact management outcomes, 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- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and in the case of a closure activity, closure; and (v) where relevant, operation activities;	Chapter 8
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to- (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; and (iii) comply with any applicable provisions of the Act regarding closure, in the case of a closure activity;	Chapter 8
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 8
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 8
(i) an indication of the persons who will be responsible for the implementation of the	Chapter 8

Content of Environmental Management Programme (EMPr)	
impact management actions;	
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Chapter 8
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Chapter 8
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the regulations;	Chapter 8
(m) an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Chapter 5
(n) any specific information that may be required by the competent authority.	Not applicable

1. DETAILS OF THE EAP

Table 1: Details of EAP

Name of the Environmental Assessment Practitioner	Shonisani Selahle
Tel No:	011 026 2560
Fax No:	086 685 9567
Email:	shonie@scprojects.co.za / admin@scprojects.co.za

1.1 Expertise of the EAP

EAPASA Registered EAP

SACNASP Registered Scientist

SACPCMP Registered Safety Manager

Qualifications

- University of South Africa, BSc Honours, Environmental Management- 2025
- Tshwane University of Technology, N. Diploma Geology – 2010
- NOSA, Implementation of ISO 45001:2018 & ISO 14001:2015

2. INTRODUCTION

Selahle Consultancy and Projects (Pty) Ltd (SCP) was appointed by Rand Water to undertake the Environmental Authorisation processes for the proposed Construction and Maintenance of the New System 1 at the Vereeniging Water Treatment Works, the Construction of approximately 7 km Sludge Pipeline (Phase 2) in Vereeniging, and the Construction of 1.5 km Sludge Line in Panfontein within the jurisdiction of Sedibeng District Municipality, Gauteng Province of South Africa. Projects of this nature trigger Listed Activities in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and the EIA Regulations, 2014 (amended in 2017). This document is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992).

Integrated Environmental Management is a key instrument of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended. NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMPr.

The EMPr is a detailed plan for the implementation of the mitigation measures to minimise the negative environmental impacts. The EMPr for this project includes a construction environmental monitoring plan specifying how the construction of the project is to be carried out. The EMPr also includes the actions required for the Post-Construction Phase (Operation and Maintenance Phase) to ensure that all potential environmental impacts are managed for the duration of the project's life cycle and will ensure environmental good practice.

The provisions of this EMPr are binding on the contractor for the duration of the contract. This EMPr must be read in conjunction with all other documents that form part of the contract, including the Generic EMPr provided by Rand Water, which is attached as Appendix A. In the event of any conflict between the provisions of this EMPr and the project specifications or the Environmental Authorisation, the provisions of this EMPr shall be subordinate.

3. PROPOSED DEVELOPMENT DESCRIPTION

3.1 Project Location and Description

The proposed project spans three locations but remains within the jurisdiction of the Servitude of Rand Water within the Sedibeng District Municipality, Gauteng Province, South Africa. The coordinates to the three sites are as follows (refer to the locality maps and the tables bSEOw).

New System 1 Vereeniging

The Vereeniging New System 1 at Rand Water Vereeniging Treatment Works will consist of the following infrastructure but not limited to:

- Construction of a new 250 MLD flocculator and 225 MLD sedimentation tank.
- Installation of the de-sludge bridge.
- Construction of access roads.
- Installation of a raw water pipeline.
- Installation of a sludge pipeline.
- Demolition of System 1 tank (90 MLD) to allow for the installation of a new automated system capable of producing 1400 MLD.
- Construction of a Laboratory and
- The installation of a new Carbon Dioxide dosing Carbonisation Bay.

Table 2: Vereeniging New System 1 Location

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Emfuleni Local Municipality
Ward Numbers	15
Nearest Town	Vereeniging
Farm Names and Numbers	LEEUWKUIL 596 IQ
Portion Numbers	Portion 111 of 596
SG Code	T0IQ00000000059600111
Co-ordinates	26°41´15.46˝ S 27°55´06.63˝ E

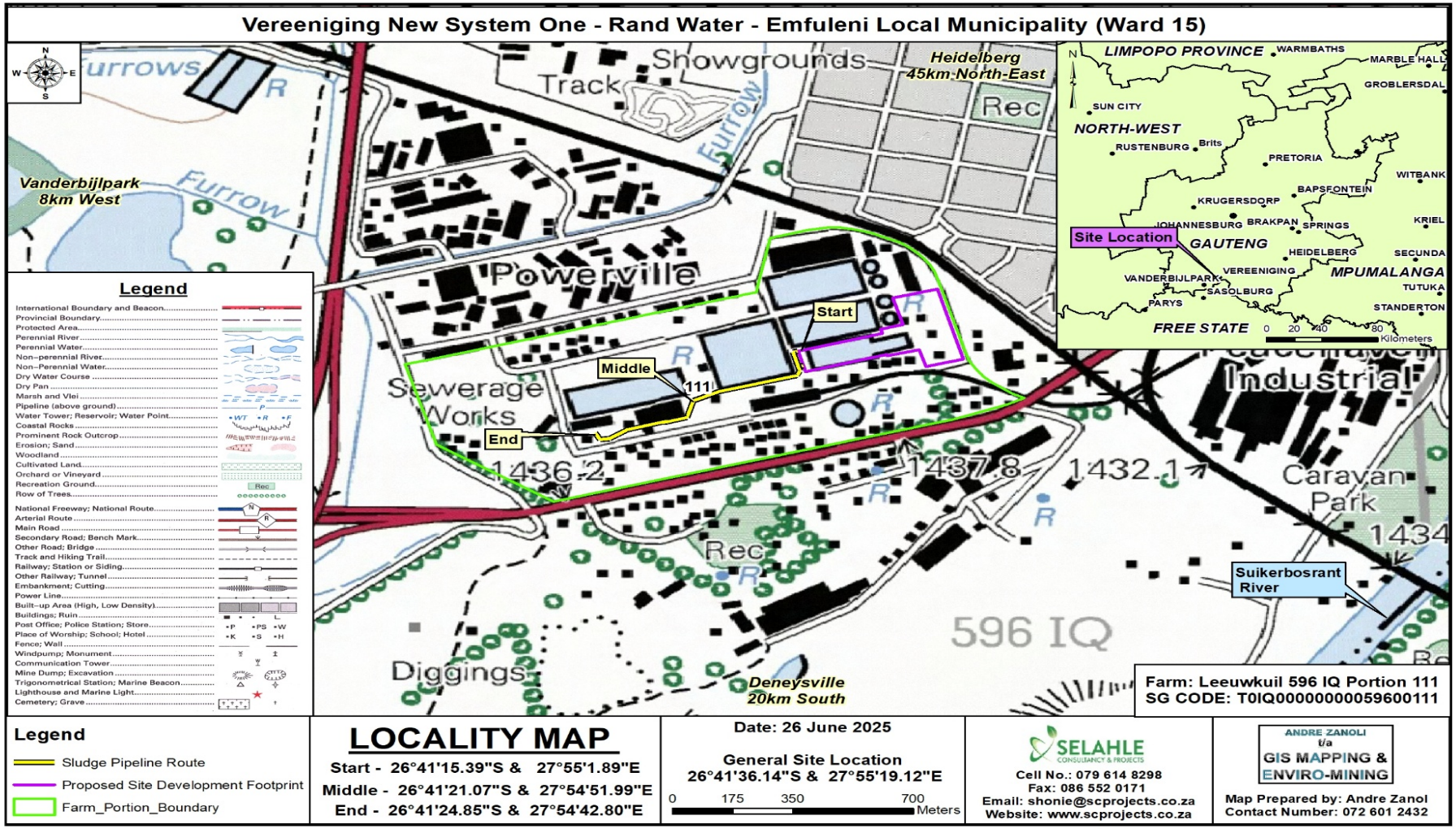


Figure 1: Locality Map for the proposed New System 1 at Vereeniging Treatment Works

Phase 2 Sludge Pipeline in Vereeniging

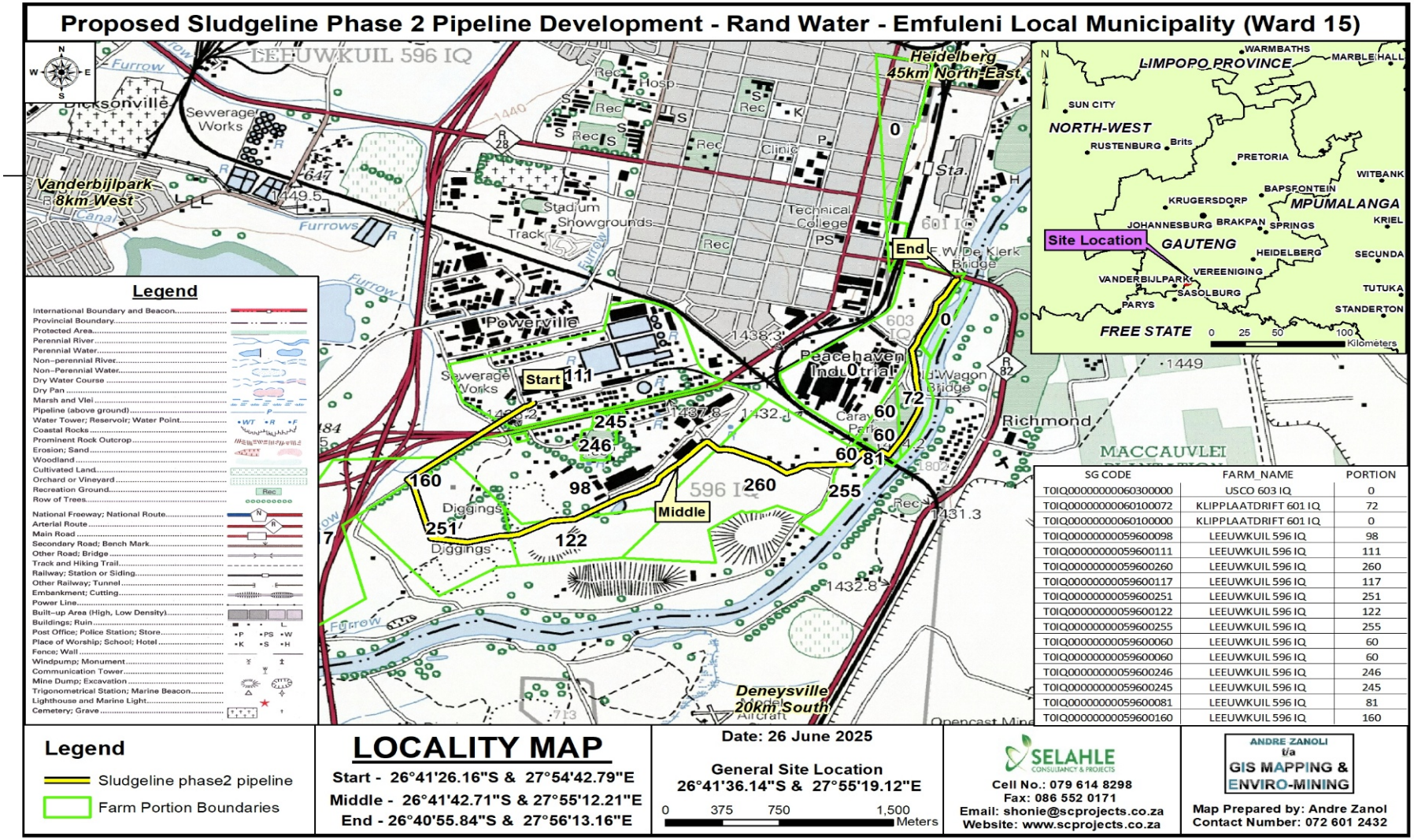
- Phase 2 of the sludge pipeline starts from the sludge pumping station inside Vereeniging Treatment Works and runs through mostly an established industrial area in the south of Vereeniging.
- The proposed sludge pipeline runs alongside as well as across some of these services, which also include Rand Water Bulk Water Pipelines to the Vaal River Crossing.
- The installation of approximately 7 km in length of 1000mm nominal internal diameter steel sludge pipe with an 8mm wall thickness to be laid from the Vereeniging Pumping Station to the Vaal River Crossing.

The sludge pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure

Table 3: Phase 2 Sludge pipeline location

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Emfuleni Local Municipality
Ward Numbers	15
Nearest Town	Vereeniging
Farm Names and Numbers	LEEUWKUIL 596 IQ KLIPPLAATDRIFT 601 IQ USCO 603 IQ UITVLUGT 434 IR
Portion Numbers	Portion 60 of 596 Portion 81 of 596 Portion 98 of 596 Portion 117 of 596 Portion 122 of 596 Portion 111 of 596 Portion 160 of 596 Portion 251 of 596 Portion 255 of 596 Portion 260 of 596 Portion 0 of 601 Portion 72 of 601 Portion 0 of 603
SG Code	T0IQ00000000059600060 T0IQ00000000059600081 T0IQ00000000059600098 T0IQ00000000059600117

	T0IQ00000000059600111 T0IQ00000000059600122 T0IQ00000000059600160 T0IQ00000000059600251 T0IQ00000000059600255 T0IQ00000000059600260 T0IR00000000043400077 T0IQ00000000060100000 T0IQ00000000060100072 T0IQ00000000060300000
Co-ordinates	Start Point: 26°41'26.16"S & 27°54'42.79"E Middle Point: 26°41'42.71"S & 27°55'12.21"E End Point: 26°40'55.84"S & 27°56'13.16"E



SG CODE	FARM_NAME	PORTION
T0IQ00000000060300000	USCO 603 IQ	0
T0IQ00000000060100072	KLIPPLAATDRIFT 601 IQ	72
T0IQ00000000060100000	KLIPPLAATDRIFT 601 IQ	0
T0IQ00000000059600098	LEEUWKUIL 596 IQ	98
T0IQ00000000059600111	LEEUWKUIL 596 IQ	111
T0IQ00000000059600260	LEEUWKUIL 596 IQ	260
T0IQ00000000059600117	LEEUWKUIL 596 IQ	117
T0IQ00000000059600251	LEEUWKUIL 596 IQ	251
T0IQ00000000059600122	LEEUWKUIL 596 IQ	122
T0IQ00000000059600255	LEEUWKUIL 596 IQ	255
T0IQ00000000059600060	LEEUWKUIL 596 IQ	60
T0IQ00000000059600060	LEEUWKUIL 596 IQ	60
T0IQ00000000059600246	LEEUWKUIL 596 IQ	246
T0IQ00000000059600245	LEEUWKUIL 596 IQ	245
T0IQ00000000059600081	LEEUWKUIL 596 IQ	81
T0IQ00000000059600160	LEEUWKUIL 596 IQ	160

Figure 3: Locality Map for the Proposed Phase 2 Sludge Pipeline

1.5km Panfontein Sludge Pipeline

The proposed Panfontein Sludge Pipeline will consist of the installation of a new interconnecting sludge pipeline, approximately 1.5 km in length and 800 mm in diameter. The pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure.

Table 4: Panfontein 1.5km Sludge Pipeline

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Midvaal Local Municipality
Ward Numbers	1
Nearest Town	Panfontein
Farm Names and Numbers	PANFONTEIN 437 IR UITVULGT 434 IR
Portion Numbers	Portion 77 of 434 Potion 1 of 437 Portion RE of 437 Portion 6 of 437
Co-ordinates	Start Point: 26° 42´ 15.72˝ S 28° 01´40.08˝E Middle Point: 26° 42´51.76˝ S 28°02´ 08.18˝ E End Point: 26° 42´32.01˝ S 28° 02´ 05.84˝E
SG Code	T0IR00000000043400077 T0IR00000000043700001 T0IR00000000043700006 T0IR00000000043700000

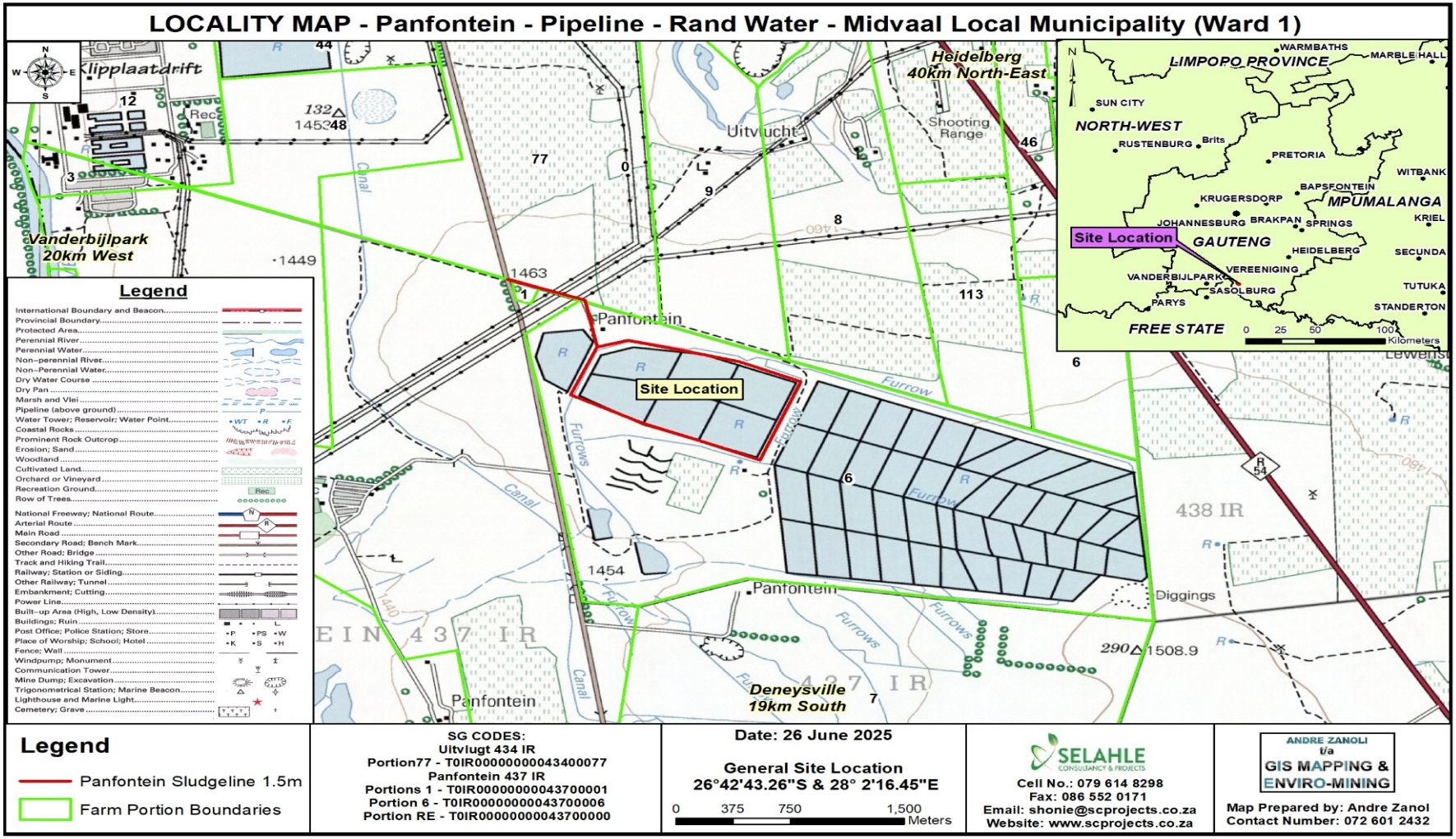


Figure 5: Locality Map for the Proposed Panfontein Pipeline

3.2 The Principal Contractor's Site Environmental Officer (PC SEO)

The PC SEO will be appointed by the Contractor to implement the EMPr and monitor activities on-site daily. The PC SEO will be the ECO's representative on the site and will report back on all audit trips. The PC SEO must report any major incidents immediately to the ECO.

Table 5: Responsibilities

Responsibility	Function
▪ Overall management of the project and EMPr implementation	Project Manager (PM)
▪ Oversee site works, liaison with Contractor (PC), PM and SEO	Senior Site Supervisor/ Contract Manager (CM)
▪ Implementation of EMPr and monitoring of compliance with the requirements of the EMPr. ▪ Maintains close communication with the PC SEO, and oversees the PC SEO's environmental control, remediation and rehabilitation actions (including checking that the complaints register and register of environmental incidents are being maintained by the PC SEO). ▪ Environmental awareness training of the contractor and select main construction staff. ▪ Settlement of damage claims and completion of Damage Release Forms.	Site Environmental Officer (SEO) – Appointed by the Rand Water
▪ Ensures the implementation and compliance with recommendations and conditions of the EMPr.	Contractor (PC)
▪ Monitoring of compliance with EMPr, environmental control of site actions, adjustment of environmental quality of works performed by construction staff, remediation and rehabilitation work. ▪ Reports back to the SEO through compilation of regular site inspection reports. ▪ Ensures compliance of construction activities with relevant environmental legislation. ▪ Maintains the complaints register that is kept on-site. ▪ Keeps record of all environmental incidents and ensures that corrective action is taken. ▪ Compiles method statements from the project specific EMPr. ▪ Environmental awareness training of all staff. ▪ Day-to-day management of landowner requirements and landowner liaison; ensures all landowner special conditions are met.	Contractor-appointed Environmental Site Officer (PC SEO)

4. PLANNING AND DESIGN

4.1 Contractor Requirements

The Contractor must be aware of the issues and impacts surrounding the proposed development site. The Contractor must also be provided with a copy of the EMPr. The EMPr must form part of any tender documents for the proposed development.

4.2 Waste Management

During the construction phase, the Contractor must ensure to make provision for the appropriate removal of waste from the site to a permitted waste disposal facility. The accumulation of construction waste materials must be avoided as far as possible.

A Waste Disposal Management Plan (DMP) must be complied with and produced. This plan should ensure to specify where all the different waste streams would be stored on site, as well as the mode of transportation of all hazardous waste to a registered landfill site. The DMP should also indicate how most waste would be recovered in means of Recycling, Reusing, and Recovering prior to it being disposed of at landfill sites.

4.3 Stormwater Management

The Stormwater Management Plan for all the proposed site development was conducted by Aryis Consulting and below is the recommendation for all three proposed development sites:

Proposed New System 1

- The stormwater infrastructure must be designed to prevent mixing of clean and dirty water flows.
- In case of accidental spillages of oils, hydrocarbons, and hazardous waste, emergency response procedures (e.g., spillage control kits) should be implemented to contain and dispose of the spillage immediately.
- Construction material on site and removed topsoil must be stored in minimally designated areas to reduce contamination, compaction and erosion.
- Regular monitoring and maintenance of stormwater management infrastructure to ensure efficiency and reduce environmental spillages to the clean environment.
- Implementing temporary attenuation and runoff routing measures to retain and redirect surface runoff as necessary.
- Decommissioning should include thorough revegetation and post-rehabilitation audits to confirm surface water recovery and prevent long-term siltation impacts.
- Clearing and keeping drains and outlets clean.
- Monitoring should be undertaken monthly during the wet season and after heavy storm events or per the site management schedule.

Phase 2 Sludge Pipeline

- Implementing temporary attenuation and runoff routing measures to retain and redirect surface runoff as necessary.
- Incorporating erosion control measures along sloped and exposed areas.
- Reinforcing diversion channels, and proper design of site access routes.
- Stormwater water runoff must be diverted from active construction zones.
- All site personnel must adhere to designated no-go zones especially near drainage lines.
- The construction schedules should prioritise low-rainfall periods.
- Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures.
- Implementing a phased construction schedule with progressive rehabilitation of disturbed areas.
- Proper bunding and impermeable surfaces must be used for all chemical and fuel storage locations.
- Erosion and sediment control mechanisms such as silt traps, sediment fences, and outlet energy dissipaters should be included along the pipeline route.

Panfontein Sludge Pipeline

- All site personnel must adhere to designated no-go zones especially near drainage lines.
- The establishment of vegetated berms is encouraged to prevent erosion.
- Areas potentially contaminated by machinery or construction activities must be diverted away from clean environments.
- Incorporating erosion control measures along sloped and exposed areas.
- Reinforcing diversion channels, and proper design of site access routes.
- Stormwater water runoff must be diverted from active construction zones.
- Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures.

All activities must be monitored to ensure that no environmental damage occurs. All damage must be mitigated immediately.

4.4 Sensitive Areas

The aquatic and Wetland Assessment study for all the proposed site development was conducted by The Biodiversity Company and below are the findings for all three proposed development sites.

Proposed New System 1

The site inspection identified multiple freshwater features at this site, including the Vaal River (classified as HGM 1) and several seep wetlands (HGM 2–10). The Vaal River was rated with high ecological importance and sensitivity, while the seeps were rated moderate. The Present Ecological State (PES) scores ranged from Category D (largely modified) to Category F (critically modified),

indicating heavy transformation but also ecological relevance. The Recommended Ecological Category (REC) for the Vaal River was Category C/D, with a management objective to improve the ecological state. For the seeps, the objective is to maintain current conditions.

Phase 2 Sludge Pipeline

The site inspection confirmed that this pipeline traverses several seep wetlands and runs parallel to the Vaal River for part of its alignment. Most watercourses in this zone were assigned a moderate ecological importance and sensitivity rating, with PES scores ranging from D to F. The ecological role of these features such as sediment trapping, flow attenuation, and habitat provision remains important, even though their current condition is degraded.

Panfontein Sludge Pipeline

The site inspection for the Panfontein site revealed a few seep wetlands, though they are in a poor ecological state (Category E/F) and show low functionality. These features are heavily degraded due to historical disturbance from water treatment infrastructure and agriculture. Despite their condition, the wetlands retain some limited role in local hydrological and nutrient regulation.

4.5 Site Environmental Officer (SEO)

A Site Environmental Officer (SEO) should be appointed to oversee all environmental aspects relating to the proposed developments. The SEO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and conditions of the environmental authorisation by the Contractor. The SEO's duties in this regard will include, inter alia, the following:

- Confirming that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr, Environmental Authorisation and Contract are adhered to at all times and taking action if specifications are not followed.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving construction method statements with input from the SEO and Engineer, where necessary, to ensure that the environmental specifications contained within this EMPr, and environmental authorisation are adhered to.
- Inspecting the site and surrounding areas regularly regarding compliance with the EMPr, Environmental Authorisation and Contract.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr and/or environmental authorisation.
- Undertaking a continual internal review of the EMPr and submitting any changes to DFFE (in case of major changes) for review and approval.

- Checking the register of complaints kept on site and maintained by the SEO and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidents of non-compliance to Project Manager (PM) and the Principal Contractor (PC).
- Conducting monthly environmental audits in respect of the activities undertaken relating to the project. The SEO shall also submit compliance audit reports to DFFE, in accordance with the requirements of the environmental authorisation. Such reports shall be reviewed by Rand Water, prior to submission.
- Keeping a photographic record of progress on site from an environmental perspective. This can be conducted in conjunction with the Safety Officer (SO) as the Safety Officer will be the person who will be on-site at all times and can therefore take photographic records weekly. The SEO would need to check and ensure that the SO understands the task at hand.
- Recommending additional environmental protection measures, should this be necessary.
- Providing a report back on any environmental issues at site meetings.

The SEO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines, and standards.
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports.
- The ability to manage public communication and complaints.
- The ability to think holistically about the structure, functioning and performance of environmental systems.

5. SITE ESTABLISHMENT

5.1 Contractor's Camp

The construction camp must preferably be located away from surrounding residential areas to minimise visual and noise impacts.

All movable materials and associated accessories must be stored overnight in the camp. The camp needs to be fenced with a lockable with access control for security purposes. No staff should be accommodated at the site camp except the overnight security guard. Proper facilities for the security personnel should be provided.

5.2 Complaints Registers

A complaint register must always be kept at the construction camp, and all complaints, issues, and concerns shall be recorded in the register. All issues, concerns and complaints should also be incorporated in the feedback report and submitted to the competent authority (DFFE).

Where complaints require corrective actions and/or measures, this must be communicated urgently to the relevant parties to ensure that the complainant is satisfied. All registered and identified Interested and Affected Parties (I&APs) should be notified prior to construction commencement.

5.3 Provision of Services

Chemical toilets should be provided for construction workers prior to construction commencement of any construction activities. These must be regularly maintained and emptied as and when required, at least weekly. The toilets must be located within walking distance of the work staff, and an average of one (1) toilet per thirty (30) workers for each sex must be provided in terms of Construction Regulation 30(1)(b) of the Occupational Health & Safety (Act no. 85 of 1993)

5.4 Staff and Environmental Awareness Plan

Staff must be made aware of their responsibilities to ensure that impacts such as fire, safety and pollution are taken care of. This must include an induction program. The movement of construction workers must be controlled, and access to adjacent properties must be prohibited.

The purpose of training is to provide an understanding of environmental management obligations and regulations for the project. This training is intended for project team members who require a higher level of knowledge and understanding of the environmental management context and implementation framework for the project. On the other hand, Environmental Awareness aims to promote general awareness among the construction workforce about sensitive environmental features and how to implement environmental best practices.

The environmental awareness plan for the development incorporates both training and environmental awareness to ensure that the proposed development is implemented in compliance with the EMPr requirements and the environmental sensitivities on site are managed properly.

As part of this plan, the applicant must be committed to taking responsibility and being accountable for environmental practices on the site. It is essential for both the employer and employee to be aware of the potential environmental impacts that may result from their activities and tasks, and to take necessary measures to mitigate them.
All potential incidents to the environment may be effectively minimised through effective training and awareness of the employees using any of the following methods:

- Supervisory meetings (weekly).
- Induction training (annually).

- Environmental Management Plan Training (annually); and
- External environmental and/or health and safety courses (when applicable).

Meetings

Weekly supervisory meetings are an excellent opportunity to increase awareness of any environmental hazards that may be pertinent for the upcoming week. During these meetings, a variety of topics related to safety can be discussed and should be properly documented. All attendees are required to sign an attendance register, and these records must be kept on file at the administrative office. The discussions may cover topics such as:

- Topics applicable to the entire operation
- Area-specific topics such as.
    - Stormwater management during construction
    - Sensitive Areas
    - Erosion control
    - Minimising traffic disturbances
    - Minimising impacts to stormwater and the associated buffer
- General environmental awareness
    - Waste management
    - Spillages
    - Saving water
    - Dust control
    - Noise generation
    - Housekeeping
    - Indigenous vegetation
    - Alien vegetation
    - Fire making

Any additional issues that are identified by the SEO will be discussed in the weekly meetings.

EMPr Training

The EMPr requires certain aspects to be chosen and addressed during training workshops at least once a year. These workshops may revolve around incidents that were frequently reported in the previous year and can cover the following topics:

- Hydrocarbon spillages
- Stormwater control
- Waste management
- Monitoring protocols and
- Safety topics.

Workers should be informed that they may refuse work that is harmful to human health and/or the environment.

Induction Training

All newly hired employees must complete induction training before starting work. Existing and returning employees should undergo refresher induction training at least once a year. The induction training must include environmental awareness training, covering basic topics related to the environment:

- Environmental legislation
- Constitutional right pertaining to the environment
- Waste management hierarchy
- Environmental, social and economic concerns
- Sensitive environmental features and
- Prevention of animal poaching.

5.5 Involvement of the SEO

The SEO should be involved in any decisions that are taken on-site. This should include the approval of the layout plan and activities that are to be undertaken during the construction phase.

LAYOUT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr addresses specific issues relating to the different phases of the project. The impact is identified, and a brief description is given. The phases of the development are then identified below

- Pre-construction
- Construction
- Operation Phase
- Rehabilitation Phase

This EMPr seeks to manage and keep to a minimum the negative impacts of a development and at the same time, enhance the positive and beneficial impacts.

7. SUMMARY OF IMPACTS ASSOCIATED WITH THE PROPOSED ACTIVITIES

Impact	Before mitigation	After mitigation
Non-compliance with the Environmental Management Plan, Permits and Environmental Authorisation. / Relevant Site Documentation	High	Low
Inappropriate design and selection of technology	Medium	Low
Fauna and flora	High	Low
Geology and soils	High	Low
Topography	Medium	Low

Waste Management	Medium	Low
Hazardous chemicals and waste	Medium	Low
Traffic	High	Medium
Stormwater run-off	High	Low
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	High	Medium
Noise Pollution	Low	Low
Land Pollution and degradation	High	Medium
Dust	Medium	Low
Impact on Archaeological and/or Paleontological Resources	High	Low
Employment/job opportunities created	High (Positive)	High (Positive)
Crime, Safety and Security	Medium	Low
Operational Phase		
Fauna and flora	Medium	Low
Geology and soils	Medium	Low
Topography	Low	Low
Waste Management	Low	Low
Hazardous chemicals and waste	Low	Low
Traffic	Low	Low
Stormwater run-off	Medium	Low
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Medium	low
Noise Pollution	Low	Low
Visual Impact	High	Medium
Crime, Safety and Security	Low	Low
Decommissioning/ Demolition Phase		
Soil Contamination	Medium	Low
Dust (Air Quality)	Medium	Low
Geohydrological, hydrological & Geological (Groundwater water disturbance function)	High	Medium
Stormwater Runoff	Medium	Low
Noise	Medium	Low
Visual impact	High	Low
Flora and Fauna	Medium	Low
Waste Management	Medium	Low
Traffic	High	Medium
Impact on Archaeological	High	Low

and/or Paleontological Resources		

1. Failure to comply with legislation & policies will lead to fines and conflicts with local, provincial and national stakeholders
2. Poor design and selection of technology will lead to poor operation, and contamination of groundwater and the surrounding land.
3. Site clearing and the removal of vegetation may lead to increased runoff, erosion and sedimentation.
4. Loss of sensitive habitat, particularly relating to the loss of micro-habitat for both faunal and floral species.
5. The construction of permanent structures (New System 1) on site will result in the loss of vegetation due to foundation excavation.
6. Destruction or alteration of critical habitats can lead to the displacement or local extinction of Species of Conservation concern (SCC).
7. Alteration of topography due to excavations and the need to level the site in order to enable construction.
8. Waste will be generated on site during the construction phase, if not disposed of correctly it will become a nuisance within the area.
9. Hazardous Waste generation during the construction phase will harm the environment, if not controlled adequately.
10. The construction phase is likely to generate additional traffic in terms of construction vehicles and heavy vehicles delivering materials to the site.
11. Contaminated water would runoff the site and eventually into the nearby watercourse (Vaal River).
12. Possible contaminated water entering the river leading to reduced ability to support biodiversity.
13. Disturbances of soils leading to increased alien vegetation proliferation, and in turn to altered riparian habitat. Altered runoff patterns, leading to increased erosion and sedimentation of riparian habitat.
14. Waste and contaminated water can be washed into the stream/water course.
15. Impacts on the watercourse in the vicinity of the project site, changing the quantity and fluctuation properties of the watercourse.
16. During the construction phase, there will be an increase in the ambient noise level on-site and on surrounding properties.
17. Land Pollution due to the improper handling of waste during the construction phase.
18. The remaining concrete mixture can degrade the environment if not properly managed. Cement and liquid concrete are hazardous to the natural environment on account of the high pH of the mixed material, and the chemicals contained therein.
19. The construction activities will increase the potential for dust especially from the clearing of vegetation. During the construction phase of the activity, materials will be moved to and from the project site and this could result in dust not only from the materials, but also from the

construction vehicles which will be operating on site. The effects of dust will be worsened during high wind conditions.

20. Absence of proper surveys can lead to delays, potential damage to valuable heritage resources.
21. The proposed development will create more employment opportunities during the construction phase.
22. Irreversible loss of heritage resources.
23. The demolition phase is likely to generate additional traffic in terms of disposal of the demolished material.
24. Illegal dumping or unsafe disposal of demolition waste.
25. Destruction of natural regrowth fauna in previously demolished areas.
26. Unfinished demolition structure creates an eyesore.
27. Disruption of Rand Water Vereeniging Treatment Works operations due to demolition noise.
28. Sediment or contaminants will be washed into nearby watercourses.
29. Groundwater contamination might occur through seepage of hazardous materials into the soil or through stormwater runoff.
30. The demolition activities will increase the potential for dust, and the effects of dust will be worsened during high wind conditions.
31. Residual oil and chemical seepage into the soil.

8. MITIGATION GUIDELINES

8.1 Environmental Management Programme

Mitigation guidelines are addressed through four phases namely the Pre-construction (Site Establishment) Phase; the Construction Phase (and associated rehabilitation of affected environment) and the Operational Phase (Post-Construction) and Closure Phase.

A set of prescribed impact management outcomes and associated actions have been identified. Holders of Environmental Authorisations (EAs), SEOs, and Contractors are responsible for ensuring that these outcomes and actions are implemented for all projects, as a minimum requirement. This is done to mitigate the impact of any impacts identified for the proposed development.

Before the commencement of construction activities, the Contractor shall be responsible for preparing and submitting Method Statements for all relevant activities. Each Method Statement must be reviewed, approved, and signed off by the key responsible parties, namely Rand Water (the Client), the Environmental Site Officer (ESO), the Contractor, and the Engineer. The Contractor shall implement all activities strictly in accordance with the approved Method Statements, while the ESO shall monitor compliance on site and enforce corrective actions where necessary.

The phases of the development are then identified and addressed below.

Table 6: Environmental Management Programme and Mitigation Measures

IMPACT	MITIGATION ACTION REQUIRED	RESPONSIBLE PERSON	FREQUENCY
PRE-CONSTRUCTION PHASE			
Site Preparation Activities	1. Appoint a Site Environmental Officer 2. The PC must draw up method statements for relevant construction activities. 3. The PM and SEO must approve all of the method statements before they become operational. 4. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barriers where applicable. 5. The PC must ensure compliance with the conditions of the EMPr. 6. The SEO must ensure compliance with the conditions of the EMPr. 7. All no-go areas on site must be properly fenced off / demarcated and signage placed before the onset of construction. 8. Records of compliance / non-compliance with the conditions of the EMPr must be kept on-site and be available on request. A copy of these records must be made available to the provincial department on request throughout the project execution. 9. All unskilled labourers must be drawn from the local market as far as possible, and use must be made of local semiskilled and skilled personnel where possible. 10. All relevant authorisations (e.g. Environmental Authorisation, Water Use Licence/General Authorisation) must be obtained before construction commences.	Rand Water PC PM & SEO PC, SEO & PM	Once Off As required As required Throughout, Monitored monthly Once off
Design and selection	1. Technology that meets approved acceptable technical standards	Engineer	Monitored Monthly

of technology	such as SABS must be selected. 2. All the development designs must adhere to the relevant legislation and/or policies.		
Construction Site Signage	1. Construction site signage and warning signs must be erected where necessary informing the public of the construction area. Safety signage where required must also be erected.	PC	Monitored Daily
Site Access	1. Use of planned access routes or only to be used. No new access routes are to be created without the necessary approvals.		Monitored Monthly
Water Supply	1. Municipal sources only to be used. Use of water from the nearby River (Vaal River) is strictly prohibited. No cleaning of vehicles or abstraction of water from the nearby watercourse may take place.		
Site and vegetation Clearing	1. Areas which are not to be constructed on must not be cleared to reduce erosion risks. 2. The development footprint area must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. 3. Stripped topsoil must be stockpiled for reuse where possible (i.e. for post-construction rehabilitation). 4. The footprint area must be aligned in existing pipelines reserves wherever possible and also be aligned as close to any existing pipeline routes as possible. 5. All removed plant material (i.e., trees) must be disposed of at a suitable waste site. No burning of plant material removed from the construction site is allowed. 6. Alien invasive vegetation is to be removed and controlled on the construction site.	PC / SEO	Monitored Monthly Monitored Bi-Weekly
Dust	1. Damping down of the un-surfaced access roads and site where required must be implemented to reduce dust and nuisance. This		

	can be achieved through regular watering.		
Soil Erosion	1. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.		Monitored Monthly
Worker Safety	1. All the necessary Public Protective Equipment (PPE) must be provided to all workers on site (including but not limited to dust masks, dust goggles, gloves, ear plugs, overalls and boots where applicable).	PC & SEO	Monitored Monthly
Sanitation and Ablution Facilities	1. Temporary chemical sanitation facilities are to be provided to workers at a ratio of 1 toilet to 30 workers (1:30) in terms of Construction Regulation 30(1)(b) of the Occupational Health & Safety (Act no. 85 of 1993). Use of the construction site and nearby area is strictly prohibited.		
Vehicle and Machinery Maintenance	1. All mechanical work, repairs or servicing will be done on-site. This must be undertaken at the relevant workshop. 2. Emergency oil spill kits are required to be kept on-site in the case of any spills of oils or any other hazardous fluid or substance. 3. Refuelling of plant equipment by means of a diesel bowser must be undertaken over a bunded or impermeable surface. Any leakages or spills must be cleaned up immediately, removed and disposed of accordingly in terms of hazardous substances.		Monitored Weekly
Storage of Hazardous or Dangerous Materials	1. No diesel, fuel, hazardous fluids or substances are to be kept on site.		Monitored Monthly
Solid Waste Facilities	1. Waste collection bins must be provided. 2. Solid waste must be disposed of at a registered landfill with sufficient capacity to assimilate waste. 3. Strictly no burning of solid waste on site.		
Excavations	1. Excavations for stormwater must be demarcated with danger tape		

	for workers' safety as well as to prevent further vegetation clearance outside the footprint.		
Identification of archaeological features	1. Training on how to identify and protect archaeological remains that may be discovered during the project	HIA Specialist	Once off
Environmental Awareness training	1. All staff must receive environmental awareness training prior to the commencement of the activities. The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course. 2. Refresher environmental awareness training is available as and when required. 3. All staff must be made aware of the conditions and controls linked to the EA and within the EMPr and made aware of their roles and responsibilities in achieving compliance with the EA and EMPr. 4. The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications and b) Waste Management	SEO & PM	Monitored Weekly
	5. Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities. b) Mitigation measures to be implemented when carrying out specific activities. c) Emergency preparedness and response procedures. d) Emergency procedures. e) Procedures to be followed when working near or within		

	sensitive areas. f) Wastewater management procedures. g) Water usage and conservation. h) Solid waste management procedures. i) Sanitation procedures. j) Fire prevention. k) Disease prevention and l) How to identify and protect archaeological remains that may be discovered during the project.		
	6. A record of all environmental awareness training courses undertaken as part of the EMPr must be available; 7. Educate workers on the dangers of open and/or unattended fires; 8. A staff attendance register of all staff to have received environmental awareness training must be available. 9. Course material must be available and presented in appropriate languages that all staff can understand.		
CONSTRUCTION PHASE			

Development of Construction and Laydown Area	1. The choice of site for the Contractor's laydown area requires the Project Manager and SEO's permission and must consider the location of residents and/or ecologically sensitive areas, including flood zones. A site plan must be submitted to the Project Manager for approval. The size of the Construction laydown area must be minimized 2. Adequate parking must be provided for site staff and visitors. The Contractor must attend to the drainage of the campsite to avoid standing water and/or sheet erosion. 3. Suitable control measures over the Contractor's yard, plant, and material storage to mitigate any visual impact of the construction activity must be implemented. 4. All laydown areas are to be fenced off in such a manner that unlawful entry is prevented, and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction laydown must be controlled by a guard or otherwise monitored, to prevent unlawful access. 5. The Construction laydown area must be set up in accordance with the EMPr. The SEO and Contractor must inspect this site to confirm and note any environmental sensitivity. 6. The construction laydown area layout plan must be provided to the SEO for approval prior to the construction of the laydown area. 7. Site establishment shall take place in an orderly manner and all required amenities shall be installed at the construction laydown areas before the main workforce move onto site. 8. All construction equipment must be stored within the construction laydown area.	PC	Once Off/Monthly

	9. All associated fuelling and re-fuelling must take place within this camp on a bunded or sealed surface such as a concrete slab. 10. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment. 11. The Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 12. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 13. All imported materials (e.g., sand) must be stockpiled within the site boundary / Construction Zone. Sand and excavated material stockpiles should be protected against wind using temporary screens, and from water erosion using tarpaulins where necessary. All stockpiles are to be limited to 3-5m heights to be suitably managed.		

Hazardous chemicals and waste	1. All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed of. Washing the remains into the ground is not acceptable as groundwater contamination could occur. All excess aggregate shall also be removed. With respect to exposed aggregate finishes, the persons undertaking construction shall collect all contaminated water and store it in sumps for disposal at an approved waste site. 2. All major spills must be specified in the contractor emergency response procedure of any materials, chemicals, and fuels or other potentially hazardous or pollutant substances must be cleaned immediately, and the cause of the spill investigated. Preventative measures must be identified and submitted to the SEO for information. Emergency response procedures are to be followed and implemented. 3. The SEO shall further monitor that materials storage facilities are cleaned/maintained on a regular basis, and that leaking containers are disposed of in a manner that allows no spillage onto the bare soil. 4. All harmful materials must be properly stored in a dry, secure environment, with concrete or sealed flooring and a means of preventing unauthorized entry. Furthermore, it must be ensured that material storage facilities are cleaned/ maintained on a regular basis and that leaking containers are disposed of in a manner that allows no spillage onto the bare soil. The management of such storage facilities and means of securing them shall be agreed. 5. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off-site.	PC	Monitored Weekly

	6. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. 7. Safety Data Sheets (SDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 8. All fuel storage areas must be roofed to avoid creation of dirty storm water. 9. Proper storage facilities for the storage of oils, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential storm water events. 10. All necessary approvals with respect to fuel storage and dispensing (if required on site) shall be obtained from the appropriate authorities. 11. Fire prevention facilities must be present at all storage facilities. 12. Storage areas must be secure to minimize the risk of crime. They		

	must also be safe from access by unauthorised persons i.e., children/animals etc. 13. Choice of location for storage areas must consider prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. Storage areas must be designated, demarcated, sign posted and fenced if necessary. 14. All fuel storage areas must be roofed to avoid creation of dirty storm water 15. All necessary approvals with respect to fuel storage and dispensing (if required on site) shall be obtained from the appropriate authorities. 16. Storage areas must be secure to minimize the risk of crime. They must also be safe from access by unauthorised persons i.e., children / animals etc. 17. Choice of location for storage areas must consider prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. Storage areas must be designated, demarcated, sign posted and fenced if necessary. 18. All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed of.		

Traffic	1. Traffic calming measures and appropriate signage to be implemented. Speed limits on all existing roads must always be adhered to. If there is any road closure, then both municipalities must be informed, and necessary arrangements must be made for the use of different routes. Suppose there will be a need for a road closure. 2. Any temporary access roads created for construction will need to follow due environmental processes and attain the necessary environmental approvals before being implemented (if required). 3. Additionally, temporary roads are to be rehabilitated prior to contractors leaving the site. 4. Damping down or proper dust suppression of the un-surfaced access roads must be implemented to reduce dust and nuisance 5. Delivery of equipment must be undertaken with the minimum number of trips to reduce the carbon footprint of these activities 6. Construction routes and required access roads must be clearly defined. 7. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident. 8. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labelled in terms of its potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.	PC	Monthly Monitoring

	9. All equipment moved onto site or off-site is subject to the legal requirements.		

Geology and soils	1. The Contractor must ensure that used oils/lubricants are not disposed of on/near the site or the surrounding environment, and that contractors purchasing these materials understand the liability under which they must operate. 2. Appoint appropriate contractors to remove any residue from spillages from site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of the above-mentioned Regulations and Acts. 3. The Contractor must ensure that use and storage of fuels and chemicals that could potentially leach into the ground be controlled. Adequate spillage containment measures shall be implemented. 4. Construct separate storm water collection areas and interceptors at storage tanks, and other associated potential pollution activities 5. Ensure all storage tanks are designed, bunded and managed to prevent pollution of drains, groundwater and soils. 6. Waste generated from these should then be disposed of at a registered landfill site. 7. Ensure that the mixing/decanting of all chemicals and hazardous materials should take place on a tray or impermeable surface. 8. It is very important that the foundation excavations for the proposed structures be inspected prior to the placing of steel reinforcement or concrete to determine that the structure is being founded upon the correct material, and to detect whether any active layers have been exposed by the foundation excavation. 9. Construction activities should preferably take place during the dry months. All surface run-offs shall be managed in such a way as to	Project Engineer/ PC/ SEO	Monthly Monitoring

	ensure erosion of soil does not occur. All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed. 10. Soils compacted during construction must be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil must be re-spread over landscaped areas. 11. Should a batching plant be required on site, the concrete batching plant must be contained within a bunded area. 12. Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding. 13. Stockpiles must not exceed 2m in height unless otherwise permitted by the Engineer. Similarly, the footprint of the resultant stockpiles is to be minimised to reasonably sized area. 14. Subsoil and overburden in all construction and lay down areas must be stockpiled separately to be returned for backfilling in the correct soil horizon order. 15. The full depth of topsoil must be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This must include the building footprints, working areas and storage areas. 16. Implement effective erosion control measures as identified by the SEO. 17. Rehabilitation of soil and vegetation must be undertaken where excavation has taken place.		

Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	1. Silt fences must be installed to prevent soil carried by stormwater run-off from entering nearby watercourses and causing siltation or pollution . 2. Particular care must be taken to prevent erosion and siltation into watercourses, specifically the nearby watercourse. 3. Earth, stone and rubble is to be properly disposed of or utilised on site so as not to obstruct natural water pathways over the site (i.e., these materials must not be placed in storm water channels, drainage lines or rivers). 4. The long-term recovery of surface water quality and hydrological function must be monitored until stability is achieve. 5. The construction activities be undertaken with comprehensive erosion control measures in place 6. Construction activities should where possible avoid the rainy season. 7. Machinery routes must be minimized. 8. A surface water monitoring program must be implemented, including baseline data collection and post-event sampling to ensure early detection of contaminants. 9. The pipeline route should avoid low-lying or flood-prone zones where possible. 10. Cement mixing shall be done only at specifically selected sites. After construction activities concluded the cement shall be crushed and removed from the site. This mixing area shall then be ripped and rehabilitated. 11. A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements	PC	Monthly Monitoring

Waste	1. Any litter must be cleared immediately. 2. The Contractor shall supply waste collection bins where such is not available, and all solid waste collected shall be disposed of at registered/licensed landfill. 3. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 4. Where considerable quantities of waste are generated, this must be placed in 200 litre bins or skip containers and removed once full. Additionally, the generated waste will need to be disposed of in line with station's waste management procedures. 5. Storm water management must be enforced by monitoring runoff levels. At the start of erosion, accelerated run-off must be diverted away from bare soil. 6. Disturbed surfaces must be kept to a minimum. All surfaces must be rehabilitated. 7. Municipal water (or another source approved by the PM and supported by the SEO) must be used for activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc	SEO & PC	Monthly Monitoring
Floodline Delineation	1. Any new structures must be positioned above the modelled floodline or be flood-proofed using resilient designs.	PC	On-going

	2. Detailed topographic surveys should be conducted to verify elevation data and guide infrastructure placement. 3. The inclusion of stormwater management features and real-time flood warning systems may also assist in reducing long-term flood damage and ensure operational continuity during extreme events.		
Flora & Fauna	1. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 2. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan to prevent erosion during flood and wind events. 3. Species of conservation concern fauna, flora or protected plants must be demarcated prior to the commencement of site clearing. 4. Removal of natural vegetation should only be limited to the footprint of the development. 5. All alien invasive plant species must be removed along the routes. 6. Before any vegetation is removed, a suitably qualified person (i.e., on SEO request or a vegetation specialist) must inspect the study area for any plant/ grass/ tree species that could be transplanted to other similar/ suitable areas. This includes all Red Data or Protected, or rare plants that may be found during the flora site assessment or during construction operations. 7. Workers must be trained on how to deal with fauna species as intentional killing will not be tolerated.	PC/ SEO	As and when needed

	8. Snaring and hunting of fauna by construction workers on or adjacent to the site are strictly prohibited and the Local Municipality shall prosecute offenders. It should also be a condition of employment that any employees/ workers caught poaching will be dismissed. 9. No vegetation is to be used for firewood. 10. Materials must not be delivered to the site prematurely which could result in additional areas being cleared or affected. 11. Vegetation clearing on the site must be kept to a minimum. 12. Vegetation is to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 13. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 14. Contaminated remediation materials must be carefully removed from the area of the spill to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal. 15. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil-absorbent material. Alternatively, any spill must follow the station's dirty water channels. 16. Alien vegetation on the site will need to be controlled. 17. The contractor must be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 18. The use of pesticides and herbicides on the site must be discouraged.		

Dust Control	1. The construction areas must be well-demarcated, and no construction activities must be allowed outside of this demarcated footprint. 2. The PC SEO must monitor weather forecasts relating to periods of expected high winds; dust control methods such as damping down must be undertaken regularly when high winds are forecast for the study area. 3. The liberation of dust into the surrounding environment shall be effectively controlled using, inter alia, water spraying and/or other dust-allaying agents, such as dust nets. 4. Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. 5. No open fires will be allowed to be made on site. 6. Provide a complaint register on-site where complaints can be made. This register should enable effective communication of complaints details of steps taken to resolve complaints. 7. display the contact details of the environmental site office and manager at the site entrance. 8. Construction activities should be limited to 07:00 to 17:00 daily. 9. Ensure an adequate water supply on the site for effective dust particulate matter suppression. 10. Always impose and regulate a speed limit of 30 km/h on the site. 11. Ensure that all vehicles are switched off when stationary- no vehicles should be idling for extended periods. 12. Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable.	PC, SEO	Weekly Monitoring & Monthly Monitoring

Stormwater Runoff	1. Reinforce diversion channels, and proper design of site access routes. 2. Stormwater water runoff must be diverted from active construction zones. 3. All site personnel must adhere to designated no-go zones especially near drainage lines. 4. The construction schedules should prioritise low-rainfall periods. 5. Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures. 6. Implementing a phased construction schedule with progressive rehabilitation of disturbed areas. 7. Proper bunding and impermeable surfaces must be used for all chemical and fuel storage locations. 8. Erosion and sediment control mechanisms such as silt traps, sediment fences, and outlet energy dissipaters should be included along the pipeline route. 9. The establishment of vegetated berms is encouraged to prevent erosion. 10. Areas potentially contaminated by machinery or construction activities must be diverted away from clean environments. 11. Incorporating erosion control measures along sloped and exposed areas. 12. Reinforcing diversion channels, and proper design of site access routes. 13. Stormwater water runoff must be diverted from active construction zones. 14. Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures.	PC	As and when required

Protection of Species of Conservation Concern (SCC)	1. Any Species of Conservation Concern, flora, or protected plants observed on site must be identified and demarcated before clearing activities begin. 2. Construction activities are likely to impact any Species of Conservation Concern or protected plants; therefore, these must be relocated, and a relevant permit must be obtained prior to any relocation activities.	PC/ SEO	As and when required
Alien invasive plant species proliferation	1. The alien plants on site will be removed during construction. 2. Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material). 3. Alien vegetation re-growth must be controlled throughout the entire site during the construction period. 4. Areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien species. 5. Clear alien vegetation along and in the rivers and maintains cleared areas. Maintain green belts/buffers along river corridors and reintroduce indigenous riparian vegetation to act as a buffer between rivers and surrounding areas. 6. No foreign plant matter or soil may be introduced into the area. 7. Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to be established. 8. Rehabilitate or revegetate disturbed areas.	PC	As and when required
Visual Impacts	1. Keep the construction sites and camps neat, clean and organised to portray a tidy appearance.	PC/SEO	Weekly

	2. Remove rubble and other construction rubbish off-site as soon as possible or place it in containers to keep the construction site free from additional unsightly elements.		
Impact on Paleontological and archaeological resources	1. Archaeological surveys must be conducted before construction activities to determine and identify cultural or historically significant sites which can be preserved, relocated or protected avoiding delay issues during excavation.	Registered Palaeontologist	As and when required
Noise	1. The Contractor shall ensure that the machinery and vehicles are well-maintained to reduce noise emissions. 2. The contractor must ensure that noisy equipment are positioned away from sensitive receptor and also implement the use of artificial barriers such as temporary walls and hoardings to reduce noise. 3. The construction phase must aim to adhere to the relevant noise regulations (SANS 10328:2008) and limit noise to within standard working hours and acceptable industrial limits (61 dBA for an industrial noise) to reduce disturbance of dwellings near the development. 4. Truck traffic must be routed away from noise sensitive areas, where possible. Construction activities are to be contained to reasonable hours during the day and early evening (weekdays from 06:00am to 18:00pm). Night-time activities near noise sensitive areas must not be allowed.	PC	Monthly Monitoring
Land pollution, degradation	1. Rubble and general construction waste on site should be removed at regular intervals. 2. All waste must be separated according to type and stored in separate drums, adequately marked according to waste sort. 3. Random littering and discarding of solid waste on the site must be	PC/ SEO	Throughout/ Monthly Monitoring

	prevented. 4. Provision of adequate numbers of litter bins throughout the development; and Implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility. 5. Hazardous waste not to be mixed with general waste and be disposed of at permitted site. 6. Records of all waste being taken off site must be recorded and kept as evidence. 7. Concrete must only be mixed on mortarboards (where small quantities of onsite mixing are required) or other impermeable surfaces, and not directly on the ground. 8. All excess aggregates shall also be removed and suitably disposed of.		
Employment/job opportunities created	1. No mitigation required due to the fact that the proposed development will have a positive impact on the local and regional socio-economic conditions by means of job creation	PC/ Applicant	Throughout
Crime, Safety and Security	1. No construction activities are to be allowed after hours during weekdays, furthermore, overtime work can be done only when approval is given by the relevant Rand Water project team members. 2. Only a limited number of two-night watchmen are to be allowed on the property to ensure the safety of equipment stored on site overnight. 3. The nearest emergency service provider must be identified, and Emergency contact numbers are to be displayed conspicuously at prominent position. 4. The site camp to be fenced off to prohibit unauthorized entry.	PC	Throughout/ Monthly Monitoring

	5. Signs should be erected to warn of construction activities.		
Labour Impacts/ concerns	1. Construction workers to wear necessary Personal Protection Equipment (PPE). 2. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site 3. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine. 4. The use of labour-intensive construction measures must be used where appropriate. 5. All construction staff must have the appropriate PPE. 6. Staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents.	PC	Throughout
Occupational Health and Safety	1. All unskilled labourers must be drawn from the local market i.e., and where possible use must be made of local semiskilled and skilled personnel. 2. Local suppliers to be used where and as far as possible 3. The recruitment process must be equitable and transparent. A concerted effort will be made to guard against nepotism and/or any form of favouritism during the process 4. Record of official complaints by employees to authorities i.e., Labour and Social Security (see Appendix A for complaints record	PC	Throughout/ Monthly Monitoring

	sheet). 5. Safety measures for work procedures must be implemented. 6. First aid kits must be available and accessible on site. 7. A health and safety plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up by the Contractor and approved by the SEO to ensure worker safety. 8. Workers must be thoroughly trained in using potentially dangerous equipment. 9. Contractors must ensure that all equipment is maintained in a safe operating condition. 10. A safety officer must be appointed. 11. A record of health and safety incidents must be kept on site. 12. Any health and safety incidents must be reported to the Project Manager immediately. 13. First aid facilities must be always available on site and a few employees must be trained to carry out first aid procedures. 14. Workers have the right to refuse work in unsafe conditions. 15. A record shall be kept of drugs administered to construction staff at the stations health facilities or precautions taken and the time and dates when this was done. 16. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / residents. 17. Working areas must be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels. 18. Eye wash and emergency shower systems must be provided in areas where there exists the possibility of chemical containment		

	of workers and the need for rapid treatment. 19. Use of electrical safety devices on all final distribution circuits and appropriate testing schedules applied to such safety systems. 20. All sources of hazardous energy or hazardous substances must have written procedures for isolation, identifying how the system, plant or equipment can be made and kept safe. 21. Use of contrast colouring on equipment/machinery including the provision of reflective markings to enhance visibility. 22. Use of moving equipment/machinery equipped with improved operator sight lines. 23. Issuing workers with high visibility clothing. 24. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e., dust masks, ear plugs etc. 25. No person is to enter the site without the necessary PPE. 26. Emergency numbers for local police and fire department etc must be placed in a prominent area 27. All speed limits must be adhered to.		
OPERATIONAL PHASE			
Closure of Construction Site	1. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained, and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the propose any world heritage sites or if any heritage sites are to be destroyed or altered. 2. Should any archaeological sites or graves be uncovered during construction, their existence shall be reported to the necessary	PC	To take place at the end of the Construction Phase/ Inspection at end of Construction Phase

	authorities immediately. 3. Should any archaeological sites be uncovered during construction, their existence shall be reported to the necessary authorities immediately. 4. All structures comprising the construction camp are to be removed from site. 5. All structures comprising the construction camp are to be removed from site. 6. The area that previously housed the construction camp is to be checked for spills of substances such as oil etc., and these shall be cleaned up. 7. All hardened surfaces within the construction camp area must be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the rehabilitation section that follows in this document. 8. Surfaces are to be checked for waste products from activities such as concreting and cleared in a manner approved by the Engineer. 9. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 10. All rubble is to be removed from the site to in line with the stations waste management procedures. Burying of rubble on site is prohibited.		
Soil Erosion	1. The construction campsite is to be cleared of all litter. 2. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless otherwise stipulated by the Engineer. 3. All residual spoil and topsoil stockpiles must be removed to spoil or spread on site.	PC	Inspection at the end of the Construction Phase

	4. All residual building materials must be returned to the depot or removed from the site.		
Visual	1. The site is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept. 2. Limited impact envisaged. 3. The activity will be visually aesthetic.	PC	Continuous
The unearthing of paleontological and archaeological artifacts during excavation	1. Conduct awareness programs to inform workers about the procedures to follow upon discovery of artifacts. Train excavation staff on the importance of preserving artifacts and recognising signs of their presence.	SEO and Registered Palaeontologist	As and when required
Alien invasive species proliferation	1. Compile and implement an Alien Invasive Management Plan. 2. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area and returning it where possible afterwards. 3. Alien invasive species, in particular category 1b species that were identified on site must be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation. 4. All alien seedlings and saplings must be removed as they become evident for the duration of construction.	Rand Water or SACNASP registered ecologist	After construction has been completed
Rehabilitation	1. Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent the pedestrian access that is present along the boundary of the wetland. 2. Ensure that maintenance work does not take place haphazardly,	Rand Water/ SEO	After construction activities have been concluded.

	but according to a fixed plan. 3. Maintenance workers may not trample natural vegetation, and work should be restricted to previously disturbed footprints. In addition, mitigation measures as set out for the construction phase should be adhered to. 4. Address erosion as soon as it becomes evident. 5. The Rehabilitation of natural vegetation and watercourse must proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the relevant fields. 6. Area that are cleared during construction need to be re-vegetated with indigenous vegetation according to a habit rehabilitation plan, to reduce erosion during flood and wind events and to promote the regeneration of functional habitat.		
Decommissioning/ Demolition Phase			
Soil Contamination	1. Excavate and dispose of contaminated soil. 2. Store demolition materials on an impermeable surface.	PC	Throughout/ Monthly Monitoring
Dust (Air Quality)	1. Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. 2. Ensure an adequate water supply on the site for effective dust particulate matter suppression. 3. Always impose and regulate a speed limit of 30 km/h on the site. 4. Ensure that all vehicles are switched off when stationery no vehicles should be idling for extended periods.	PC	Throughout/ Monthly Monitoring
Geohydrological, hydrological &	1. Cover any waste that is likely to wash away or contaminate storm water	PC/ SEO	Throughout/ Monthly Monitoring

Geological (Groundwater water disturbance function)	2. Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed. 3. Provide containment areas for potential pollutants at construction camps, refuelling depots and concrete batching plants. 4. Identify and remove contaminated underground structures. 5. Monitor any seepage during works.		
Stormwater Runoff	1. The stormwater infrastructure must be designed to prevent mixing of clean and dirty water flows. 2. In case of accidental spillages of oils, hydrocarbons, and hazardous waste, emergency response procedures (e.g., spillage control kits) should be implemented to contain and dispose of the spillage immediately. 3. Construction material on site and removed topsoil must be stored in minimally designated areas to reduce contamination, compaction and erosion. 4. Regular monitoring and maintenance of stormwater management infrastructure to ensure efficiency and reduce environmental spillages to the clean environment. 5. Implementing temporary attenuation and runoff routing measures to retain and redirect surface runoff as necessary. 6. Decommissioning should include thorough revegetation and post-rehabilitation audits to confirm surface water recovery and prevent long-term siltation impacts. 7. Clearing and keeping drains and outlets clean. 8. Monitoring should be undertaken monthly during the wet season and after heavy storm events or per the site management schedule.	PC/ SEO	Throughout/ Monthly Monitoring
Noise	1. All plant and construction equipment to be kept in good repair to	PC/ SEO	Throughout/

	ensure that point source noise emissions are reduced. 2. Working outside the regular working hours (weekdays 8am – 5pm) must be approved, and adjacent property owners must be notified.		Monthly Monitoring
Flora and Fauna	1. Do not clear the vegetation outside of the footprint area. 2. Should any animals (e.g. reptiles or mammals) be found during the demolition activities, the SEO or relevant specialist should be contacted immediately to ensure the safe removal of the specimen. 3. Limit footprint of work areas.	PC/ SEO	Throughout/ Monthly Monitoring
Waste Management	1. Demolition rubble/ debris must be disposed of at a registered landfill site 2. Waste skips to be covered with a net to prevent windblown waste. 3. Disposal certificates must be obtained for all waste disposals.	PC/ SEO	Throughout/ Monthly Monitoring
Traffic	1. Manage the increase in traffic in terms of congestion, road surface damage, safety concerns, dust and erosion. 2. Only designated roads should be used for construction vehicles, and 3. Ensure drivers and operators of equipment are familiar with the safety policies and regulations. 4. Traffic calming measures and appropriate signage to be implemented. 5. Avoid transportation of demolished material during peak hours.	PC/ SEO	Throughout/ Monthly Monitoring
Impact on Archaeological and/or Paleontological Resources	1. Permit to demolish at the new system 1 must be obtained from the Provincial Heritage Resources Authority. 2. if any archaeological remains or historical material are exposed during the construction phase, construction at the affected area must cease immediately and the Provincial Heritage Resources Authority must be notified	PC/ SEO	Throughout/ Monthly Monitoring

	3. The area should be demarcated in order to prevent any further work until an investigation has been completed.		

9. CONCLUSION

The environmental, biophysical, and social impacts associated with the project have been assessed across all phases of the project lifecycle. While both positive and negative impacts have been identified, it has been concluded that the negative impacts can be mitigated to acceptable levels through the implementation of the mitigation measures outlined in this Environmental Management Programme (EMPr). This EMPr must be read in conjunction with the Rand Water Generic EMPr, which is attached as Appendix 1, to ensure understanding of all environmental management requirements applicable to the proposed development.

APPENDIX 1

RAND WATER GENERIC EMPR